

Energy Efficiency Business Plan

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EXECUTIVE SUMMARY

SoCalGas Portfolio Snapshot

SoCalGas Customers by the Numbers		2015 Totals	
Customer Count (Number of Accounts)			
Residential		5,540,172	
Commercial		163,078	
Industrial		17,607	
Agricultural		1,969	
Public		13,266	
Portfolio Total		5,736,092	
Program Participation (% of total)			
Portfolio Total		328,959	
Portfolio Percentage		5.73%	
Residential		5.9%	
Commercial		0.9%	
Industrial		0.8%	
Agricultural		1.1%	
Public		1.6%	

		2010-2015	2015
Annual Consumption in Therms			
	Average	Trends	Totals
Residential	2,320,849,648		2,029,009,675
Commercial	685,936,850		698,506,928
Industrial	884,016,261		971,957,436
Agricultural	66,255,176		70,022,417
Public	147,021,357		134,079,258
Portfolio Total	4,104,079,292		3,903,575,714
Energy Savings in Therms			
	Totals	Trends	Totals
Residential	37,677,939		4,401,651
Commercial	15,520,170		3,464,827
Industrial	72,747,402		4,333,459
Agricultural	4,841,338		944,940
Public	8,812,994		1,506,452
C&S	23,332,830		9,093,495
Low Income	14,177,214		1,565,091
Total Portfolio Savings	177,109,885		25,309,916

Notes:

Customer counts and consumption data excludes electric generation end use.

Program Participation is based upon non-consolidated figures (e.g. each rebate application is counted individually).

Sparklines represent 2010-2015 data. Green and Red dots identify low and high points respectively.

Annual portfolio consumption does not include electric generation (Non-PPPS) usage which accounted for 1.371 billion therms in 2015.

SoCalGas 2015 Portfolio Natural Gas Consumption

Sector	Percentage
Residential	52%
Commercial	18%
Industrial	25%
Public	3%
Agricultural	2%

SoCalGas 2015 Energy Efficiency Portfolio Savings

Sector	Percentage
C&S	36%
Residential	17%
Industrial	17%
Commercial	14%
Low Income	6%
Public	6%
Agricultural	4%

A. Portfolio Introduction

For more than 145 years, Southern California Gas Company (SoCalGas) has served Central and Southern California as a responsible and engaged environmental leader, employer, and neighbor. As the nation's largest natural gas distribution utility, SoCalGas delivers clean, safe, and reliable energy to 21.6 million consumers through 5.9 million meters in 12 counties with more than 500 communities, including 220 incorporated cities. The service territory encompasses approximately 20,000 square miles of diverse terrain throughout Central and Southern California, from Visalia to the Mexican border.

SoCalGas will continue to be a leader in delivering innovative customer assistance and energy efficiency programs that are valued by customers, sensitive to the environment, stimulate the economy, and make a difference in the communities served. The SoCalGas core values, with respect to energy efficiency, are to provide cost-effective, customer-centric solutions that will ultimately support the economic viability of all of its customers.

SoCalGas' mission is to offer a suite of energy efficiency (or EE) solutions that incorporates the best available technologies and services valued by customers, contributes to achievement of energy efficiency goals, and that ultimately aligns with the State's energy efficiency policies - including a doubling of energy efficiency in California by 2030.¹ SoCalGas' vision integrates the ideals of innovation, partnership, and customer-centric approaches to influence customers and their energy efficiency decisions.

B. Overview & Approach

California Energy Efficiency Goals

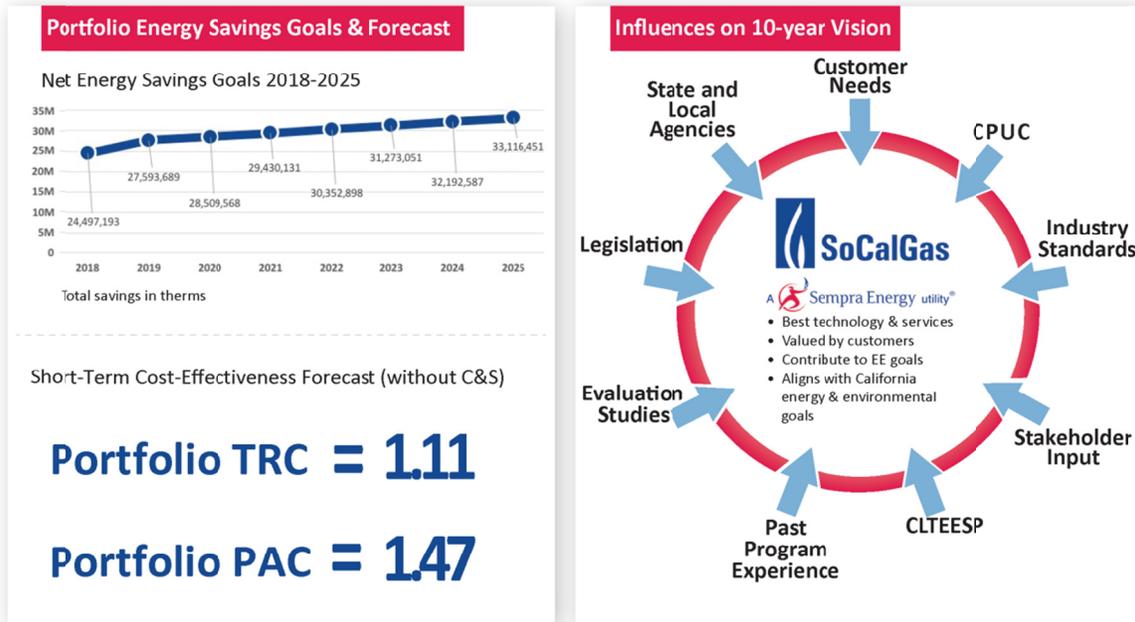
There are several newly adopted legislative bills providing specific guidance for the future of energy efficiency in California. From Senate Bill (SB) 350 to Assembly Bills (AB) 758, 793, and 802, there are new directives that are helping to shape the next generation of energy efficiency program offerings. The primary goal is set by SB 350, which calls for a doubling of the energy efficiency levels in California by 2030. With this goal set, many legislative and regulatory directives provide a pathway for SoCalGas and other Program Administrators to follow that will help shape the next generation of energy efficiency program offerings. The California Public Utilities Commission (Commission or CPUC) has also issued specific guidance to Program Administrators on how to formulate the energy efficiency business plans to achieve the State's new energy efficiency goals. In response, SoCalGas has reshaped existing program strategies and envisions new, innovative approaches to meet these specific directives. These program

¹ See Clean Energy and Pollution Reduction Act of 2015, California Senate Bill 350 (2015). See California Public Utilities Code § 25327(d).

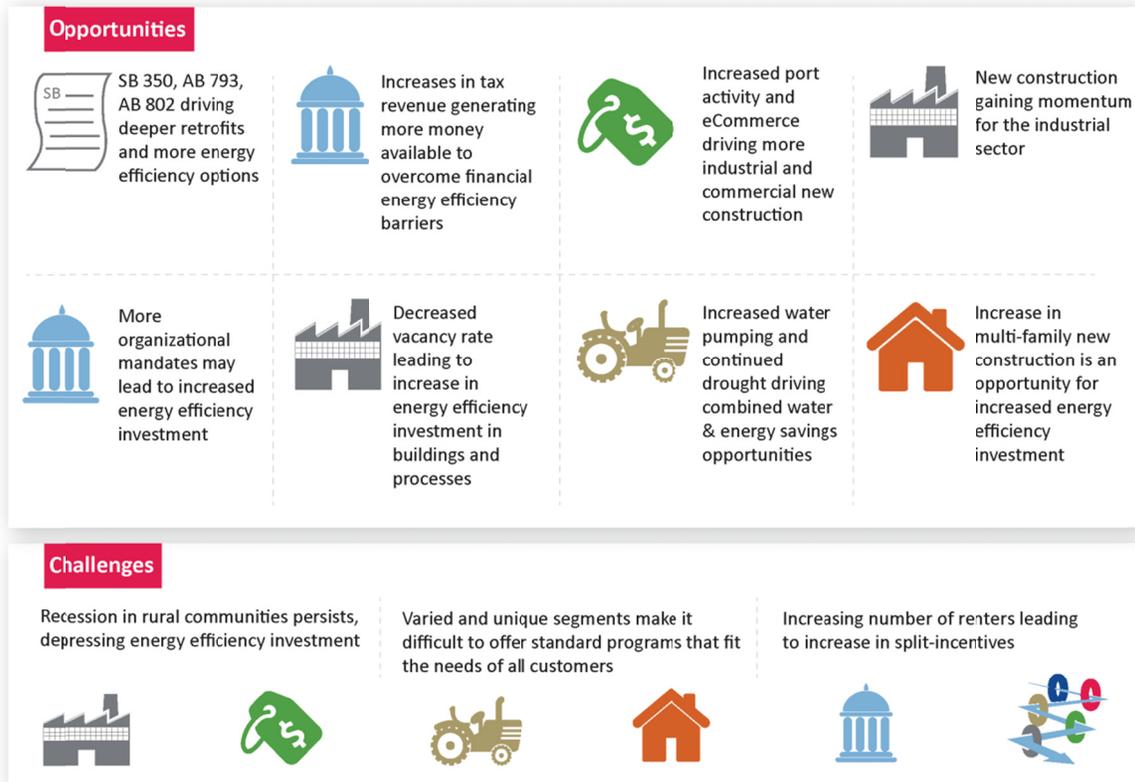
strategies are presented in each of the sector-based chapters within this Business Plan. A summary of the recent legislative and regulatory directives along with SoCalGas' proposed program strategies to address these directives are detailed in Appendices A and E.

Figure 1

Executive Summary - Market Characterization



Key Industry Trends



Key Trends

There are a number of key trends that are influencing how SoCalGas provides energy efficiency programs to its customers. Below are a few key trends affecting various customer sectors in SoCalGas' service territory:

- **Legislative Mandates** – There are several legislative mandates levied upon various customers to promote deeper energy efficiency retrofits, including SB 350, AB 758, AB 793, and AB 802.
- **Increased Tax Revenues For Public Sector** – California has mainly recovered from the 2008 recession and is now experiencing surplus tax revenue. This creates an opportunity to direct funds to assist public customers in reducing the financial barriers to energy efficiency.
- **Recession Continues in Rural Communities** – Recent economic studies project rural communities in California, especially in the San Joaquin Valley, to continue to have sluggish economies in contrast to other areas within the state.
- **Water** – The agricultural sector faces significant issues in water. Water availability is a very large concern for growers because of persistent drought in California; limited water availability is leading to increased water pumping. As various segments use different water management approaches, energy management solutions can play an integral role in the efficient use of energy and water.
- **Agricultural Labor** – The agricultural sector is experiencing a decreased labor supply and, as a result, an increase in labor costs. The increased labor costs severely limit the agricultural customer's ability to invest in more energy-efficient equipment and processes.
- **Public Sector Organizational Mandates** – Various public sector customers have instituted organizational mandates such as the University of California's carbon neutrality initiative to realize net zero greenhouse gases from its buildings by 2025. Achievement of these types of goals relies heavily upon assistance from energy efficiency programs.
- **Port Activity and the Growing Importance of e-Commerce Continue to Drive Improvement in the Inland Empire's Industrial Real Estate Market** – The Inland Empire is one of the strongest and most dynamic industrial markets in the nation, benefiting from logistics advantages, high demand, growing lease rates and a substantial amount of available land for future industrial projects. The outlook for the market continues to be positive beyond 2016. Alone among the southern California five-county region, the Inland Empire's new development and construction is expected to be strong with demand easily absorbing new supply.

- **New Construction Gaining Momentum for the Industrial Sector** – The outlook for industrial development is much more optimistic, especially for warehouse and distribution facilities.
- **Builders Focus on Multi-Family New Construction** – Due to higher construction and property costs, new homebuilders are building multi-family dwellings in areas of southern California historically dominated by the single family segment. For example, Orange County, an area where single-family construction has dominated for decades, is now experiencing higher construction starts in the multi-family segment, closer to metropolitan areas throughout the county.
- **High Levels of Renters in Single Family Segment** – Over the past few years, the single family segment has experienced a growth in rentals of single family dwellings. Los Angeles County has experienced an increase in rental demand in all segments since 2010, causing issues regarding split-incentives to become more prevalent. Due to the high cost to own relative to income, this trend is expected to continue.
- **Low Vacancy Rates in the Industrial Sector** – The vacancy rate of industrial real estate, a key economic indicator, has steadily declined from a high of about 6 percent in 2011 to 1.2 percent in Q1 2016, and Los Angeles exhibits the lowest vacancy rates of the ten largest markets across the United States. This creates an opportunity for more industrial customers to invest in efficiency improvements for their buildings and processes.

Comparison to Past Cycles

In past program cycles, program portfolios were offered based on specific programs and/or technologies. The new sectorial business plan approach is based on customer needs and expectations, within like customer groups, proactively offered in a deliberate and efficient manner in order to significantly increase the adoption of customer energy efficiency solutions among all customer types within the sector. The Business Plan includes a combination of proven and newer program strategies based on past successes coupled with new approaches to efficiently identify customers with the greatest energy efficiency opportunities using data analytic advancements enabled by SoCalGas' newly implemented Advanced Metering Infrastructure (AMI).² Taking advantage of new AMI technology, customer energy usage habits can now be examined and categorized through efficient and continuous data analytics, to identify how customers can permanently incorporate energy efficiency into their homes and businesses. No longer will energy efficiency programs be passively offered when customers decide to participate; now customers will actively be encouraged to modify energy behaviors

² The Advanced Meter Infrastructure project is currently scheduled to complete by the end of 2017; however, there are a few areas of the SoCalGas network build that are at risk of not being constructed in time due to challenges imposed by the local jurisdictions of some cities and counties (~2% of the network is at risk). The inability to deploy the necessary infrastructure in these jurisdictions will likely negatively impact energy efficiency opportunities for customers in these areas.

and to invest in the right energy efficiency upgrades at the right time, based on a coordinated set of program offerings, to improve the overall efficiency of their energy usage.

In addition to proven, existing program strategies, SoCalGas will incorporate new program strategies and corresponding program tactics to arrive at a complete energy efficiency solution set for the customer. The proven and new program strategies are further detailed in the Program Intervention Strategies section of each sector chapter. These offerings will be introduced to the customers over time and may be withdrawn and retooled in order to adapt to market changes and responses.

The evaluation, measurement, and verification (EM&V) process includes sector-related market studies, load impact, programs, process evaluations, and potential studies on energy efficiency programs and market segments from previous program years. The sector business plans incorporate, with and without modifications, various recommendations that have not previously been incorporated into existing energy efficiency programs. A list of referenced EM&V studies applied in the business planning process is shown in Appendix B.

C. Vision and Goals

The goal of the energy efficiency Business Plan is to set the tone and direction for the next generation of SoCalGas energy efficiency program offerings. It is vitally important that it is clear, concise, and connected to California's overall energy efficiency vision. This Business Plan relies, in part, on the current California Long-Term Energy Efficiency Strategic Plan as a touchstone to help shape the vision. There are a number of other influences that help shape the energy efficiency Business Plan vision including: Commission policies, legislative directives, evaluation studies, industry trends, customer needs, stakeholder input, and program experience.

Vision:

To offer a suite of solutions that incorporates the best available technologies and services valued by our customers, contributes to achievement of energy efficiency goals, and that ultimately aligns with the State's overarching energy and environmental goals.

Key energy efficiency portfolio goals:

- Facilitate, sustain, and transform the long-term delivery and adoption of energy-efficient products and services;
- Cultivate, promote, and sustain lasting energy-efficient operations and practices; and
- Meet customers' energy efficiency adoption preferences through a range of simplified offerings that address customer energy efficiency needs.

D. Strategies and Approaches

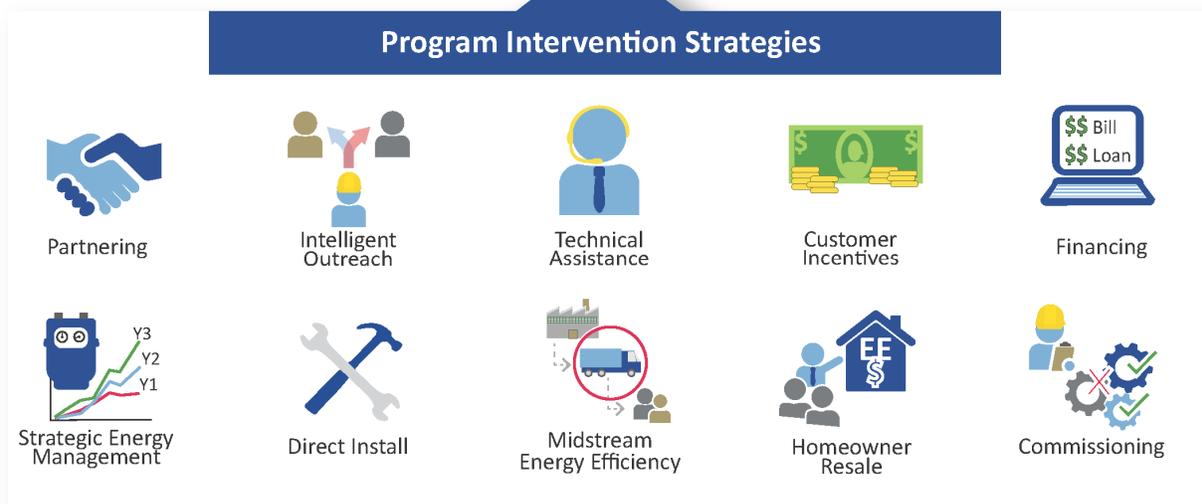
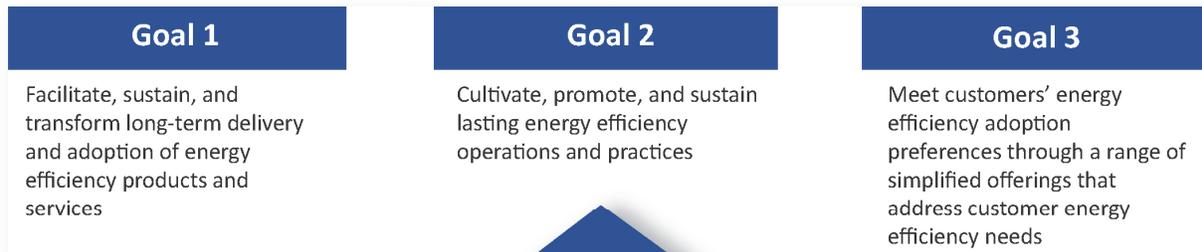
Figure 2

Program Intervention Strategies will be deployed in each sector to achieve sector goals, contribute to portfolio goals, and help realize the SoCalGas 10-year Portfolio Vision

10-year Portfolio Vision

To offer a suite of solutions that incorporates the best available technologies and services valued by our customers, contributes to achievement of energy efficiency goals, and that ultimately aligns with the State’s overarching energy and environmental goals

Energy Efficiency Portfolio Goals



Overview of Intervention Strategies

Since the 1990s, California has embraced the notion that energy efficiency program intervention strategies, coupled with government intervention (e.g., public policies and laws), can permanently reduce market barriers so customers can achieve higher levels of energy efficiency. In a transformed market, customers will naturally adopt higher levels of energy efficiency without the need for such program and government interventions. All programs, resource and non-resource, contribute in some way to reducing market barriers in order to achieve the desired, long-lasting market effects.³ The current Commission market transformation definition is stated below:

“Market transformation is long-lasting, sustainable changes in the structure or functioning of a market achieved by reducing barriers to the adoption of energy efficiency measures to the point where continuation of the same publicly-funded intervention is no longer appropriate in that specific market. Market transformation includes promoting one set of efficient technologies, processes or building design approaches until they are adopted into codes and standards (or otherwise substantially adopted by the market), while also moving forward to bring the next generation of even more efficient technologies, processes or design solutions to the market.”⁴

To identify the appropriate program strategies, the Business Plan identifies sector-specific problem statements with corresponding resolutions or desired outcomes. Sector-specific program strategies are presented that will reduce current market barriers. Program delivery will rely on a combination of third-party delivered statewide and local programs. These programs will be supplemented with SoCalGas support that will enable third-party program implementers and customers to work together. A summary list of the various programs strategies is presented below. Details about each intervention strategy are presented in each sector chapter of this Business Plan.

³ “Market transformation is not a label that uniquely identifies certain energy efficiency program designs to the exclusion of others. It is instead an objective that all energy-efficiency programs have at least a theoretical potential to achieve to varying degrees.” Eto, J., Pahl, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Ernest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

⁴ California Public Utilities Commission. (2009, September 24). D.09-09-047, pp. 88-89.

Table 1 – Program Intervention Strategies

Strategy & Tactics	Residential	Commercial	Industrial	Agricultural	Public
Partnering					
• Utility Partners	Existing	Existing	New	New	Existing
• Industry Partners	Existing	Existing	New	New	New
• Customer Partners	Existing	New	New	-	Existing
• Retailer Partners	Existing	-	-	-	-
Intelligent Outreach					
• Data Analytics	New	New	New	New	New
• Virtual Energy Audits	Existing	Existing	New	New	New
• Data Sharing	Existing	Existing	Existing	Existing	Existing
• Facility Energy Audits	Existing	Existing	Existing	Existing	Existing
• Energy Management Technology	Existing	Existing	New	New	New
• Industry EE Best Practices	New	New	New	New	Existing
• Disadvantaged Community/ Small Customer Outreach	Existing	Existing	New	New	New
• Single Point-of-Contact	Existing	-	-	-	-
Technical Assistance					
• Technical Training	-	Existing	Existing	Existing	Existing
• Technical Support	-	Existing	Existing	Existing	Existing
Strategic Energy Management					
• Pay-for-Performance	-	New	New	New	New
• Modified Savings Analysis	-	New	New	New	New
• Use of AMI Data	-	New	New	New	New
• Cross-Promotion	-	New	New	New	New
• Meter Large Projects	-	New	New	New	New
Customer Incentives					
• Pay-for-Performance	New	New	New	New	New
• Customized Incentives	Existing	Existing	Existing	Existing	Existing
• Deemed Incentives	Existing	Existing	Existing	Existing	Existing
• Bundled Measures	New	New	New	New	New
• Whole Building	Existing	Existing	Existing	Existing	Existing
• Retro-Commissioning	-	Existing	-	-	Existing
• Monitoring-Based Commissioning	-	Existing	-	-	Existing
• Contractor Incentives	New	-	-	-	-
Direct Install (DI)					
• Standard DI	Existing	Existing	New	New	New
• Comprehensive DI	New	New	New	New	New

Table 1 – Program Intervention Strategies					
Strategy & Tactics	Residential	Commercial	Industrial	Agricultural	Public
Midstream Energy Efficiency					
• Midstream Incentives	Existing	Existing	Existing	New	-
• Distributor Training	Existing	New	New	New	-
Financing					
• On-Bill Financing	-	Existing	Existing	Existing	Existing
• Credit Enhancement	Existing	Existing	Existing	Existing	Existing
• On-Bill Repayment	-	New	New	New	New
• Public Funding Assistance	-	-	-	-	New
• Loan Awareness	Existing	Existing	-	-	-
Homeowner Resale					
• Energy Performance Rating	New	-	-	-	-
• Sales Training & Awareness	New	-	-	-	-
• Home Certification	New	-	-	-	-
• Benchmarking	New	-	-	-	-

Key Challenges

There are several market barriers present within each sector that inhibit customers from achieving higher levels of energy efficiency. Market barriers are a byproduct of market sector characteristics and customer behavior within a specific sector. Program strategies are temporary interventions introduced into the market sector to reduce these market barriers to create real, lasting market changes. To realize the desired sector outcomes, several coordinated and integrated program intervention strategies will be deployed throughout the various market channels to increase customer energy efficiency adoption levels. This will support the vision of increased adoption of energy efficiency products and behavioral practices.

In certain instances, a customer may behave in a manner similar to those in other sectors. For example, a commercial retail customer may also act as an industrial processing plant in a shared facility. In those instances, intervention strategies from various sectors will be offered to these multi-dimensional customers in a coordinated offering.

Due to the limited natural gas usage within many of the customer segments and the need to simplify customer engagement in the delivery of demand-side management programs, SoCalGas proposes to coordinate program delivery with local utilities (electric and water), where practicable. This will allow for simplified customer engagement that will empower the customer to implement a complete energy and water efficiency plan.

Intervention Strategies

The Business Plan chapters provide a comprehensive list of program intervention strategies directed at SoCalGas’ customer sectors. The strategies are intended to overcome the various market barriers identified in this Business Plan to achieve permanent market effects. These strategies will be deployed in a cohesive manner at various stages during the execution of the Business Plan.

Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the Business Plan proposes a set of key metrics for each sector and cross-cutting program activity. Each sector chapter identifies key milestones in the advancement towards a set of desired sector outcomes. In most cases, the desired outcome is expected well beyond the near and mid-term implementation horizon. To properly monitor progress towards the desired outcome over time, the metrics will rely on data currently collected, tracked, and verified as part of the program administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking for both the program portfolio manager and the Commission while keeping the monitoring costs to reasonable levels. Sector metrics and targets may change over the ten-year rolling portfolio cycle, as SoCalGas and its implementers deliver programs and learn more about market characteristics and responsiveness to intervention strategies.

E. Budgets and Cost-Effectiveness

Portfolio Budget

SoCalGas' Business Plan budget provides an overview of the expected levels of annual spending for 2018-2025, along with 2016 and 2017 approved budgets for reference. As authorized in Commission Decision (D.) 15-10-028, SoCalGas' Business Plan budget represents its best estimates of spending for the life of the Business Plan.⁵ The intent is to allow Program Administrators flexibility to adjust spending during the life of the Business Plan.⁶ SoCalGas will file a Tier 2 Advice Letter (AL) annually, containing a detailed budget for the next calendar year's energy efficiency portfolio.⁷ The Tier 2 AL budgets will include detailed budgets for cost recovery, transfer, and contracting purposes.⁸

⁵ "It [the budget] will establish a "ballpark" figure for spending for the life of the business plan."

California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 55.

⁶ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 56.

⁷ California Public Utilities Commission. (2015, October 28). D.15-10-028, OP 4.

⁸ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 56.

Table 2 – Portfolio Budget Forecast (\$000s)

Sector	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Residential	\$29,688	\$29,613	\$29,613	\$29,128	\$29,738	\$30,354	\$30,978	\$31,610	\$32,249	\$32,896
Commercial	\$12,633	\$13,438	\$13,438	\$15,440	\$16,121	\$16,808	\$17,501	\$18,201	\$18,907	\$19,620
Industrial	\$12,976	\$12,373	\$12,373	\$12,534	\$12,700	\$12,871	\$13,046	\$13,225	\$13,410	\$13,599
Agricultural	\$5,296	\$3,618	\$3,618	\$4,471	\$4,539	\$4,608	\$4,679	\$4,751	\$4,825	\$4,901
Public	\$6,675	\$8,377	\$8,377	\$8,706	\$8,988	\$9,273	\$9,561	\$9,854	\$10,150	\$10,450
Cross-cutting: ET	\$1,823	\$1,748	\$1,748	\$1,789	\$1,831	\$1,874	\$1,919	\$1,964	\$2,010	\$2,058
Cross-cutting: C&S	\$843	\$843	\$843	\$862	\$881	\$902	\$922	\$943	\$965	\$987
Cross-cutting: Finance	\$2,264	\$2,264	\$2,264	\$2,316	\$2,369	\$2,423	\$2,478	\$2,535	\$2,593	\$2,652
Cross-cutting: WE&T	\$3,819	\$3,744	\$3,744	\$3,839	\$3,937	\$4,037	\$4,140	\$4,246	\$4,354	\$4,466
Market Sector Subtotal	\$76,018	\$76,018	\$76,018	\$79,085	\$81,104	\$83,150	\$85,224	\$87,329	\$89,463	\$91,629
SoCal REN	\$4,337	\$4,337	\$4,337	\$4,337	\$4,337	\$4,337	\$4,337	\$4,337	\$4,337	\$4,337
EM&V	\$3,348	\$3,348	\$3,348	\$3,476	\$3,560	\$3,645	\$3,732	\$3,819	\$3,908	\$3,999
SoCalGas Total	\$83,703	\$83,703	\$83,703	\$86,898	\$89,001	\$91,132	\$93,293	\$95,485	\$97,708	\$99,965
<i>Other EE-Related Budgets</i>										
Statewide ME&O*	\$2,437	\$1,830	\$2,105	\$1,578	\$-	\$-	\$-	\$-	\$-	\$-
New Finance Offerings**	\$-	\$5,134	\$1,798	\$1,749	\$1,701	\$-	\$-	\$-	\$-	\$-
Grand Total	\$86,140	\$90,667	\$87,606	\$90,225	\$90,702	\$91,132	\$93,293	\$95,485	\$97,708	\$99,965

*The SW ME&O budget is funded outside of the Business Plan through D.16-09-020 that authorized the program budget from Oct 2016 to Sep 2019. The annual budget for 2016 is based on D.15-08-033 and D.16-09-020.

**New Finance Offerings budgets were authorized in D.12-11-015, D.13-09-044, and extended in D.15-06-008. The pilot programs are funded outside of the Business Plan and budgets allocated based on anticipated spend through 2020.

SoCalGas' energy efficiency budget provided in the Business Plan, including the administrative component, was developed to reflect labor and non-labor costs associated with managing and delivering the energy efficiency portfolio. The administrative budget includes scope of work associated with, but not limited to, portfolio management, contract oversight, regulatory reporting, internal management controls, and overhead costs. These administrative costs align with the allowable cost definition provided by the Commission in D.09-09-047, D.12-11-015, and the Energy Efficiency Policy Manual Version 5.

Portfolio Savings & Cost-Effectiveness

SoCalGas will administer and oversee implementation of a vast portfolio that will produce therm savings spanning over all sectors as specified in this Business Plan. The goal of doubling energy efficiency savings by 2030 will be at the forefront of all new and existing resource programs to help achieve this goal.

The energy savings presented in the following tables represent several key changes from previous program cycles:

- Therm savings are presented as gross and net savings as the Commission reverts back to net energy efficiency goals; and,
- Cumulative goals and results will be reinstated for each IOU.

Additionally, SoCalGas anticipates that the Business Plan forecast will need to be updated as new Potential and Goals studies are released by the Commission. The tables below are based on SoCalGas’ forecasts, which leverage the 2015 Potential and Goals Study and AB 802 Technical Analysis. The introduction of AB 802 and SB 350 into California will allow opportunities to pursue untapped and stranded energy efficiency potential for customers.

Table 3 – Portfolio Gross Annual Energy Savings Forecast⁹ (MM Therms)

Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Residential	2.90	3.82	4.73	4.73	4.98	5.24	5.49	5.74	5.99	6.25
Commercial	6.00	6.04	5.13	7.11	7.60	8.10	8.60	9.10	9.60	10.10
Industrial	8.39	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19	10.19
Agricultural	2.06	1.87	1.87	2.78	2.80	2.82	2.84	2.86	2.88	2.89
Public	-*	-*	2.58	2.78	2.93	3.08	3.23	3.39	3.53	3.69
Market Sector Subtotal	19.35	21.92	24.50	27.59	28.50	29.43	30.35	31.28	32.19	33.12
Cross-cutting: C&S***	17.31	13.87	12.70	12.60	12.20	10.90	10.30	9.60	9.10	9.10
Total	36.66	35.79	37.20	40.19	40.70	40.33	40.65	40.88	41.29	42.22

* Public sector was included in the Commercial sector in 2016 and 2017.

**2016 and 2017 are shown for historical purposes. The energy savings reflect gross savings from SoCalGas compliance filings.

***Codes and Standards savings are reported as net savings values.

Table 4 – Portfolio Net Annual Energy Savings Forecast¹⁰ (MM Therms)

Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Residential	1.75	2.29	2.80	2.79	2.93	3.07	3.22	3.36	3.50	3.64
Commercial	2.76	3.41	2.81	3.89	4.16	4.44	4.71	4.98	5.26	5.53
Industrial	4.26	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Agricultural	1.07	0.98	0.98	1.46	1.47	1.48	1.49	1.50	1.51	1.52
Public	-*	-*	1.41	1.52	1.61	1.69	1.77	1.85	1.93	2.02
Market Sector Subtotal	9.84	11.83	13.14	14.81	15.31	15.82	16.33	16.84	17.34	17.85
Cross-cutting: C&S	17.31	13.87	12.70	12.60	12.20	10.90	10.30	9.60	9.10	9.10
Total	27.15	25.70	25.84	27.41	27.51	26.72	26.63	26.44	26.44	26.95

* Public sector was included in the Commercial sector in 2016 and 2017.

**2016 and 2017 are shown for historical purposes. The energy savings reflect net savings from SoCalGas compliance filings.

⁹ Gross Total Annual MM Therm goals set in D.15-10-028, and will be adjusted to net goals per D.16-08-019.

¹⁰ *Id.*

Sector	2018	2019	2020	2021	2022	2023	2024	2025
Residential	4.73	9.47	14.45	19.76	25.32	31.05	37.03	43.26
Commercial	5.13	12.23	19.83	27.94	36.54	45.48	54.86	64.66
Industrial	10.19	20.38	30.57	40.76	50.95	61.14	69.55	77.68
Agricultural	1.87	4.65	7.45	10.27	13.10	15.52	17.73	19.94
Public	2.58	5.36	8.30	11.38	14.62	17.92	21.37	24.93
Total	24.50	52.09	80.60	110.10	140.52	171.11	200.53	230.47

Sector	2018	2019	2020	2021	2022	2023	2024	2025
Residential	2.80	5.59	8.52	11.63	14.89	18.24	21.73	25.37
Commercial	2.81	6.70	10.86	15.29	20.00	24.87	29.98	35.31
Industrial	5.15	10.30	15.45	20.60	25.75	30.90	35.15	39.28
Agricultural	0.98	2.43	3.90	5.38	6.86	8.09	9.20	10.31
Public	1.41	2.94	4.54	6.23	8.00	9.80	11.67	13.61
Total	13.14	27.95	43.26	59.13	75.50	91.90	107.74	123.87

SoCalGas presents the expected emissions reductions associated with the program savings forecasted for program years 2018 – 2020 in its Business Plan.

Gross Emissions Avoided	CO ₂ (tons)	NO _x (lbs)	PM-10 (lbs)
Annual	1,000,385	1,585,672	1,156
Lifecycle	13,527,902	21,456,499	15,240

*Includes codes and standards

Near Term (2018-2020) Cost-Effectiveness

Two key aspects of SoCalGas' portfolio are that (1) projects tend to have long lead times due to the complexities and higher costs of gas energy efficiency measures; and (2), the portfolio relies heavily on the industrial and agricultural sector to maintain cost-effectiveness and will continue to do so over the next ten years. The cost-effectiveness of the industrial and agricultural sectors allows SoCalGas to offer resource and non-resource programs to all customer segments.

As the transition to more third-party implementers takes effect from 2018-2020, SoCalGas expects cost-effectiveness to remain relatively unchanged throughout the near-term period, as

existing programs are either revised or phased out (see below for more details on third-party transition). This period will allow the piloting of new and innovative programs where successful and cost-effective ones will become the backbone of the portfolio. However, during the near-term period new and existing strategies such as the residential behavioral, commercial, and public direct install, commercial and public commissioning, normalized meter energy consumption, and codes and standards advocacy programs will have positive impacts to maintain cost-effectiveness.

Table 8 illustrates SoCalGas' 2018-2020 near term portfolio both with and without codes and standards. The Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests take into account the 2017 updated avoided costs as approved by the Commission in D.16-06-007. In addition, the public sector has been broken out and will be presented on its own moving forward. SoCalGas will learn from the public sector in the near-term to evolve and run more cost-effective programs in the mid and long-term.

Sector	TRC	PAC
Residential	0.75	1.00
Commercial	1.28	1.81
Industrial	2.54	4.25
Agricultural	1.97	3.30
Public	1.00	1.30
Codes & Standards	1.90	291.65
Total without C&S	1.11	1.47
Total with C&S	1.54	4.30

Mid and Long-Term Cost-Effectiveness

It will take some time for new third-party programs to ramp-up and mature for the portfolio to see the impacts on cost-effectiveness. Successful programs will be continued in the mid and long-term periods and ineffective programs will be retired and/or re-solicited. As the program administrator, SoCalGas will continually monitor and evaluate all strategies and programs to maintain a cost-effective portfolio.

SoCalGas anticipates that the following programs will contribute heavily to SoCalGas' portfolio during the mid and long-term periods, including:

- Residential behavior programs;
- Residential, commercial, and public direct install and bundling programs;
- Midstream retailer and contractor programs;
- Industrial custom and normalized meter energy consumption incentives; and,
- Industrial strategic energy management.

Additionally, SoCalGas' mid and long-term portfolio will strive to continue to be cost-effective while also taking into account several key changes that are being contemplated by the Commission. Some of these changes (i.e., non-energy benefits) can have major impacts on the portfolio and include:

- Alignment of cost-effectiveness framework with California's environmental goals;
- Introduction of non-energy benefits (NEBs) as well as other costs and benefits; and,
- Inclusion of market and reliability impacts based on reliability and resiliency of the grid.¹¹

SoCalGas will continue to be at the forefront of keeping natural gas energy efficiency cost-effective while also collaborating with stakeholders to ensure that cost-effectiveness tests continue to be relevant and impactful.

F. Statewide Programs

The Commission, in D.16-08-019, created significant changes to statewide program administration and third-party program offerings in energy efficiency portfolios. This decision directed program administrators to include in the business plans a proposal for transitioning the majority of programs to be outsourced, with a minimum of 60 percent of the budgeted portfolio transitioned by the end of 2020. In addition to changes to the third-party requirements, the Commission modified the energy efficiency program administrative structure by requiring that all upstream and midstream programs be delivered uniformly throughout the four large Investor-Owned Utilities' (IOUs) service territories,¹² and overseen by a single Lead Program Administrator, determined by consensus and put forth in the business plans. Appendix A to the Executive Summary describes the joint IOU approach to Statewide Administration.

The Commission requires the Lead Program Administrator to provide the objectives, metrics, and solicitation strategy for each statewide program. SoCalGas will be the Lead Program Administrator for the Residential New Construction Program, the Gas Emerging Technologies Program, the Foodservice Point-of-Sale (POS) Rebate Program, and the Midstream Water Heating Program. The full list of statewide programs and Lead Program Administrators is in Table 9 below.

¹¹ Integrated Distributed Energy Resources Working Group. (2016, May 31). *Final Report of the IDER Working Group filed by Southern California Edison Company (U 338 E), Pacific Gas and Electric Company (U 39 M), San Diego Gas & Electric (U 902 E), and Southern California Gas Company (U 904-G)*. Retrieved from <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M166/K248/166248840.PDF>

¹² The four IOUs are Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas and Electric (SDG&E), and SoCalGas.

Table 9 - Statewide Programs	
Statewide Program	Lead Program Administrator
Plug Load & Appliance – POS	SDG&E
Residential New Construction	SoCalGas
Heating, Ventilation, and Air Conditioning (HVAC) Upstream	SDG&E
HVAC Midstream	SDG&E
Savings by Design	SCE
Lighting – Primary	SCE
Lighting – Innovation	SCE
Lighting – Market Transformation	SCE
Financing – New Offerings	PG&E
Codes & Standards – Building Codes Advocacy	PG&E
Codes & Standards – Appliance Standards Advocacy	PG&E
Emerging Technologies – Gas	SoCalGas
Emerging Technologies – Electric	SCE
Workforce Education & Training (WE&T) - K-12 Connections	PG&E
Institutional Partnerships – California Community Colleges	SCE
Institutional Partnerships – University of California/California State University	SCE
Institutional Partnerships – State of California	PG&E
Institutional Partnerships – California Department of Corrections and Rehabilitation ¹³	PG&E
Marketing Education & Outreach – Energy Upgrade California Campaign	PG&E
Foodservice POS Rebate ¹⁴	SoCalGas
Midstream Water Heating	SoCalGas

The Commission also requires that Program Administrators propose in their Business Plan filings at least four downstream programs to be piloted on a statewide basis and include a Lead

¹³ Ordering Paragraph 8 of D.16-08-019 names the State of California and the California Department of Corrections and Rehabilitation as two separate sub-programs, in keeping with past filings. Moving into the new statewide framework, the IOUs intend to merge the two sub-programs into a single program that serves all State agencies, departments, and commissions.

¹⁴ Ordering Paragraph 8 of D.16-08-019 requires that all upstream and midstream programs in the existing portfolio, including but not limited to those listed in the decision, plus new programs proposed in business plans that are market transformation, upstream, or midstream, shall be delivered statewide. SoCalGas currently has two midstream programs: Foodservice POS Rebate and Midstream Water Heating, which SoCalGas intends to continue to offer as part of the rolling portfolio. In this new paradigm, these programs will be delivered statewide, led by SoCalGas.

Administrator and other program details.¹⁵ The four downstream programs to pilot on a statewide basis are listed in Table 10. While SoCalGas will not lead any of the four downstream programs proposed in this Business Plan, objectives, metrics, and solicitation strategies for each of these downstream statewide pilots will be provided in the Lead Program Administrator’s Business Plan.

Table 10 - Downstream Programs to Pilot Statewide	
Downstream Pilot	Lead Program Administrator
WE&T – Career & Workforce Readiness	PG&E
HVAC – Quality Installation/Quality Maintenance	SDG&E
Indoor Agriculture	PG&E
Water/Wastewater Pumping	SCE

Residential New Construction Program

Program Objectives

The Residential New Construction program seeks to deliver a statewide program that promotes the development of energy-efficient communities in support of California’s goal to achieve Zero Net Energy (ZNE) single family and multi-family home new construction. The program will enable customer choice while encouraging the design, building, and real estate communities to incorporate energy efficiency into sustainable design and construction, green building practices, real estate transactions and emerging technologies.

The new Residential New Construction program will rely on one or more third-party implementers to support specific functions within the overall statewide program. The following is a list of objectives for this statewide program:

- Promote energy efficient home and building design and construction to the home design and builder communities.
- Create a new home rating system to promote energy efficient homes.
- Promote the installation of efficient electric and gas appliances and renewable technologies and supply sources (photovoltaics, renewable gas, etc.) into residential new construction.
- Hold building design and other educational workshops to promote the design, construction, and purchase of ZNE homes.
- Coordinate with key industry partners in the design, promotion, and acceptance of ZNE residential community concepts.

¹⁵ California Public Utilities Commission. (2016, August 25). D.16-08-019, OP 9.

Solicitation Strategy

Program solicitations will call upon the innovative proposals of the energy efficiency service provider community. The Residential New Construction program will be proposed, designed, and implemented by at least one third-party implementer. There could be multiple implementers due to the regional footprint of home builders in the market. The scope of the request for proposal for this program will be guided by SoCalGas' Business Plan including the sector goals, sector-level strategies, and program intervention strategies. SoCalGas will collaborate with selected third-party implementers on program design and delivery to increase the likelihood of program success and integration with other energy efficiency programs within the portfolio. The implementation contract type will likely be a pay-for-performance approach for key contract activities (e.g., energy savings delivered).

Transition Timeline

After approval of the Business Plan, the Residential New Construction program will conduct a competitive program solicitation, seeking program designs to deliver a program on a statewide basis. SoCalGas expects this phase to commence in 2018 to allow for selections, contract negotiations, and execution prior to the start of 2019.

Metrics

The following metrics are illustrative and will be finalized with the selected implementer(s):

- *Number of single family homes that exceed energy codes by more than 5%.*
- *Number of multi-family homes that exceed energy codes by more than 5%.*
- *Support the implementation of a single and multi-family home rating system by 2025 in California.*
- *Conduct single and multi-family home design workshops that support ZNE home and community design.*

Gas Emerging Technologies Program

Program Objectives

The Gas Emerging Technologies Program (ETP) will address three overarching priorities:

- Use Technology Priority Maps (TPM) to ensure high priority areas are met. To address the need to ensure all high priority areas are addressed, the Gas ETP will use collaboratively designed TPMs to drive the emerging technologies research agenda during the time period covered in this business plan. Gas ETP will use existing technology roadmapping efforts whenever possible to create TPMs to align with California policy and customer needs. These TPMs will seek to identify good candidates for all utility programs including market transformation initiatives.

- Support a pipeline with a consistent stream of new and diverse technologies. Gas ETP projects will be designed to encourage manufacturers and technology developers to create technologies that help Program Administrators achieve their energy efficiency goals.
- Find emerging gas technologies with energy savings opportunities for customers in all sectors. This is accomplished in part by early vetting of technologies and solutions that are candidates for inclusion into an energy efficiency portfolio.

Solicitation Strategy

Gas ETP will seek multiple program implementers to capture the most innovative, effective program designs while promoting a healthy and vibrant energy efficiency ecosystem where multiple implementers, both large and small, can be part of the ETP future. Gas ETP will look for program designs that support the stated objectives and strategies.

- It is envisioned that a solicitation strategy will be linked to the TPMs that will be undertaken as part of the early planning efforts once the business plans have been approved.
- Central to the development of robust TPMs and a solicitation strategy will be the incorporation of the Business Plan strategies for all segments, fuel-type (gas and electric) unique needs, Market Transformation objectives, program portfolio needs, and regional needs.
- Implementers will be considered for their ability to address solicitation strategy goals.
- Strategy will support the three program objectives outlined above including identifying technologies that may be considered by Program Administrators for incentives.

ETP will rely on the specialized expertise from both single-fuel IOUs, SCE and SoCalGas, to lead the advancement of both electric and natural gas energy efficient technologies, through a dual Lead Program Administrator approach. Both SCE and SoCalGas, in close collaboration with other Program Administrators, can bring expertise and focus on increasing the number of energy efficient gas and electric technologies.

Transition Timeline

- Meet the obligation for 2017 program implementation under current program design and any activities that prolong into 2018 and beyond. Gas ETP will commit to projects in 2017 that will be delivered in subsequent years; Program Administrators may need to maintain certain infrastructure to support those interim activities.
- Start the development of the TPMs in 2017.
- Ramp up 2018 implementation with the development of implementation plans, TPMs and other strategic planning activities.

- It is expected that the implementation of the new model will start in 2018 as the old program model ramps down.

Metrics

The following metrics are illustrative and will be finalized with the selected implementer(s).

- *Number of TPMs initiated*
- *Number of TPMs updated*
- *Number of projects initiated*
- *Number of outreach events*

Foodservice POS Rebate Program

Program Objectives

The Foodservice POS Rebate program seeks to increase the sales of high efficiency commercial foodservice equipment by engaging midstream market actors to stock and actively market high efficiency equipment. This supports the CLTEESP, which has an overarching objective to utilize the market to achieve more profound energy savings, aligning with the program goal to incentivize the sale of high-efficiency foodservice equipment by engaging mid-stream market actors. The CLTEESP states that not only office buildings but stores, restaurants, warehouses, schools, hospitals, public buildings and facilities, and others account for over 25 percent of natural gas consumption and space heating, water heating, and cooking make up over 90 percent of gas use, and these areas should receive extra attention for energy efficiency strategies.¹⁶ The program will deliver energy savings by providing end-use customers equipment rebates for high efficiency commercial kitchen equipment purchased at the point-of-sale.

Solicitation Strategy

Program solicitations will call upon the innovative proposals of the energy efficiency service provider community. The Foodservice POS Rebate program will be proposed, designed, and implemented by one or more third-party implementer, for statewide delivery. The scope of the request for proposal for this program will be guided by SoCalGas' Business Plan including the sector goals, sector-level strategies, and the program intervention strategies. SoCalGas will collaborate with the selected third-party implementer on program design and delivery to increase the likelihood of program success. The implementation contract type will likely be a pay-for-performance approach for key contract activities (e.g., number of units sold).

¹⁶ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 28. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

Transition Timeline

After approval of the Business Plan, the Foodservice POS Rebate program will conduct a competitive program solicitation, seeking program designs to deliver a program on a statewide basis. SoCalGas expects this phase to commence in 2017 to allow for selections, contract negotiations, and execution prior to the start of 2018.

Metrics

The following metrics are illustrative and will be finalized with the selected implementer(s).

- *Number of midstream market actors engaged*
- *Number of units rebated*

Midstream Water Heating Program

Program Objectives

The Midstream Water Heating program's objective is to push higher efficiency water heaters into the non-residential market by leveraging the distributor and contractor communities. The distributor and contractor communities allow SoCalGas to target all small, medium, and large non-residential customers. Customers will receive the utility rebate at the point of sale from the distributor/contractor thereby removing the need to complete additional paperwork. The goal of the program is to streamline the rebate process and target customers when they are looking at purchasing equipment. For now, only storage and tankless water heaters are allowed in the program but SoCalGas will look at adding additional measures at the appropriate time.

Solicitation Strategy

Program solicitations will call upon the innovative proposals of the energy efficiency service provider community. The Midstream Water Heating program will be proposed, designed, and implemented by one or more third-party implementer, for statewide delivery. The scope of the request for proposal for this program will be guided by SoCalGas' Business Plan including the sector goals, sector-level strategies, and the program intervention strategies. SoCalGas will collaborate with the selected third-party implementer(s) on program design and delivery to increase the likelihood of program success. The implementation contract type will likely be a pay-for-performance approach for key contract activities (e.g., number of units sold).

Transition Timeline

After approval of the Business Plan, the Midstream Water Heating program will conduct a competitive program solicitation, seeking program designs to deliver a program on a statewide

basis. SoCalGas expects this phase to commence in 2018 to allow for selections, contract negotiations, and execution prior to the start of 2019.

Metrics

The following metrics are illustrative and will be finalized with the selected implementer(s).

- *Number of distributors enrolled*
- *Number of units rebated*
- *Number higher efficiency units sold*

G. Transition Plan

This transition plan complies with the Commission's requirement to have 60 percent of the energy efficiency program portfolio budget be proposed, designed, and implemented by third-parties by the end of 2020. The plan will support a smooth transition that:

- Aligns with SoCalGas' core competencies of customer outreach and engagement, data analytics, natural gas focus, and safety;
- Achieves higher levels of energy efficiency for customers in support of California's aggressive goal to double energy efficiency by 2030; and,
- Creates a smooth, seamless transition to a new portfolio administrative structure that benefits customers, SoCalGas, and the energy efficiency provider industry.

To achieve the 60 percent third-party requirement and create a smooth transition, SoCalGas' plan identifies: (1) solicitation approach and schedule; (2) sector level sourcing strategy; and (3) SoCalGas operations to support energy efficiency programs.

Solicitation Approach and Schedule

The transition plan proposes to re-organize the portfolio to a set of integrated strategies and program offerings based on customer segments, as detailed in the Business Plan. This portfolio reset is consistent with the Commission's new sector-based approach. The transition plan considers future energy efficiency potential, customer needs, market trends, current legislative and regulatory direction, and past energy efficiency program performance.

For 2017, SoCalGas' energy efficiency portfolio budget, including EM&V, is \$85.7 million, of which \$22.3 million, or 26 percent, is currently implemented by third-parties.¹⁷ By the conclusion of this transition plan, at the end of 2020, programs that are proposed, designed, and implemented by third parties will increase to more than \$54.2 million or 60 percent of the annual portfolio budget, including EM&V activities.

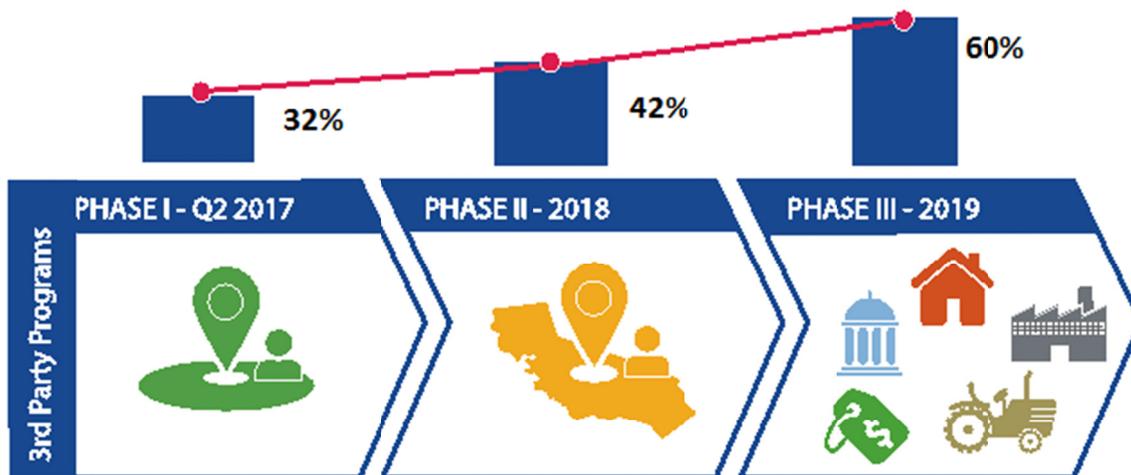
¹⁷ 2017 budget, as filed in the SoCalGas 2017 Budget Advice Letter 5023, includes Statewide ME&O.

Program solicitations will call upon the innovative proposals of the energy efficiency service provider community. Specific programs will be proposed, designed, and implemented in the appropriate market channel by third-party implementers. The scope of the request for proposals for programs will be guided by SoCalGas' Business Plan including the sector goals, sector-level strategies and the program intervention strategies. SoCalGas will collaborate with selected third-party implementers on program design and delivery to increase the likelihood of program success and integration with other energy efficiency programs within the portfolio.

To promote a healthy and vibrant energy efficiency ecosystem in California, for both large and small providers, including a focus on Diverse Business Enterprises (DBE) contracting practices, and to support a smooth transition and to provide minimal impact to SoCalGas' internal organizations (e.g., procurement, customer service), SoCalGas will conduct a three-phased approach. The solicitations will be staggered in three phases throughout the transition with last solicitation targeted to occur in the second quarter of 2019. The three phases will focus on the following areas:

- Phase I – In the initial phase of the transition plan, SoCalGas intends to refresh its current third-party program offerings by re-soliciting those programs. However, SoCalGas is not committed to offering the same programs in its portfolio, and looks forward to receiving new program design ideas from third parties. SoCalGas proposes that this initial phase commence in the second quarter of 2017 to allow for selections, contract negotiations, and execution prior to 2018. This will account for approximately 32 percent of the portfolio.
- Phase II – In the second phase, after approval of the Business Plan, Statewide programs will be put out for competitive bids, soliciting design ideas for operating programs on a statewide basis, through the lead program administrator. SoCalGas expects this phase commence in 2018 to allow for selections, contract negotiations, and execution prior to the start of 2019. After this phase, third-party programs will account for approximately 42 percent of the portfolio, cumulatively.
- Phase III – In the third phase, SoCalGas will solicit design ideas for energy efficiency program delivery for its Commercial, Industrial, and Agricultural sectors, including its core calculated and deemed programs. In addition, SoCalGas will look at incorporating third-party implementers into its Local Government Partnership model and multi-family program offerings. SoCalGas expects this phase commence in 2019 to allow for selections, contract negotiations, and execution prior to the start of 2020. As a result, SoCalGas will achieve at least 60 percent of the portfolio, cumulatively, by end of 2020.

Figure 3: Phased Third-Party Program Solicitation Approach



By staggering the solicitations, it will also allow the third-party service provider community with ample time to design and propose effective programs for SoCalGas’ consideration. SoCalGas will release a series of competitive solicitations, on an annual basis, to allow for continuous opportunities for the energy efficiency service provider community and to encourage ongoing innovation within the program portfolio. SoCalGas plans to launch the first set of program solicitations in 2017 in expectation of Commission approval of the Business Plan Application.

Sector Level Sourcing Strategy

SoCalGas’ Business Plan presents a cadre of program strategies to address market barriers and encourage customers to significantly increase their adoption of energy efficiency solutions. These strategies will be directed at five specific customer sectors and target customer segments and sub-segments with higher energy efficiency potential. The sectors include: residential, commercial, industrial, agricultural, and public. Additionally, there is a cross-cutting sector that includes strategies that support all of the customer segment delivery offerings.

Third-party energy efficiency service providers will be called upon to propose, design, and implement specific programs in support of the Business Plan. SoCalGas, as the portfolio manager, will assist third-party program providers with customer account management support and other customer services to improve the program offerings, avoid administrative redundancies, and realize the results expected. The following is a sector-level summary of the rationale of the strategies where SoCalGas will seek program proposals from third-party providers to help reach the mandatory minimum threshold of 60 percent by the end of 2020.

The sector strategies discussed below are intended to leverage the core competencies of all stakeholders to develop a customer-centric model that best positions SoCalGas to achieve its energy efficiency goals. SoCalGas' core competency is assisting customers in optimizing the management of their energy usage, while the competencies of third-party implementers are to provide technical assistance and manage energy efficiency projects. Table 1 above provides a list of program intervention strategies, which third-party providers should leverage in proposing new program design ideas in each sector. These strategies and their sector-specific variations are detailed in each sector chapter of the Business Plan.

Residential Sector

By 2019, most of SoCalGas residential programs will be delivered by third-party program providers, including both local and statewide offerings. SoCalGas is seeking effective and efficient program designs to enhance and/or replace existing residential programs. For example, to date, the Home Upgrade program has seen an increase in customer participation, however, the program costs far outweighs the ratepayer benefit. SoCalGas will be searching for a more cost-effective program design to address the comprehensive whole home approach. Additionally, SoCalGas will be looking for innovative strategies to address the multi-family segment, which continues to have significant energy efficiency potential, especially in the water heating end-use category. This is an ideal candidate for a co-delivery approach between SoCalGas, a partner electric utility, and water agencies, to offer comprehensive measure solutions to SoCalGas' large and diverse customer base using third-party program providers.

Recently, the Commission has categorized the Point of Sale (POS) component of the Plug Load & Appliance program (PL&A POS) as a midstream program, which will be proposed, designed, and implemented statewide by one or more third-party providers. In order to decrease program and retailer costs, SoCalGas will implement a residential downstream customer rebate program, which will not be connected to the midstream delivery channel. Advances in consumer hand-held devices, coupled with lower retailer interest in midstream incentive offerings, creates an opportunity to deliver on-demand rebates to consumers more efficiently and cost-effectively. SoCalGas proposes to expand upon its current offerings and deliver this strategy to customers as it possesses the infrastructure in place to integrate customer data systems, customer and retailer outreach, and rebate processing technology to conduct this activity successfully and cost-efficiently.

Residential HVAC, Residential New Construction, and PLA POS are residential sector programs that are required to be delivered Statewide by third-parties, with solicitations for each program targeted in 2018. SoCalGas' annual budget for third-party residential sector programs will approximately be between \$19-\$21 million by the end of 2020.

Commercial Sector

The commercial sector can be implemented through various strategies to maximize portfolio cost-effectiveness while achieving energy savings and strategic goals. Energy efficiency program participation in the commercial sector in SoCalGas' service territory has been

dominated by the healthcare, food service, and laundry segments based on the 2010-2015 energy savings program performance. Energy service companies are an integral part in supporting energy efficiency projects within these segments. SoCalGas will complement the energy service companies' role by soliciting for third-party program design that will address the commercial customers through program intervention strategies. SoCalGas will leverage its core competencies in order to facilitate customer engagement in commercial energy efficiency programs. As trusted energy advisors, SoCalGas will provide a laser focus on the customer through the leveraging of long-standing customer account executive relationships and a focus on data access and analytics, facilitation of customer audits, and local outreach opportunities, which altogether, enable an intelligent outreach platform for which to engage customers and allow for third-party implementers to provide the technical assistance needed to complete projects.

Savings By Design, Non-Residential HVAC, and the Midstream Foodservice Rebate Program are commercial programs that are required to be delivered Statewide by third-parties, with solicitations for each program targeted in 2018. SoCalGas' annual budget for third-party commercial sector programs will approximately be between \$11-\$13 million by the end of 2020.

Industrial Sector

The industrial sector continues to offer the largest potential for energy efficiency in SoCalGas' service territory, as it represents the most gas consumed by any sector. To encourage greater participation in energy efficiency programs within the industrial sector, SoCalGas will solicit new program designs for this sector. The industrial chapter of the Business Plan includes a combination of proven and newer program strategies coupled with inventive approaches to efficiently identify customers with the greatest energy efficiency opportunities using data analytic advancements enabled by SoCalGas' advanced meter capabilities. Using data analytics and traditional outreach approaches, SoCalGas will offer an integrated set of program strategies that meet the customer's unique energy efficiency needs.

The industrial sector offers an abundance of energy savings opportunities for the customer including operational changes in production processes and improvements to operations and maintenance (O&M) practices. Specific program strategies will be offered to the customer to permanently capture these energy savings. As with the commercial sector, SoCalGas will facilitate customer engagement in industrial energy efficiency programs through customer account executive relationships, facilitation of customer audits, and local outreach opportunities. Altogether, this approach enables an intelligent outreach platform from which to engage customers and allow third-party implementers to provide the technical assistance needed to complete projects.

SoCalGas' annual budget for third-party industrial sector programs will approximately be between \$6-\$8 million by the end of 2020.

Agricultural Sector

The agricultural chapter of the Business Plan includes a combination of proven and newer program strategies coupled with inventive approaches to efficiently identify customers with the greatest energy efficiency opportunities using Intelligent Outreach, a data analytics strategy enabled by SoCalGas' advanced meter capabilities. To encourage greater adoption of energy efficiency among all agricultural customer segments, SoCalGas will seek to offer third-party programs based on a simple, low-cost suite of strategies that are tailored to the unique customer characteristics of the agricultural sector. A targeted focus will also be applied to agricultural customers who operate in disadvantaged communities throughout the service area, which includes most rural communities.

Similar to the commercial and industrial sectors, SoCalGas will facilitate customer engagement in agricultural energy efficiency programs through long-standing customer account executive relationships, facilitation of customer audits, and local outreach opportunities. Altogether, this approach enables an intelligent outreach platform from which to engage customers and allow for third-party implementers to provide the technical assistance needed to complete projects.

SoCalGas' annual budget for third-party agricultural sector programs will approximately be between \$2-\$4 million by the end of 2020.

Public Sector

SoCalGas will look to integrate third-party providers into its local government partnership (LGP) model, beginning in 2019. The current LGPs rely heavily upon third-parties to assist in program delivery. This will be expanded upon to allow third-parties to propose, design, and deliver the next generation of LGPs as well as institutional partnerships (IPs). The future LGPs and IPs will continue to be supported by SoCalGas representatives, both account executives and project managers, to facilitate the partnership between the utility, the local government, and the implementer. This key role will provide support to enhance and expand upon the customer relationship, provide program and/or project outreach, and resolve customer issues. In addition, the public sector will create additional partnering opportunities with other customer segments such as unified school districts and water districts. For example, SoCalGas will work with local water agencies to coordinate AMI data to better inform customers on energy and water efficiency solutions. Such programs are considered local and are ideal candidates to be jointly implemented by Publicly Owned Utilities (POUs) and Southern California Edison within SoCalGas' service territory. A technical assistance program offering will be a key element to support public sector customers. Technical assistance will also be delivered through a third-party energy efficiency service provider.

IPs are public sector programs that are required to be delivered Statewide by third-parties, with solicitations for each program targeted in 2018. SoCalGas' annual budget for third-party public sector programs will approximately be between \$3-\$4 million by the end of 2020.

Cross-cutting Sectors

SoCalGas will look to third-parties to propose programs for significant portions of the codes and standards, emerging technologies, workforce education and training, and financing sectors. The successful Innovative Designs for Energy Efficiency Activities (IDEEA365) approach will continue as an ongoing offering to capture innovative new program proposals throughout the duration of the rolling portfolio timeframe.¹⁸ As identified above as key areas where SoCalGas will leverage its core competencies to enable customer engagement in energy efficiency, SoCalGas will continue to provide on-bill financing, local outreach and training services through its dedicated Energy Resource Center, and support local codes and standards work in collaboration with local municipalities throughout its service territory.

SoCalGas' annual budget for third-party cross-cutting sector programs will approximately be between \$2-\$3 million by the end of 2020.

SoCalGas Operations to Support Energy Efficiency Programs

Portfolio Management and Oversight

As stated by the Commission, the utilities will now focus more on their role as determiners of “need” and energy efficiency portfolio design, and less on their role as program designers and implementers. Utility Program Administrators, with Commission approval, will still retain discretion in their portfolios with respect to the budget allocations to each type of activity, based on the overall needs in their service territories. While retaining all the program administrative responsibilities such as customer interface, rebate processing, and contract management, SoCalGas will need to expand its role as a “collaborator” with third-party program providers, other Program Administrators, key market actors (e.g., industry groups) and the customer. For example, collaboration will be necessary with program implementers during the program selection process including any necessary modifications to third-party program design to ensure the overall portfolio achieves SoCalGas' energy efficiency goals. As roles and responsibilities of the program administrator are further refined, adjustments to SoCalGas' portfolio management responsibilities will occur as well.

Customer Recruitment and Engagement

Individual programs will be proposed, designed, and implemented by third-party providers based on the program intervention strategies presented in the Business Plan. In order to provide an effective engagement platform to support the successful program implementation by third-party providers, SoCalGas will leverage its core competencies of customer engagement. SoCalGas will sharpen its focus on the following areas in order to implement

¹⁸ The IDEEA365 approach will not be used for solicitations of Statewide programs identified in Business Plans.

effective strategies that utilize its understanding of the customer, effectively engage the customer, and facilitate customer participation in cost-effective and comprehensive energy efficiency:

- **Customer Engagement:** As a trusted energy advisor to customers, leveraging SoCalGas' connection to customers is paramount for success. SoCalGas' customer account executives play a foundational role in engaging customers in demand-side management solutions, including energy efficiency. This engagement will provide the valuable connection needed between SoCalGas, the customer, and the third-party implementers in order to motivate customers to pursue energy efficiency and provide the technical assistance needed to complete projects. SoCalGas also markets its On-Bill Financing (OBF) program primarily through its account executives. By enabling qualified customers to complete energy efficiency projects with no up-front costs, OBF eliminates one of the major barriers to participation in energy efficiency, resulting in greater customer engagement in energy efficiency programs.
- **Data Analytics:** As the energy service provider, SoCalGas has extensive database information on customers, including real time advanced meter data that provides accurate and actionable usage and behavioral metrics. SoCalGas' expertise in data mining and analytics will facilitate the identification of energy efficiency opportunities that will allow for intelligent outreach and effective engagement based on specific customer needs.
- **Customer Outreach:** Leveraging data analytics and targeted understanding of customer behavior will facilitate local outreach, including marketing efforts to drive customer awareness, interest, and participation in energy efficiency programs.
- **Customer Audits:** Connecting the engagement opportunities afforded by customer account executives with meaningful data analytics will allow for targeted customer facility audits that assist customers to quickly identify energy savings opportunities. Leveraging "on the ground" experience in customer facilities, SoCalGas is best positioned to facilitate the customer audit, which will result in continued energy management engagement in order for SoCalGas to identify the necessary technical assistance expertise provided by third-party implementers.

Portfolio Oversight

SoCalGas ultimately has the fiduciary responsibility in administering the energy efficiency portfolio, including the assurance that ratepayer funds are utilized properly. This responsibility requires a portfolio and program oversight role, including performing inspections, engineering review, quality assurance, and quality control (QA/QC), and effective contract management. In addition, SoCalGas will leverage its established infrastructure, which includes rebate processing, and the utilization of IT systems to track program participation and enable reporting to the Commission.

H. Conclusion

As detailed in this Business Plan, SoCalGas will provide a comprehensive portfolio of reliable, innovative, and cost-effective energy efficiency programs and strategies to achieve deeper energy efficiency penetration in the marketplace. SoCalGas is committed to achieving its energy efficiency goals and supporting the State's energy efficiency policies and targets. By integrating the ideals of innovation, partnership, and customer-centric approaches, SoCalGas seeks to create impactful solutions that are valued by customers, sensitive to the environment, stimulate the economy and make a difference in the communities served.

Appendix A to the Executive Summary: Statewide Administration Approach

Statewide Administration Approach

January 17, 2017

By

Pacific Gas and Electric Company

San Diego Gas and Electric Company

Southern California Edison Company

Southern California Gas Company

I. Introduction

Decision (D.) 16-08-019 modifies the energy efficiency program administrative structure by requiring that all upstream and midstream programs, market transformation efforts, and at least four pilot downstream programs be delivered uniformly throughout the four large Investor-Owned Utility (IOU) service territories, and overseen by a single lead Program Administrator (PA). In requiring these programs to be administered on a statewide basis, the California Public Utilities Commission (CPUC or Commission) wants to prioritize ease of program access to customers, and in part, lower transaction costs for PAs and implementers.¹⁹

This document presents the IOUs assignments for Lead Administration of statewide programs, along with the rationale for said assignments. Ultimately, a PA is responsible for managing their program portfolio, and is accountable for achieving savings goals in their territory.²⁰ Statewide programs contribute to the PA's goal achievement; effective administration and implementation of these programs is paramount to achieving these goals. In this document, the IOUs also describe a governance process that represents a joint collaborative commitment to the success of the statewide model.

II. Direction

D.16-08-019 directs statewide programs to be administered by one Lead PA, with the capacity to handle statewide programs. The Commission left the Lead PA assignments for each statewide program to be determined by current program administrators and put forth the designations in the business plans to be filed on January 17, 2017.²¹ With the exception of capacity, the Commission did not prescribe qualifications for Lead PAs. The Decision expected that "natural leads with the capacity to handle the statewide programs will either volunteer or be nominated by their peers, with a consensus approach brought forward to the Commission for [their] consideration."²² At this point, the four IOUs have taken lead roles in administering the statewide programs.

Once a Lead PA is determined for the statewide programs, the Commission recognizes that the remaining PAs still play an important role in the administration of statewide programs.²³ The Commission calls for a consultative and collaborative relationship between the Lead PA and other administrators on key aspects of the portfolio,²⁴ and states that they "are

¹⁹ California Public Utilities Commission. (2016, August 25). D.16-08-019, pg. 51.

²⁰ "We wish to continue to push the utilities to focus more on their role as determiners of "need" and portfolio design." California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 71.

²¹ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 53

²² *Id.* at 54.

²³ The seven current Program Administrators are: Pacific Gas and Electric, Southern California Edison, Southern California Gas Company, San Diego Gas and Electric, Bay Area Regional Energy Network, Southern California Regional Energy Network, and Marin Clean Energy.

²⁴ California Public Utilities Commission. (2016, August 25). D.16-08-019, 54.

deliberately not specifying in this decision the exact form such collaboration should take.”²⁵ With this direction, the IOUs describe a governance process that presents the consultative and collaborative relationship in the statewide administration model.

III. Approach

To improve program delivery and efficiency, the IOUs holistically evaluated potential Lead PAs using six program administration criteria. The six criteria used in determining Lead PA assignments are described below.

1. **Portfolio Approach and Natural Bundling:** The IOUs considered an overall portfolio approach and grouped programs to support a cohesive program strategy and an emphasis on increasing the effectiveness of energy efficiency, improving cost-effectiveness, balancing localized considerations, and providing the most value for the customers. As an example, the same lead was assigned to both the Residential and Commercial HVAC Programs so that the Lead PA can determine if these programs can be consolidated to gain efficiencies. In addition, through the bundling of interdependent programs, such as Electric Emerging Technologies and the Savings By Design (SBD) programs as well as the grouping of the Gas Emerging Technologies and Residential New Construction programs, the IOUs will achieve greater continuity for oversight and focus on zero net energy (ZNE) policy goals, along with increasing energy efficiency.

The IOUs also considered specific factors in the marketplace such as regional, climate, and locational resource constraints which could have a bearing on the relationship with major customers, vendors, and suppliers. For example, different end uses or technologies require different skillsets, a different set of manufacturers, trade organizations, and distributors to engage. This is particularly true in the area of lighting and HVAC where the suppliers and experts in each area are vastly different. The Lead PA assignments consider these unique factors and bundle programs accordingly.

2. **Cost-effectiveness:** The IOUs reviewed program administrators’ ability to deliver energy savings in the most cost-effective manner. For each of the Lead PA assignments listed below, the Lead PA chosen was typically the lowest in administering a program on a \$/kWh or \$/therm basis, or has the highest Total Resource Cost (TRC) ratio for the program.
3. **Capacity:** Each IOU's capacity to administer a given program at the statewide level was considered, with the understanding that establishing this new structure and process may require shifting significant work across administrators. Given the requirement to begin the transition to this structure, all IOUs will need to participate and take the lead in key areas. No single PA can or should lead all statewide programs, and these assignments consider balancing administrative burden and responsibilities with diversity in experience. We anticipate that the structure of the statewide portfolio and lead assignments may evolve over time as we gain experience with the new statewide

²⁵ *Id.*

model. There may also be staffing impacts due to the transformative changes being undertaken that will likely unfold over time as we continue to execute and prove the success of this new model.

In addition, the IOUs reviewed each of the statewide programs and used historical information and experience to help estimate the capacity each IOU has to administer statewide programs. Examples of information used are: total savings for each program for the past 6 years, total savings for 2015, and knowledge of the support infrastructure necessary to effectively administer and support delivery of programs and services to customers.

4. **Expertise:** Expertise, experience, and knowledge are important factors to consider regarding statewide program administration, both from a technical and an administrative perspective. Understanding that implementers will be designing and delivering these programs, expertise in administration will be required to ensure proper program oversight, achievement of program goals, strategic portfolio management, and a full understanding of Commission rules. From a technical perspective, in an effort to ensure speed to market, agility, and program management discipline, the IOUs qualitatively reviewed and evaluated the relative expertise each IOU had for a given program to assist in the assignment process. For example, the technical expertise available to support the Emerging Technologies Program (ETP) for both gas and electric technologies was considered, including how such expertise may be used to support other important efforts such as the development of the grid of the future. Of particular importance with ETP is the close connection to fuel-specific expertise, which resulted in the decision to create two distinct electric and gas ETPs. Knowledge of the characteristics and needs of key strategic customers and partners was also considered, such as with the Institutional Partnership programs.
5. **Relationships:** Inter-utility (including publicly-owned utilities) and external industry relationships are also an important factor to consider regarding statewide program administration. The IOUs qualitatively reviewed and evaluated the relationships each had with key stakeholders for a given program to assist in the assignment process. Relationships each IOU had with key upstream vendors, emerging technology organizations, and State entities were considered. The relationships held by each IOU are important to ensure the new statewide programs launch quickly, and with minimal disruption to the market or customers.
6. **Feedback from Stakeholders:** Through the California Energy Efficiency Coordinating Committee (CAEECC) process, stakeholders have provided input to the IOUs on proposed lead assignments.²⁶ This input includes bundling similar programs, recognition of prior leadership, and leveraging demonstrated expertise. The IOUs have considered

²⁶ IOUs presented proposed Lead Assignments to the CAEECC on September 21, 2016, October 19, 2016, and again on November 16, 2016.

stakeholder recommendations, and have made adjustments to proposed Lead Assignments, as appropriate.

IV. Guiding Principles

The following Guiding Principles represent the shared commitments of IOU PAs in the delivery of statewide-administered energy efficiency programs.

1. **Support the State’s energy efficiency policy goals.** Orient portfolio design around State and Regulatory objectives and act in the best interests of all customers.
2. **Do no harm.** Make decisions that preserve our collective ability to meet energy savings goals, achieve cost-effectiveness goals, and minimize impacts to existing local and downstream programs.
3. **Advocate for all PAs.** Recognize that the whole is greater than the sum of its parts. Be willing to collaborate with other PAs in planning and decision-making efforts.
4. **Assume best intentions.** In an environment of shared goals and shared directives, be humble in the approach and ambitious for the broader group’s success.
5. **Be good listeners.** Take responsibility for the environment by which decisions are made such that all participants have the opportunity to participate.
6. **Take a stand for customers.** Take into consideration the customer experience and strive for simplicity, clarity, and ease.
7. **Wisely pursue change.** Demonstrate open-mindedness to changes in design, delivery and administration.

V. Lead Assignments

The final Lead Assignments, by IOU, are put forth as follows:

Pacific Gas and Electric Company	Institutional Government Partnerships: State of California and Department of Corrections
	Financing: New Financing Offerings
	Codes and Standards: Building Codes Advocacy and Appliance Standards Advocacy Programs
	Workforce Education and Training: Centergies K-12 Connections Programs
	Workforce Education and Training: Career & Workforce Readiness (<i>downstream pilot</i>)

	Indoor Agriculture Program (<i>downstream pilot</i>)
Southern California Edison Company	Electric Emerging Technologies Program
	Lighting: Primary Lighting, Lighting Innovation and Lighting Market Transformation
	Commercial New Construction: Savings by Design
	Institutional Government Partnership: University of California and California State University
	Water/Wastewater Pumping Program for non-residential Public sector (<i>downstream pilot</i>)
Southern California Gas Company	Residential New Constructions
	Gas Emerging Technologies Program
	Foodservice Point-of-Sale (POS) Program
	Midstream Commercial Water Heating
San Diego Gas and Electric Company	Upstream Heating, Ventilation, and Air Conditioning (HVAC)
	Midstream Plug Load Appliance (PLA)
	Residential HVAC Quality Installation/Quality Maintenance (QI/QM) (<i>downstream pilot</i>)

What follows is a brief discussion on the rationale behind these choices.

Pacific Gas & Electric (PG&E)

1. State Government Partnerships (State of California and Dept. of Corrections)

Following the principle of natural bundling, the IOUs believe that combining the two State partnerships under one lead would result in economies of scale and increased efficiencies. PG&E believes that engaging public customers through strategic partnerships enables customers to take action while demonstrating leadership that inspires their constituents to pursue their own energy efficiency projects. PG&E is presently the statewide lead for these partnerships and PG&E benefits from ready access to state agency leadership

due to geographic proximity. PG&E will rely on its proximity to help facilitate effective management of these partnerships. As PG&E's business plan explains, PG&E sees a great opportunity to engage more state agencies, including the Judicial Council through expanded and new partnerships to share technical expertise and to achieve greater participation in energy efficiency programs and drive deeper savings achievement.

2. Financing (New Finance Offerings)

PG&E believes that investments in finance programs will allow Program Administrators to more cost-effectively achieve energy efficiency savings, which aligns with the state's vision for energy efficiency financing. PG&E's finance team has professional financing expertise and experience in implementing energy efficiency financing programs both in and outside of California. PG&E has demonstrated statewide leadership in the realm of finance programs for the last four years, particularly in the development of the statewide on bill repayment (OBR) pilots. Not only has PG&E collaborated well with its IOU partners, it has built strong working relationships with the Commission and the California Alternative Energy and Advanced Transportation Financing Authority (CAETFA) to help shape the future of energy efficiency financing in California.

As the Lead PA, PG&E will continue to work closely with CAETFA to build the finance pilots that work best for California. PG&E has seen growth in the On-Bill Financing (OBF) program. PG&E has dedicated itself to continuous improvement of the OBF program by integrating it into our programs, and focusing on making the program easy for contractor participation. PG&E has seen a steady growth in its financing loan pool since 2012 and is on track to continue that growth through 2016. PG&E now has the largest loan pool amongst the IOUs, and has thus far only experienced minimal defaults. PG&E has demonstrated its leadership by implementing a non-rebate OBF pathway for customers – the OBF Alternative Pathway. PG&E believes that its new process for OBF has potential to increase participation in energy efficiency from customers who have previously chosen not to participate in IOU programs. This Alternative Pathway should become a model for energy efficiency financing investments statewide, and a model for other financing programs beyond OBF.

In PG&E's finance business plan chapter, PG&E has shown a commitment to continuing to innovate and test new financing structures that can have an incremental impact on our customer's ability to fund their energy efficiency investment. PG&E understands what drives customers to undertake energy efficiency investments, which has led to exploring financing structures that will overcome specific barriers customers face to investing in energy efficiency. PG&E has shown a commitment to financing as a strategy for residential energy efficiency adoption through its on-bill loan program for this sector. As detailed in its Business Plan, the goals for statewide financing include overcoming customer transaction barriers to investment and increasing the supply and access to affordable capital.

3. Codes and Standards (Building Codes Advocacy and Appliance Standards Advocacy)

Codes and Standards (C&S) represent an extremely cost-effective way to help meet the State's ambitious goal to double energy efficiency by 2030 and reduce greenhouse gas

emissions. PG&E has demonstrated leadership in C&S for over 10 years at both the state and federal level. PG&E has the engineering and strategic resources available to successfully lead the statewide C&S advocacy sub-programs. PG&E has the expertise to lead and direct the program to meet the California Energy Commission (CEC) and CPUC's goals for the C&S program. PG&E has developed strong relationships with the statewide PAs, CEC, Department of Energy, efficiency advocates, industry stakeholders, and CPUC staff. These relationships allow PG&E staff, in conjunction with the other IOUs, to navigate upcoming Title 24 and Title 20 rulemakings successfully. These relationships have allowed PG&E to work on agreements with industry to gain their support for the CEC's proposals and achieve additional energy savings.

PG&E has managed CASE studies through careful planning and execution while maintaining quality. The resulting CASE studies have provided the basis for considerable cost-effective energy savings for California. A strong CASE study increases the likelihood and the speed that the CEC will begin a rulemaking since it provides a solid foundation for their work. PG&E has experience directing primary data collection to support CASE topics so that supporting data is timely, statistically relevant and comprehensive. As statewide lead, PG&E will continue to partner with the IOUs, CEC, and CPUC, and shape the next generation of codes and standards 2.0, which the statewide C&S business plan details.

4. Workforce Education and Training (K-12 Connections)

As the current statewide lead for K-12 Connections, PG&E brings the expertise required to effectively engage the broader educational communities (schools, colleges, professional organizations) for a successful K-12 WE&T initiative. PG&E's WE&T staff include trained, professional educators who bring the right expertise to lead evaluation efforts on program design proposals. PG&E's experience in working directly with disadvantaged communities and organizations that serve disadvantaged workers sets PG&E up for success as the IOUs respond to Senate Bill (SB) 350 and look for ways to broaden outreach and engagement of these communities in energy efficiency programs.

PG&E is currently the statewide lead for the Connections subprogram. For over 25 years, PG&E has supported the K-6 sector with a cost-effective education program which serves elementary school students at an average cost of \$3.30 per student. Furthermore, PG&E's existing online career awareness portal for high school students can serve a broader audience than the PG&E service territory. PG&E has conducted a variety of education programs that have served K-12 schools. For example, Energenius has evolved to incorporate the latest curriculum standards. Energenius has reached about half of all K-8 schools across PG&E's diverse service territory while receiving above 90% satisfaction ratings. PG&E has leveraged programs and experts across organizations to offer comprehensive K-12 resources to serve its diverse service territory (e.g., working with the low income programs CARE and Energy Savings Assistance (ESA) to incorporate energy, conservation and environmental education in the Out of School program delivered to low income students and their families).

As statewide lead, PG&E plans to leverage internal and external partnerships to cost-effectively deliver resources to the K-12 marketplace, such as the IOUs' Local Government Partnerships and Energy Savings Assistance program implementers, the California Student Aid Commission, the California Apprenticeship Coordinators Association, and several UC/CSU

campuses. PG&E has also used marketing efforts of organizations such as the California Department Education and the California Teachers Association. As the Business Plan explains, PG&E envisions a workforce capable of meeting California’s energy savings goals and implementing its utility programs. This includes the current workforce and the next generation of the workforce. PG&E believes firmly that its role as statewide lead for K-12 Connections and Career Workforce Readiness will help meet this vision.

5. WE&T Career Workforce Readiness (CWR) Program

As statewide lead administrator for the CWR program, PG&E brings the expertise required to effectively engage the broad array of workforce and community partners, stakeholders and other interested parties for a successful career and workforce readiness initiative. PG&E has experience working with disadvantaged workers and with organizations that serve disadvantaged workers and disadvantaged communities. Our experience in working with disadvantaged communities sets us up for success as the IOUs respond to SB 350, exploring ways to broaden outreach and engagement of these communities in our energy efficiency programs. As our Business Plan explains, PG&E envisions a workforce capable of meeting California’s energy savings goals and implementing its utility demand-side management programs. We believe firmly that our role as statewide administrator for CWR will help us meet this vision.

6. Indoor Agriculture (IA) Program

PG&E will dedicate its decades of experience serving California’s agricultural community to being the statewide lead administrator for the IA program, PG&E has provided agricultural customers a variety of energy efficiency solutions from technical assistance to rebates and low/no interest loans. PG&E understands that energy is a key resource for farmers, and that smart energy management can be a powerful tool in addressing rising energy costs, regulatory standards, and safety issues. Leveraging our years of knowledge of agricultural customers, and what motivates them to make energy efficiency investments positions PG&E well as statewide administrator for this new downstream program.

Southern California Edison (SCE)

1. Electric Emerging Technologies Program

The IOUs propose to divide the ETP by fuel source to account for the specialized knowledge and skills that are associated with each fuel type and distribution system. Because it is ETP’s role to support the resource program portfolios with new innovations, fuel-specific subject matter experts (SMEs) will be critical to providing strategic planning and quality assurance functions. The two functions are central so that policy and technology are developed into measures. SCE and Southern California Gas Company (SoCalGas) have unique fuel-centric expertise that will be leveraged for these critical functions that the implementers will not provide under the new administrative model for ETP. The expertise in administration is necessary to ensure proper program oversight, achievement of program goals, strategic portfolio management, and a full understanding of Commission rules. Fuel-specific SMEs at SCE

and SoCalGas will bring an understanding of the implementers' roles in designing and delivering these programs as they relate to both electric or gas measures. Collaboration between electric and gas statewide program administrators, as well as other PAs, are essential to the success of this model, which ETP has over 12 years of experience through the Emerging Technologies Coordinating Council (ETCC).

The IOUs assign SCE as the statewide PA for the Electric ETP. SCE has been the statewide lead for over 10 years providing leadership in program design, planning, implementation, policy input, and program evaluation for the statewide program. Under SCE's leadership, the ETP has been successfully restructured²⁷ to meet the evolving policy needs of California (SB 350, Assembly Bill 802) and the Commission while maintaining cohesive and collaborative working relationships with other IOUs and CPUC staff. In addition, SCE has had consistent commitment to ETP in terms of expertise, resources, and budget allocation and has successfully met or exceeded all program goals since the program's inception over 10 years ago.²⁸

SCE has led efforts with innovation-focused organizations such as the Los Angeles Cleantech Incubator (LACI), CEC grant programs (CalSEED and Regional Clusters), and CleanTech Open. SCE has also helped foster innovation through outreach activities such as the Technology Resource Innovation Outreach (TRIO) initiative and through collaboration with the Department of Energy's early stage technology completion effort (First Look West – FloW) and the newly formed Rocket Fund, both managed by CalTech. In addition, SCE has reviewed over 500 ideas and launched over 100 new measures or technologies and various pilots through its ideation process, many of which were funneled into the process or reviewed with the support of SCE's ETP.

SCE also has a team of technical experts within ETP to review potential products and services for SCE's demand-side management (DSM) programs. SCE's team of DSM technical experts brings the expertise required to effectively engage with ETP's collaborators and peers. SCE's staff includes trained, professional engineers who have the necessary skills and proficiency to oversee technology projects. SCE's Lead Program Manager has over seven years

²⁷ The PY2013-2014 ETP Targeted Effectiveness Evaluation concludes "ETP consistently exceeds PIP objectives. Moreover, the ETP exceeded some objectives by significant amounts....Objectives were achieved within allocated budget,...[and] projects align with CEESP end-use areas." Opinion Dynamics Corp., & Energy and Resource Solutions. (2015, November). *PY2013-2014 Emerging Technologies Program Targeted Effectiveness Study Report, CALMAC Study ID CPU0112.01*, pp.41-42. Retrieved from http://www.calmac.org/publications/PY2013-2014_ETP_Targeted_Effectiveness_Evaluation_Volume_I_FINAL.pdf

²⁸ Opinion Dynamics Corp., & Energy and Resource Solutions. (2015, November). *PY2013-2014 Emerging Technologies Program Targeted Effectiveness Study Report, CALMAC Study ID CPU0112.01*. Retrieved from http://www.calmac.org/publications/PY2013-2014_ETP_Targeted_Effectiveness_Evaluation_Volume_I_FINAL.pdf; Opinion Dynamics Corp., & Itron, Inc. (2013, December 10). *PY2010-2012 California Statewide Emerging Technologies Program Phase II Program Effects Report, Volume I, CALMAC Study ID CPU0066.03*. Retrieved from http://www.calmac.org/publications/ETP_Phase_II_Program_Effects_Report_Volume_I_FINAL.pdf

of leadership as the statewide ETP lead, over 10 years at SCE, and over 15 years in technology development within the utility and DSM context. SCE's team also includes a full-time staff that brings a combined 75 years of expertise to administrating the statewide ETP. In addition, SCE's DSM technical experts also collaborate closely with other experts across SCE to coordinate projects and to help determine how new technologies will impact the grid. This is vital to help California build the grid of the future that supports customer choice, the two-way flow of electricity, and the ever-expanding adoption of distributed energy resources — energy efficient equipment, rooftop solar, onsite energy storage, electric vehicles, and energy management systems — to achieve cost savings, cleaner energy, conservation, and enhanced reliability. SCE will continue to leverage this expertise through its Electric Emerging Technology Program to support the IOUs and the State of California so that the plug-and-play-grid-of-the-future reaches its potential. SCE looks forward to continuing and building upon its effective leadership of ETP²⁹ as it transitions to administering the statewide Electric ETP in 2018.

2. Lighting (Primary Lighting, Lighting Innovation and Lighting Market Transformation)

The IOUs recommend that SCE be the statewide PA for the Lighting programs. SCE leads the state in energy savings claimed through the statewide primarily lighting programs³⁰ and is the low-cost leader compared to the other IOUs on a \$/kWh basis.³¹ In addition, SCE's upstream lighting approach concept has been replicated in other states.

SCE has also been the historical lead for the Lighting Market Transformation (LMT) and Lighting Innovation (LI) programs, which have contributed to SCE's effective Primary Lighting program in the past. Through these programs, SCE has embarked on various pilots that have provided valuable data related to future program design and implementation. Sample successes include the development of a midstream delivery channel for lighting technologies that continues to expand into other technology categories today. This and other pilots conducted by SCE have focused on customer engagement and partnering with large organizations established at a nationwide level. SCE has the expertise in lighting to continue developing and researching energy efficiency lighting products that will aid towards future initiatives.

In its 2017 budget Advice Letter, SCE planned to defund both LMT and LI as stand-alone program areas, noting that some aspects of the programs could be integrated into the Emerging Technologies program. In the immediate term, SCE sees no need for this strategy to change, and funding is already set aside to complete its remaining pilots; however, SCE may

²⁹ SCE has demonstrated strong statewide leadership in the realm of Emerging Technologies. Not only has SCE collaborated well with its IOU partners, it has built strong working relationships with Energy Division, CEC-PIER, SMUD, LADWP, BPA, NEEA, NYSERDA, DOE, and industry leaders across the U.S.

³⁰ SCE's claims 75% of all energy savings claimed through the statewide primary lighting program.

³¹ Southern California Edison. (2016, December 14). *Advice 3465-E-A (U 338-E) Supplemental Filing to Advice 3465-E, Southern California Edison Company's 2017 Annual Energy Efficiency Program and Portfolio Budget Request*. Retrieved from <https://www.sce.com/NR/sc3/tm2/pdf/3465-E-A.pdf>

also leverage third-party solicitations to garner new program ideas in this space as long as overall portfolio cost-effectiveness can be maintained.

3. Commercial New Construction – Savings by Design (SBD)

The IOUs recommend that SCE be the statewide lead for the Commercial New Construction – SBD Program.

Coupling of SBD and the Electric ETP under SCE will help California reach ZNE in the commercial sector by 2030 as we endeavor for the two programs to work together to shepherd nascent technologies from ETP into SBD. In addition, the grouping of Electric Emerging Technologies, all Lighting program areas, and SBD programs under SCE will provide California with an end-to-end focus on lighting that begins with the evaluation of new lighting technologies and ends with code readiness through nonresidential new construction. This combined programmatic approach will also be an important factor in SCE's pursuit of achieving ZNE on behalf of our customers and for California given that lighting is one of the primary end-use measures in both the commercial and the residential markets.

However, SCE's approach to SBD will be much more holistic. We will also focus on supporting a Whole Building Approach to project opportunities. This will be done by streamlining the design and implementation activities with customers, design teams, and partner trade associations, all with the common goal of developing and constructing the most energy-efficient buildings and communities possible, with a focus on preparing the industry for zero net energy buildings.

In addition, SCE has over 18 years' experience in administering the SBD Program and has stimulated whole-building energy modeling & ZNE building designs by supporting the development of more advanced modeling programs. SCE is a top-two performer in terms of cost on a \$/kWh basis and also has the capacity to administer the program on a statewide basis.³² SCE also has a long-standing partnership with SoCalGas for program delivery, in which SCE provides recommendations, pays the customer incentives, and processes the Therm savings on the behalf of SoCalGas. Some examples of these programs are the SBD Program and PLA Program. This partnership demonstrates SCE's ability to partner with other PAs to administer programs.

To strengthen SBD moving forward, SCE will issue a competitive Request for Proposal (RFP) to enhance resources in the areas of program design, implementation, and processing, as appropriate.

4. Government Institutional Partnerships – UC/CSU and CA Community Colleges

The IOUs recommend that SCE be the statewide lead for the Government Institutional Partnerships – UC/CSU and CA Community Colleges program. SCE is the current statewide lead for the UC/CSU Partnership. SCE has deep knowledge of the customer base and has dedicated

³² Southern California Edison. (2016, December 14). *Advice 3465-E-A (U 338-E) Supplemental Filing to Advice 3465-E, Southern California Edison Company's 2017 Annual Energy Efficiency Program and Portfolio Budget Request*. Retrieved from <https://www.sce.com/NR/sc3/tm2/pdf/3465-E-A.pdf>

resources committed to helping the UC/CSU system and other higher-education partners meet our shared DSM, ZNE, and environmental goals. SCE's Program and Account Management team has the institutional knowledge and the relationships with this customer base to provide guidance and to help meet evolving energy and environmental goals, which are unique for the higher-education customer segment.

SCE has been successful in meeting its goals in a cost-effective manner and is the low-cost leader in administering the UC/CSU Program and a leader in administering the CCC Program on a \$/kWh basis.³³ In addition, SCE also has the information technology systems infrastructure necessary to support program administration at the statewide level, including unique online application capabilities.

SCE is driving innovation in the higher-education segment and has submitted a high opportunity project or program (HOPPs) proposal to the Commission for the Public sector with a UC/CSU focus to help drive deeper savings.³⁴ SCE has also helped UC/CSU partners meet their DSM, ZNE, and environmental goals through SCE's ETP, for which SCE is also the proposed statewide lead, thus ensuring a continued synergy between the Electric ETP and the Institutional Partnership programs.

5. Water Infrastructure Systems Efficiency Program (WISE)

WISE is a DSM program designed to provide EE solutions to water production, distribution, and treatment systems. The program serves water agencies, special districts, and local governments with a focus on water treatment, wastewater treatment, and pumping facilities and systems. The WISE program was originally launched out of SCE's IDEEA 365 solicitation, was a pilot for approximately 18 months, and is now transitioning to a mainstream third party-implemented program. SCE's extensive experience with the WISE pilot will be useful for conducting the program on a statewide basis as a downstream pilot.

Southern California Gas Company (SoCalGas)

1. Residential New Construction

SoCalGas is committed to administering dual-fuel energy efficiency program offerings on behalf of all PAs and many publicly-owned utilities in its shared service territories. SoCalGas has demonstrated that it has been the most cost-effective administrator of the Residential New Construction program, on a \$/therm basis. SoCal Gas' demonstrated experience of successfully managing dual-fuel energy efficiency programs to customers, coupled with the discipline on cost-effective implementation, well-positions SoCalGas to assume statewide leadership of the Residential New Construction program.

³³ Retrieved from <http://eestats.cpuc.ca.gov/views/EEDDataPortal.aspx>

³⁴ Southern California Edison. (2016, August 22). Advice 3460-E (U 338-E) *Submission of High Opportunity Projects and Programs Proposal – Public Sector Performance-Based Retrofit Program*. Retrieved from <https://www.sce.com/NR/sc3/tm2/pdf/3460-E.pdf>

SoCalGas has the infrastructure, systems, and discipline in place to manage complex, multi-dimensional energy efficiency programs across multiple service territories. For example, SoCalGas has 28 joint programs with municipal electric utilities and water agencies, such as Los Angeles Department of Water and Power (LADWP), including the Residential New Construction Program. SoCalGas also has long-standing partnerships with PG&E, San Diego Gas and Electric (SDG&E), and SCE in delivering joint gas and electric programs throughout the shared service territory. Since 2013, SoCalGas' California Advanced Homes Program has enrolled more than 25,000 new home units in its shared service area with combined builder project incentives of over \$15 million – the most in California.

In addition to partnerships with other utilities, SoCalGas has strong relationships with manufacturers, distributors, and builders to deliver the Residential New Construction program. SoCalGas works together with all its market actor partners to help the building industry design and develop more environmentally-friendly communities and support California's efforts for new single family homes to reach ZNE by 2020. SoCalGas seeks to leverage its learning from active partnerships with Metropolitan Water District and LADWP's Water Conservation teams to increase the speed to market as water conservation becomes an increasingly important component of the Residential New Construction equation throughout California. SoCalGas intends to administer a program with a crosscutting focus on sustainable design and construction, green building practices, energy efficiency, and emerging technologies. SoCalGas' experience in delivering dual-fuel programs by bringing all market actors together in an engaged partnership, positions it to implement this vision.

2. Gas Emerging Technologies Program (ETP)

As a gas-only utility, SoCalGas is focused on developing efficient new natural gas technologies to fit the needs of California customers. The statewide ETP initiative has been successful in bringing new and underutilized technologies into the utility energy efficiency portfolios based on the strong, collaborative network (the ETCC) formed among the ETP staff at the four IOUs, as well as Sacramento Municipal Utility District and LADWP. These relationships will not disappear in the new statewide Administration model, but rather will be enhanced under SoCalGas' administrative leadership. As described for the Residential New Construction program, SoCalGas has a strong reputation for collaborative leadership among a wide range of market actors and key ET information and policy organizations, such as the American Council for an Energy-Efficient Economy (ACEEE), Consortium for Energy Efficiency (CEE), and Energy Solutions Center (ESC). This leadership will extend to Gas Emerging Technologies.

Creating two distinct gas and electric Emerging Technologies Programs will allow for greater focus on a wider range of energy-specific new technologies. SoCalGas is a recognized leader in bringing new efficient gas technologies to market. Gas ETP will build on the existing statewide program framework, such as using the ETCC collaboration structure, in-house and external testing facilities, and the experience of more than a hundred heating technology assessments delivered in the past five years. SoCalGas has close relationships with the CEC natural gas Public Interest Energy Research programs and the Gas Technology Institute, to bring new, energy-efficient gas technologies into the portfolio. As the statewide ET program currently operates, natural gas technologies can often be a secondary focus to electric

technologies given the higher portion of electric energy efficiency budgets among the IOUs. However, SoCalGas' ET efforts have ensured that progress in gas technologies continues to reap the significant energy saving sought by the state. With two distinct electric and gas ETPs, the programs can laser focus on the development, assessment, and introduction of more new and underutilized technologies, without regard to fuel prioritization. It will also enable a more relevant engagement with stakeholder organizations, given the manufacturers, distributors, trade allies, and member organizations associated with natural gas technologies are significantly different than the electric counterparts. For technologies with dual benefits, such as energy management systems, SoCalGas and SCE will closely partner, as they often do already, to efficiently use program resources. They will also collaborate to ensure that program administration, strategy and product and process quality controls are set at high levels, enforced and cost-efficient. SoCalGas looks forward to continuing its successful program administration and collaboration as it transitions to administering the statewide Gas ETP.

3. Foodservice POS Rebate and Midstream Water Heating Programs

Ordering Paragraph 8 of D.16-08-019 requires that all upstream and midstream programs in the existing portfolio, including but not limited to those listed in the decision, plus new programs proposed in business plans that are market transformation, upstream, or midstream, shall be delivered statewide. SoCalGas currently offers two midstream programs: Foodservice POS Rebate and Midstream Water Heating, which SoCalGas intends to continue to offer as part of the rolling portfolio. In this new paradigm, these programs will be delivered statewide, led by SoCalGas.

The Foodservice POS Rebate program seeks to increase the sales of high efficiency commercial foodservice equipment by engaging midstream market actors to stock and actively market high efficiency equipment. The Midstream Water Heating program's objective is to push higher efficiency water heaters into the non-residential market by leveraging the distributor and contractor communities. SoCalGas will leverage its experience in administering these programs to expand their delivery statewide.

San Diego Gas & Electric (SDG&E)

SDG&E is a lean, efficient Program Administrator. Even though SDG&E's territory has key factors that work against cost-effectiveness (limited Industrial sector and a relatively small portfolio – \$116.5M), SDG&E has been able to create a portfolio with a TRC greater than 1.5 as well as creating a competitive lifecycle cost for energy efficiency measures. Building upon this platform for success, SDG&E's statewide lead assignments are based on its vision for the future of these statewide program offerings.

1. Upstream Heating, Ventilation, and Air Conditioning (HVAC)

SDG&E has proven leadership in HVAC innovation. As the residential HVAC lead for almost four years, SDG&E's proven statewide leadership has identified opportunities to synergize customer offerings with complete cradle to grave innovative through our upstream, midstream and downstream HVAC programs. SDG&E has collaborated with HVAC industry

stakeholders to increase and optimize the performance of the HVAC programs to increase customer comfort, improve air quality, reduce operating costs, and save energy for all customer segments. As the HVAC marketplace evolves, SDG&E has incorporated Pay-for-Performance contracts, customer-centric design, cost reductions, increased energy savings, Advanced Meter Infrastructure data analytics, Integrated Demand Side Management solutions, whole building integration, and cutting edge advanced technologies to meet the demands of the changing landscape of California's Legislation (e.g. AB 758, SB 793, SB 1414, SB 350, AB 802).

2. Midstream Plug Load and Appliances (PLA)

SDG&E's innovative approach will accelerate market-based energy-efficient purchases. A strong drive to identify process improvements, reduce costs and resources to implement effective programs while improving the customer experience requires a core team of creative, thoughtful innovators. In early 2016, SDG&E overhauled and redesigned the water and energy-savings kit program, part of the Plug Load and Appliance program. SDG&E leveraged our team's extensive experience with sourcing, fact-based negotiating and contracting to secure volume discount pricing and streamline processes resulting in a 50% reduction in the cost of water and energy-savings kit administration. Additionally, SDG&E reduced customer order fulfillment to less than 10 days improving the customer experience.

SDG&E will be leveraging the team's strengths and experience from the other IOUs to realize significant results on a statewide scale. SDG&E believes that the statewide administration of the midstream PLA Program can elevate access of efficient end-use products while facilitating emerging energy management technologies.

As the statewide lead for the midstream PLA Program, SDG&E will partner with manufacturers, distributors, retailers and other influential market participants to develop comprehensive and innovative initiatives that reduce energy usage across technologies with high savings potential. SDG&E intends to consider multiple intervention strategies for program delivery including, but not limited to Retail Products Platform, Point of Sale or a hybrid approach. Additionally, upstream and midstream partnerships will be leveraged to increase the visibility and eventually decrease the cost of energy management technology. SDG&E also intends to collaborate with those key market actors to increase demand for national connectivity standards and protocols, which will ultimately improve adoption and customer experience for those technologies. Finally, SDG&E recognizes that an energy management hub, be it physical or virtual, will be an integral part of a home owner's energy management. Through this home network, customers will have unprecedented access to information and control of their homes.

3. Residential QI/QM (Downstream Pilot)

The rapid growth of air conditioning in California homes has made it one of the state's largest energy consuming end-uses and the single largest contributor to peak demand. Activities designed to improve HVAC efficiency, therefore, provide a significant opportunity to improve energy efficiency and reduce peak power demand. Historically, programs that have targeted maintenance and installation aspects of the HVAC market have been plagued with

poor cost effectiveness, low realization rates, and minimal market participation. This has resulted in mixed opinions and interest from the HVAC industry.

In alignment with the California Long Term EE Strategic Plan³⁵, SDG&E will seek to overcome the barriers that have caused program performance issues in the past. This strategy will employ a five point approach:

- a. Improve HVAC system performance to generate greater savings for customers;
- b. Enhance requirements to insure that only qualified contractors can participate;
- c. Simplify the assessment and measurement approach to optimize cost effectiveness;
- d. Employ a pay for performance approach to align incentives with savings; and
- e. Create value propositions that address and overcome the “run to fail” mentality for equipment maintenance and installation.

In addition to the changes described above, these efforts will result in customers increasingly valuing the improved health and safety and lower maintenance or replacement costs better HVAC systems can provide.

V. Governance

To ensure success of this new statewide administration model, the IOUs are working to develop a statewide program governance structure for a number of administration elements, such as program budgets and customer satisfaction. The Program Administrators will attempt in good faith to resolve any dispute or concern arising out of or in relation to the statewide administration of energy efficiency programs through negotiations between an authorized representative of each of the PAs with authority to settle the relevant dispute via Regular Meetings. When agreement cannot be reached via these meetings, any Program Administrator can trigger the formal Commission dispute resolution process. The following is a discussion of how IOUs intend to address certain are topics that may benefit from governance. The governance process must be flexible in order to allow Program Administrators to adjust as they gain experience with statewide program administration.

Communication

To promote statewide program collaboration, all Program Administrators will participate in periodic meetings to review key issues including program performance, implementer performance (key performance indicators) and program direction. The Lead

³⁵ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, Section 1. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

Program Administrator is responsible for hosting these meetings. All PAs will file regulatory documents and provide periodic reporting. The Lead PA will file on behalf of the overall statewide programs and the other PAs will report on local impacts (savings and budget). All PAs are responsible for regular and ongoing communications, above and beyond compliance filings and regulatory reporting requirements, for program elements specific to their own service territory.

Contract and Fiscal Management

The Lead PA is responsible for program monitoring and oversight, including but not limited to savings, budget, key performance indicators and other contract terms. The Lead PA is not authorized to unilaterally make budget decisions without explicit approval from affected PAs. Upon which time, the Lead PA is responsible for following the regulatory compliance process should said change trigger an Advice Letter or update to the Implementation Plan.

Downstream Programs: Custom Project Support

For downstream statewide programs, the Implementer, in coordination with the Lead PA, is responsible for consistently applying regulatory requirements for custom projects. Custom projects may be additionally supported by local sales representatives that can help the customer and Implementer with project development.

New Programs, Material Scope Changes, Program Closures

In the event that a PA identifies a need for a new upstream or midstream program, this proposal should be presented to all PAs for consideration within their portfolios. If all PAs agree that the new program meets a market need in a cost-effective manner that leads to market transformation, the program will be put forth as a statewide program through an Advice Letter to the Commission. No one PA can unilaterally launch a statewide program without the broad support, including budget and energy savings commitments, from the other PAs. Additionally, the PA that proposes the program is not the presumptive lead and the determination for Lead PA for the new program is to be addressed among all PAs. If consensus cannot be reached for a proposed new upstream or midstream program, a non-statewide approach can be brought to the Commission for consideration with sufficient justification from the proposing PA.

Changes to existing program scope and budget must be discussed among all PAs as there may be a material impact should one PA assert a material change to their budget commitments. Proposals to close a program must have agreement among all PAs before filing an Advice Letter to advise the Commission of intent to close a program.

Statewide Program Council

A Program Council will be formed for each statewide program, to serve as an oversight body to support the PAs in decision-making and strategic direction. The Program Council is comprised of Authorized Representatives of participating PAs. All authorized participants must be invested in the chosen outcome and a consensus approach is preferred to prevent those in the minority feeling marginalized or left out of the decision-making process.

Program Council Responsibilities to Include:

- Informed Decision-making: review materials, provide feedback and ask questions, as necessary to make an informed decision on the matter-at-hand.
- Active Participation: Attend meetings, share opinions and experience, ask questions and designate a delegate when necessary.

Dispute Resolution

In the event of a dispute between the PAs concerning the design, implementation or performance of any statewide-administered energy efficiency program, such matter or matters in dispute shall be finally settled in a meeting of the Program Council or, if necessary, by the Commission.

VI. Roles and responsibilities in Statewide Program**Administration**

In D.16-08-019, the Commission laid the foundation for the relationship between a Lead Administrator and the other Program Administrators, expecting “a consultative and collaborative process with the other administrators, either via the CAEECC or via separate sector and/or program-level coordination venues created and hosted by the lead administrators and involving all other relevant administrators.”³⁶ In a collaborative and inclusive process, identification of key program administrator responsibilities and the corresponding roles between the Lead Program Administrator, Non-Lead Program Administrators (herein referred to as Other Program Administrators), and Statewide Implementer(s) are essential in the successful management of statewide programs. It is expected that the assigned duties will vary among upstream, midstream, and downstream programs. However, the Commission notes that maintaining the connectivity between the IOUs and their customers is considered critical for success.³⁷ Customers will largely continue to engage in energy efficiency programs through the local utility websites, use of local marketing campaigns, local outreach efforts, and call centers, and potential engagement from local sales representatives.

For each statewide program, the IOUs will detail specific roles and responsibilities in the distinct implementation plans, to be developed following Business Plans filings. Following are some key principles governing the relationship between the Lead and Other Program Administrators:

³⁶ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 54

³⁷ “Utilities have an ongoing ability and responsibility to determine the needs to serve their customers.” California Public Utilities Commission. (2016, August 25). D.16-08-019, Conclusion of Law 61.

- The Lead PA has lead responsibility for program design and delivery, procurement, contract administration (including co-funding agreements where appropriate), invoicing, and contract payments. Final decisions regarding program design and delivery, in collaboration with Implementer(s), shall be agreed upon by all IOU administrators with guidance from the Program Council as necessary.
- The Lead PA is responsible for overseeing Implementer performance, including the achievement of contract goals, meeting energy savings and cost-effectiveness goals, and achieving customer satisfaction service levels in all IOU service territories.
- The Lead PA should consider, support, and where feasible, facilitate all local HOPPs and program partnerships, including those with publicly-owned utilities and public agencies, which address local issues or locational constraints.
- The Lead PA (or Implementer) shall provide regular reports including energy savings accomplishments, energy savings forecasts, incurred costs, forecasted costs, and other relevant metrics to Other PAs.
- The PAs will work together to grant relevant and appropriate data access and/or operations system access to selected Implementer(s), and ensure Implementer complies with Commission data security and privacy requirements.
- The Lead PA is not authorized to exceed approved IOU service territory budgets without written consent of all IOU administrators through the Program Council, as necessary.
- All IOUs may propose changes in program funding, or propose cancelation of program activity, based on local concerns or portfolio needs, including fund shifting. Changes should be approved by the impacted IOU administrators through the Program Council.

Statewide administration will require the coordination and collaboration of the statewide Lead PA, other Program Administrators funding the statewide program, and Implementer(s) chosen to design and deliver the statewide programs. Clear roles and responsibilities for each party should result in efficiencies by minimizing duplication of effort. The IOUs envision four high-level functional areas:

- Solicitation Management
- Program Management
- Program Support
- Evaluation, Measurement, and Verification (EM&V)

A high-level overview of the various roles and responsibilities by function and task are provided below. While the categories will remain consistent, roles and responsibilities for the various tasks may differ across types of programs and market interventions and updates will be made as necessary. As statewide administration is a new concept, roles and responsibilities may evolve over time to ensure we achieve the objectives for statewide administration, as set forth by the Commission in D.16-08-019.

Category 1: Solicitation Management

Request for Proposal (RFP) Design	
Lead PA	(1) Host RFP design meeting to gather input on the general vision and direction of the program and determine applicable intervention strategies to be addressed by RFP.
	(2) Develop appropriate metrics for each strategy including budget, savings and cost-effectiveness targets, target sectors / subsectors, key performance indicators, etc.
Other PA	(1) Provide input on the general RFP design and vision for the program.
	(2) Provide input regarding appropriate metrics for each strategy including budget, savings and cost-effectiveness targets, target sectors / subsectors, key performance indicators, etc.
Implementer	Not yet engaged.

RFP Management	
Lead PA	(1) Issue RFP.
	(2) Host PRG meetings in accordance with RFP process.
Other PA	(1) Participate in PRG meetings.
Implementer	Not yet engaged.

Category 2: Program Management

Program Design (as reflected in IP)	
Lead PA	(1) Provide input to Implementer on program design once bids are solicited.
Other PA	(1) Provide input to Lead PA on program design once bids are solicited.
Implementer	(1) Design program approach based on intervention strategies; budget, energy savings, and cost-effectiveness targets; other key performance indicators; and target sectors / subsectors.
	(2) Incorporate stakeholder input into final program design as collected via the CAEECC process.

Implementation Plans	
Lead PA	(1) Upon selection, Lead PA and Implementer will refine program scope, as needed.
Other PA	(1) Participate in CAEECC to provide input on Implementation Plans.
Implementer	(1) Upon selection, Lead PA and Implementer will refine program scope, as needed.
	(2) Implementer will act as primary author of Implementation Plan, to be approved of initially by Lead PA before presented to CAEECC for stakeholder input.
	(3) Present Implementation Plan at CAEECC to solicit input on Implementation Plan.

Key Performance Indicators	
Lead PA	(1) Upon contract award, and as a part of post-award refinement, Lead PA and Implementer finalize Key Performance Indicators.
	(2) Gather data on a monthly basis and review Implementer performance along with program performance on a quarterly basis.
	(3) Lead PA is the sole determiner of rewards or corrective action based on Implementer performance.
Other PA	(1) Other PA is kept informed of Key Performance Indicators.
	(2) Provide feedback to Lead PA and/or Implementer based on Key Performance Indicators, and any concerns or comments on efforts/results in own territory.
Implementer	(1) Implementer gathers data for Key Performance Indicators on a rolling or monthly basis (as relevant).

Program Delivery	
Lead PA	(1) Provides support to Implementer, including use of local utility website, local marketing campaigns, local outreach efforts, call centers, and engagement from sales representatives.
Other PA	(1) Provides support to Implementer, including use of local utility website, local marketing campaigns, local outreach efforts, call centers, and engagement from sales representatives.
Implementer	(1) Independently deliver program to target sectors / subsectors. Implementer(s) may collaborate with local sales representatives as relevant.
	(2) Monitor performance to ensure program meets budget, energy savings, and cost-effectiveness targets as well as other key performance indicators.
	(3) Continuously improve program delivery based on evaluation of program performances.

Program Support and EM&V needs for statewide programs will be determined after Implementation Plans are developed.

RESIDENTIAL CHAPTER

Residential Sector Snapshot

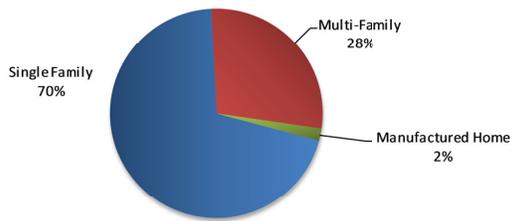
Residential Customers by the Numbers		2015 Totals	
Customer Count (Number of Customers)			
Single Family		3,683,251	
Multi-family		1,855,438	
Manufactured Home		1,483	
Sector Total		5,540,172	
Program Participation (% of total)			
Residential Total Projects		327,044	
Residential Percentage		5.9%	
Single Family		7.0%	
Multi-family		3.2%	
Manufactured Home		0.2%	

Annual Consumption (Therms)	2010-2015		2015
	Average	Trend	Totals
Single Family	1,639,185,025		1,420,826,386
Multi-family	638,227,737		570,261,799
Manufactured Home	43,436,886		37,921,490
Sector Total	2,320,849,648		2,029,009,675

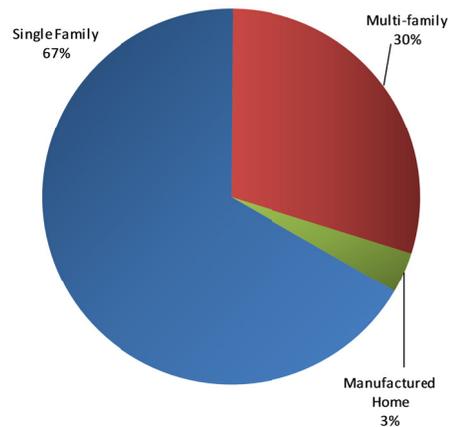
Energy Savings (Therms)	2010-2015		2015
	Average	Trend	Totals
Single Family	3,722,139		2,939,758
Multi-family	2,059,907		1,307,988
Manufactured Home	497,611		153,904
Sector Total	6,279,656		4,401,651
Energy Savings as % of EE Portfolio	21.3%		17.4%

Notes:
 Manufactured Home Customer Count includes master-metered accounts, and may not be reflective of individual dwellings.
 Program Participation is based upon non-consolidated figures (e.g. each rebate application is counted individually).
 Sparklines represent 2010-2015 data. Green and Red dots identify low and high points respectively.

2015 Residential Gas Consumption by Segment



2015 Residential Energy Savings by Segment



A. Residential Sector Chapter Summary

The residential sector is entering a period of great change with new market entrants, new innovative energy efficiency programs, and government regulations promising to reshape the market in the upcoming years. California households consume approximately 620 therms annually per household, 31% lower than the United States average, due largely to California's mild climate.³⁸ To realize the vision for the residential sector customers, SoCalGas has developed the following goals:

- Goal 1:** Achieve comprehensive, deep energy efficiency levels through a whole house approach.
- Goal 2:** Increase energy efficiency adoption levels for all residential customers with a focus on multi-family customers with high potential through efficient outreach and effective offerings.
- Goal 3:** Increase adoption of energy-efficient gas appliances and energy management devices.
- Goal 4:** Through the promotion of gas efficiency, enable new construction to achieve zero net energy (ZNE) performance levels.

Residential Sector Vision

Residential energy use will be transformed to ultra-high levels of energy efficiency. All cost-effective potential for energy efficiency will be routinely realized for all residential properties and will fully integrate with other customer demand-side management options – including clean renewables – on a site-specific basis.

B. Approach to Achieve Residential Sector Goals

The residential sector Business Plan includes a combination of proven and newer program strategies. These strategies are coupled with new approaches to efficiently identify customers with the greatest energy efficiency opportunities using data analytic advancements enabled by SoCalGas' advanced meter infrastructure (AMI). Using data analytics and traditional outreach approaches, SoCalGas will offer an integrated set of program strategies that meet the customer's unique energy efficiency needs.

Though the residential sector represents a very diverse customer base, residential customers use natural gas in similar ways. The large number of residential customers within the service

³⁸ United States Energy Information Administration, Independent Statistics and Analysis. (2012, June 12). Residential Energy Consumption Survey data show decreased energy consumption per household. *Today in Energy*. Retrieved from <http://www.eia.gov/todayinenergy/detail.php?id=6570>

territory results in significant energy efficiency potential. Specific program strategies will be offered to the customer to permanently capture these potential energy savings. To encourage greater adoption of energy efficiency among all residential customer segments, SoCalGas will offer a simple, low cost suite of programs that are tailored to the unique customer characteristics of the residential sector.

The sector strategies have been developed to address the residential sector's unique set of barriers that inhibit the customer from achieving greater levels of energy efficiency. Typically, multiple barriers co-exist in the same market as summarized in the identified challenges. These barriers will be reduced by a complimentary, integrated set of program intervention strategies that will actively engage the residential customer to capture both stranded market and economic energy efficiency potential. SoCalGas has distilled these barriers into the following sector challenges:

Challenge 1: Whole House retrofits are too costly for customers and the current program design is cost-ineffective.

The high first cost market barrier is the largest obstacle to whole house retrofits. The 2014-2015 Energy Upgrade California Home Upgrade Program process evaluation noted that the cost of equipment continues to be a major barrier to participation, particularly among near-participants who reported an annual income below \$100,000. In response, program participants are increasingly turning to financing options to fund the large capital cost associated with whole home retrofits.³⁹ Financing program participants spent far more money on whole house projects than rebate participants or non-participants.⁴⁰ Still the vast majority of homeowners (75%) prefer not to use any form of financing.⁴¹ The existing program is cost-inefficient in its current design.⁴² Within the 2013-2015 program cycle, the program constituted over \$17 million in program expenditures and consistently achieved its savings

³⁹ EMI Consulting and Tetra Tech. (2016, October 17). *Energy Upgrade California, Home Upgrade Program Process Evaluation 2014-2015, CALMAC Study ID PGE0389.01, pp. 69-70*. Retrieved from http://www.calmac.org/publications/EUC_Home_Upgrade_Process_Evaluation_Report_Draft_2016.08.24_%28CLEAN%29.pdf

⁴⁰ The Cadmus Group. (2016, October 3). *HERO Program Profile Final Report, CALMAC Study ID PGE0388.01*. Retrieved from http://www.calmac.org/publications/HERO_Program_Study_Final_Report.pdf

⁴¹ Opinion Dynamics Corp. & Dunsky Energy Consulting. (2016, March). *PY 2014 Finance Residential Market Baseline Study Report, Volume I of II, CALMAC Study ID CPU0131.01*. Retrieved from http://www.calmac.org/publications/PY2014_Residential_Finance_Market_Baseline_Volume_1_FINAL.pdf

⁴² A recent increase in Home Upgrade job submittals demonstrates that recent utility program improvements have addressed participation requirements identified by CPUC evaluation studies. However, these tactical improvements do not address the cost-effectiveness issue of the whole building design.

targets; however, the cost-effectiveness was well below the cost-to-benefit ratio threshold.⁴³ In an effort to increase customer participation in the municipality territory, SoCalGas leveraged existing municipality direct install home upgrade offerings that were led by the publicly-owned utility (POU) and SoCalGas provided additional funding to include gas measures to offer a comprehensive suite of electric and gas measures. Other municipalities have expressed interest in this model and SoCalGas will work with those POUs to expand this model.

Challenge 2: Low participation across residential sector, especially in the multi-family segment.

The multi-family segment is very diverse. Multi-family buildings vary widely in terms of heating, ventilation, and air-conditioning (HVAC) systems, building size, tenant incomes, finance structures, and ownership structures - all significant factors that affect decision-making. These characteristics make the multi-family sector extremely diverse in their decision-making and thus require innovative energy efficiency strategies. For example, multi-family building ownership is not highly concentrated, which means more decision-makers must undertake the effort and be convinced before the building sector as a whole can reach its efficiency potential at scale.⁴⁴ To that point, building owners with fewer properties may have less motivation to undertake the effort to understand the incentives, measures, and other relevant factors, or have fewer staff available to assist them in doing so.

Split-incentives exist in both multi-family and single family homes. It is difficult to influence the energy efficiency decision-maker in the residential sector because of split-incentive issues. Under most multi-family unit leases, energy costs are paid directly by tenants, therefore, building owners are not motivated to invest in efficient building systems. For some leases, however, building owners pay energy expenses and tenants have little incentive to save energy in their leased space. This split-incentive barrier is also growing in the residential new construction area between the builder and future homeowner. Additionally, AB 802 has led the way for High Opportunity Projects and Programs (HOPPs) to be implemented by IOUs. These programs may capture stranded energy efficiency opportunities and should measure pre- and post- building performance. SoCalGas' HOPPs, including the Central Water Heater Multi-family Building Solution program, will explore and address the owner/tenant split-incentive.

Multi-family owners lack capital funds to invest in energy efficiency improvements. Some owners find it difficult to convince lenders of the required building expenses and energy efficiency upgrades. In addition, many owners may not have the credit or collateral to obtain secure financing options to implement energy efficiency projects.

⁴³ Southern California Gas (SoCalGas) Company. (2016). *Energy efficiency annual reports 2013-2015*. Retrieved from <http://eestats.cpuc.ca.gov/views/documents.aspx>

⁴⁴ Energy Programs Consortium. (2013, November). Multifamily energy efficiency: Reported barriers and emerging practices. *American Council for an Energy Efficient Economy*, p. 10. Retrieved from http://aceee.org/files/pdf/resource/epc_%20multifamily_housing_13.pdf

Performance uncertainty related to mild climate and low energy costs. The relatively low cost of natural gas and southern California’s mild climate creates customer uncertainty in the value, both short and long-term, of energy efficiency investments. Additionally, equipment tends to last longer in southern California’s dry, mild climates, further impacting the customer’s uncertainty of the benefits in replacing working equipment.

Lack of confidence regarding the future energy savings and bill reduction associated with retrofits or changes in customer behaviors. This has limited the deployment of program strategies designed to permanently modify customer energy consumption levels and patterns. Recognition of behavioral energy efficiency is an integral part of achieving both market and economic potential within the residential sector. There is also a concern regarding whether behavioral energy efficiency can be captured and recognized while reducing the hassle and/or transaction costs barrier for the customer. With a reliance on AMI usage data, energy savings resulting from behavioral and equipment retrofits are readily recognized. A policy change is needed to recognize and encourage behavioral energy efficiency in the residential sector while reducing the customer’s transactional costs associated with participation in more comprehensive energy efficiency efforts.

Challenge 3: Appliance retailers re-evaluating support for point-of-sale rebate program offering due to growing participation costs.

Retailers affected by growing point-of-sale participation costs. SoCalGas has experienced first-hand a trend of retailers not willing to pay transactional costs for supporting energy efficiency purchases. The continued steady decline in the retail industry, since 2008, has caused many retailers to be much attuned to operational costs.⁴⁵ Major retailers⁴⁶ are withdrawing from point-of-sale (POS) programs due to rising transactional costs associated with their participation in the program. In the early stages of the POS program, the measures and retailers’ stock keeping units (SKUs) related to eligible measures were small enough for the retailers to manage. As the measure mix grew, so did the number of transactions, making it more costly to track, monitor and manage. Many of the large retailers are experiencing financial losses and are re-evaluating their participation for the following reasons: bar codes not matching eligible SKUs; invoicing of non-qualifying measures; and inability to track manual discounts.⁴⁷

⁴⁵ Bloomberg.com recently reported that until its third fiscal quarter last year, Wal-Mart had posted eight consecutive quarters of declining sales at stores open more than 12 months. Best Buy posted five straight quarters of profit decline before reporting a \$2.6 billion loss on March 29, while analysts forecast declining same-store sales and profit for Target this year. Banjo, S., & Fitzgerald, D. (2014, January 16). Stores confront new world of reduced shopper traffic. *The Wall Street Journal*. Retrieved from <http://www.wsj.com/articles/SB10001424052702304419104579325100372435802>

⁴⁶ Home Depot and Lowe’s hardware store chains.

⁴⁷ Illume Advising. (2016, July 20). *SoCalGas Cold Water Default Clothes Washer Process Evaluation, CALMAC Study ID SCG0217.01*. Retrieved from

Challenge 4: Diminishing returns and increasing costs are causing the residential new construction builder community not to pursue above code energy efficiency.

Above code energy efficiency is cost-prohibitive. Due to higher new construction costs, homebuilders are not incorporating above code energy efficiency into new homes, thereby creating lost opportunities.⁴⁸ With the United States economy in a steady recovery, the housing market, which had been hit severely during the recession, is beginning to make a comeback. As the housing market recovers, new home construction demand is increasing, and so are costs. According to the Engineering News-Record (as cited in Chinburg Properties), construction costs between March 2014 and February 2015 rose 2.9%, and for the previous 12 months rose 3.2% - exceeding the U.S inflation rate of the previous years.⁴⁹ While costs in every industry tend to increase slightly from year to year, there are additional factors affecting the construction market, causing a steady average price increase. Three main causes for rising construction costs include: rising material and transportation costs; competition for labor and tradespeople; and code compliance.⁵⁰

The continuation of aggressive building code has likely resulted in lost energy efficiency opportunities. With the launch of 2013 Title 24 Building Energy Efficiency Standards, the SoCalGas single family residential new construction program has experienced a substantial and consistent decline in enrollment and participation, creating energy efficiency lost opportunities. As Title 24 requirements become more rigorous, the builder community is moving away from attempting aspirational goals necessary to meet program qualification thresholds and simply building to code. This is partially a result of lower program incentives and whether the homebuyer will pay for the higher cost associated with above-code energy efficiency. As code requirements increase, the applicable benefit of the above code incentives decreases, thus causing longer payback periods for energy efficiency measures. Finally, recent code changes have allowed builders to opt for solar-ready building options in lieu of energy efficiency.

Due to this rigorous ever-changing upward code, the hard-won cooperative relationship between the IOUs and builders has begun to erode. Builders become indifferent to above code⁵¹ savings due to the decrease in financial benefits and thus become indifferent to building relationships with IOUs. Furthermore, with curtailed new construction program enrollment,

http://www.calmac.org/publications/SoCalGas_CWDCW_Process_Evaluation_Final_Report_07-20-2016.pdf

⁴⁸ Homebuilder outreach feedback has identified cost as a program participation barrier

⁴⁹ Engineering News-Record, as cited in Chinburg Properties, Inc. (2016). What to know about why new home construction costs are on the rise. Retrieved from <https://chinburg.com/4-reasons-new-home-construction-rising>

⁵⁰ Chinburg Properties, Inc. (2016). What to know about why new home construction costs are on the rise. Retrieved from <https://chinburg.com/4-reasons-new-home-construction-rising>

⁵¹ SoCalGas homebuilder feedback

touchpoint (relationship based, less face-to-face) opportunities for IOUs to educate and influence energy efficiency decisions by builders are also diminishing.

Desired Outcomes

The sector business plan identifies key milestones in the advancement towards a permanent market effect⁵² through a set of desired sector outcomes. In many cases, the desired outcome is expected well beyond the near and mid-term planning horizon, and ties to the 10-year vision for the sector. The business plan identifies the corresponding program intervention strategies that will be deployed to reduce the market barriers that will result in the desired sector outcome.

Table 1 - Desired Outcomes	
10-year Vision: Residential energy use will be transformed to ultra-high levels of energy efficiency. All cost-effective potential for energy efficiency will be routinely realized for all residential properties and will fully integrate with other customer demand-side management options – including clean renewables – on a site-specific basis.	
Challenges	Desired Outcome
Whole house retrofits too costly and program offerings cost-ineffective.	Increase the customer adoption of whole house gas energy efficiency solutions.
Low participation across residential sector, especially multi-family segment.	Increase customer adoption of gas energy efficiency solutions, including behavioral-related actions, across all residential segments especially the multi-family segment.
Appliance retailers re-evaluating support for point-of-sale rebate program offering due to growing participation costs.	Increase adoption of energy efficiency gas appliances in single family and multi-family segments.
Diminishing returns and increasing costs are causing the residential new construction builder not to pursue above code energy efficiency.	Increase the amount of above code energy efficiency gas technologies into new homes to avoid lost opportunities.

The following metric targets allow SoCalGas to continuously track the residential sector progress towards achieving these goals:

⁵² "A market effect is a [permanent] change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficiency products, services, or practices and is causally related to market interventions [i.e., program or government]." Eto, J., Prah, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Ernest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*, p. xii. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

Goal 1: Metric Target – Increase the number of homes with whole house gas energy efficiency solutions by 35% over 2015 levels by 2025.

Goal 2: Metric Target – Increase gas energy savings in multi-family sub-segments by 15% over 2015 levels by 2025.

Goal 3: Metric Target – Increase energy savings through adoption of energy-efficient home gas appliances by 15% over 2015 levels by 2025.

Goal 4: Metric Target – Increase gas energy savings from residential new construction by 15% over 2015 levels by 2020.

Residential Sector Budget

To facilitate the achievement of the residential sector goals, SoCalGas will rely on a coordinated combination of existing and new program intervention strategies. The following table shows the residential sector budget set aside for the 2018-2025 implementation of these strategies.

Table 2 – Sector Budget (\$000s)										
Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Residential	\$29,688	\$29,613	\$29,613	\$29,128	\$29,738	\$30,354	\$30,978	\$31,610	\$32,249	\$32,896

**2016 and 2017 are shown for historical purposes.

Table 3 contains the net therm savings forecast for the 2018-2025 timeframe, based on the 2015 Potential and Goals Study and the AB 802 Technical Analysis.

Table 3 – Annual and Cumulative Net Savings (MM Therms)										
Savings	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Annual	1.75	2.29	2.80	2.79	2.93	3.07	3.22	3.36	3.50	3.64
Cumulative			2.80	5.59	8.52	11.63	14.89	18.24	21.73	25.37

**2016 and 2017 are shown for historical purposes. The number reflects net energy savings from compliance filings.

Table 4 presents annual and lifecycle gross emissions avoided forecasts for residential sector programs.

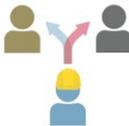
Table 4 – Near-Term (2018-2020) Gross Emissions Avoided			
Gross Emissions Avoided	CO ₂ (tons)	NO _x (lbs)	PM-10 (lbs)
Annual	86,580	135,151	1,136
Lifecycle	1,079,319	1,684,660	15,527

Table 5 shows the near-term cost-effectiveness for the residential sector.

Table 5 – 2018-2020 Cost-Effectiveness		
Sector	TRC	PAC
Residential	0.75	1.00

C. Overview of New Program Strategies and Tactics

In addition to proven program strategies, SoCalGas will incorporate new program strategies and corresponding program tactics to arrive at a complete energy efficiency solution set for the residential customer. The proven and new program strategies are further detailed in the Program Intervention Strategies sub-section. These offerings will be introduced to the customers over time and may be withdrawn and retooled to adapt to dynamic market changes and changes to regulatory program policies. The new program approaches and the proposed implementation timeframe are summarized in Table 6.

Table 6 - New Program Strategies			
Program Intervention Strategy	Description	New Tactics	Timing
 <p>Intelligent Outreach</p>	To assist customers in identifying the greatest energy efficiency opportunities, improve cost efficiency in program delivery, segment-specific benchmarking and provide deeper, comprehensive energy savings solutions.	<ul style="list-style-type: none"> • Data Analytics • Industry Best Practice Sharing 	Near, Mid-term
 <p>Homeowner Resale</p>	Works with the real estate community, homeowners, and multi-family property owners (including new construction) to promote the advantages of purchasing an energy efficient home (single family and multi-family).	<ul style="list-style-type: none"> • Energy Performance Rating • Home Certification • Benchmarking • Sales Training & Awareness 	Near-term
 <p>Customer Incentives</p>	Facilitates customer choice by offering a simplified suite of financial incentive strategies to reduce the high first cost barrier, the key market barrier for most customers.	<ul style="list-style-type: none"> • Pay-for-Performance • Contractor Incentives • Bundled Measures 	Near-term
 <p>Direct Install</p>	The comprehensive direct install program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for multi-family properties.	<ul style="list-style-type: none"> • Comprehensive Direct Install 	Near-term

*Note: Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years.

D. Residential Sector Market Characterization

The residential sector is generally segmented into two groups: single family and multi-family. Specifically, within the residential market there are four metered segments:

- Single family
- Multi-family individual-metered
- Multi-family master-metered
- Other (which includes manufactured homes and central facilities)

The residential sector, both single family and multi-family segments, is generally characterized as follows:

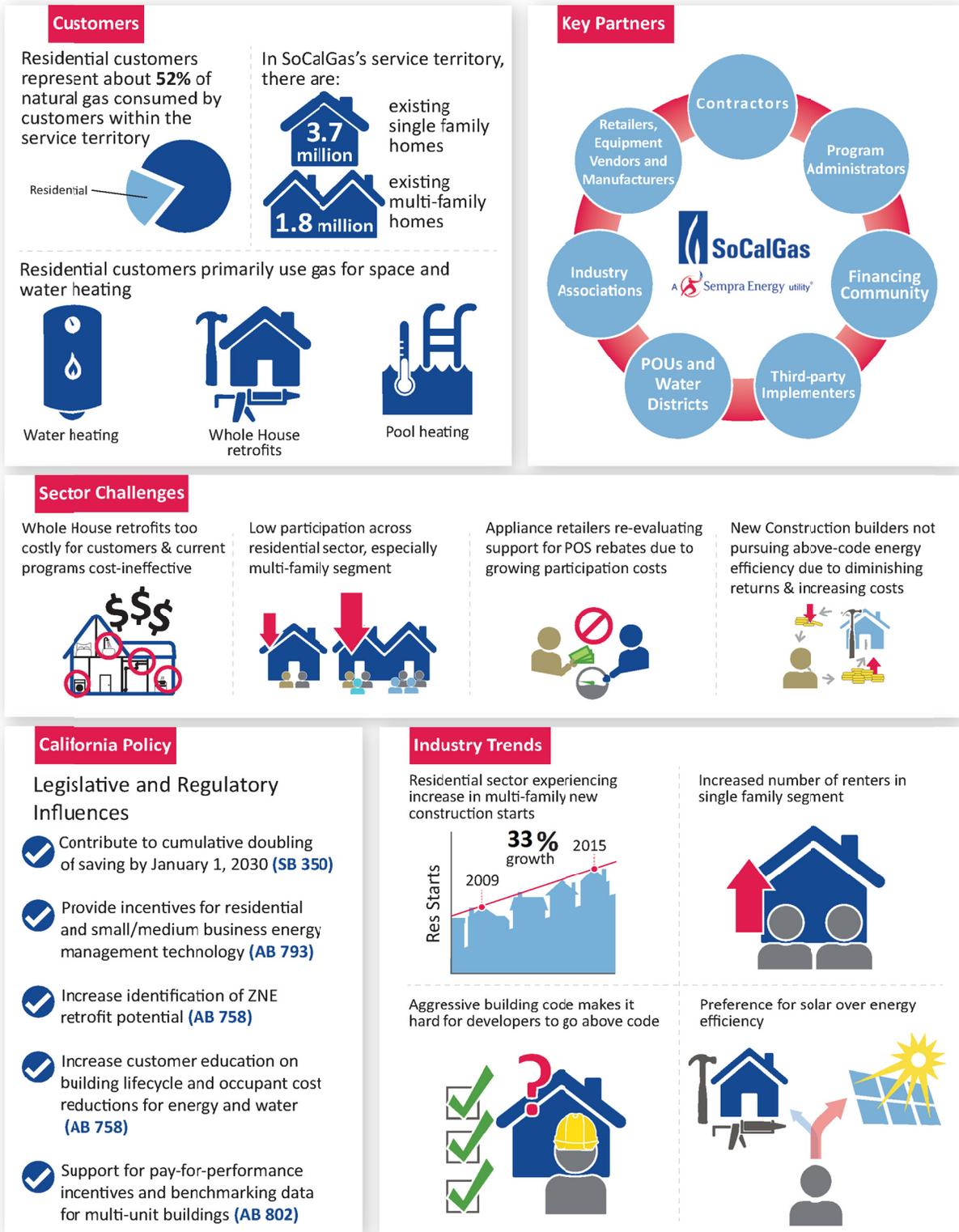
- Very large number of residential accounts;
- Low natural gas consumption due to the region's mild climates;
- Low cost of natural gas as an energy source;
- Perceived complexities of participation by retailers and customers;
- Trouble overcoming the high first cost to energy efficiency, especially for whole house solutions;
- Limited opportunities for natural gas energy efficiency; and
- A prolific split-incentive barrier issue across both multi-family and single family segments including new construction.

Customer Landscape

As shown in Table 7, in 2015 there were nearly 3.7 million existing single family homes and over 1.8 million existing multi-family units in SoCalGas' service territory.

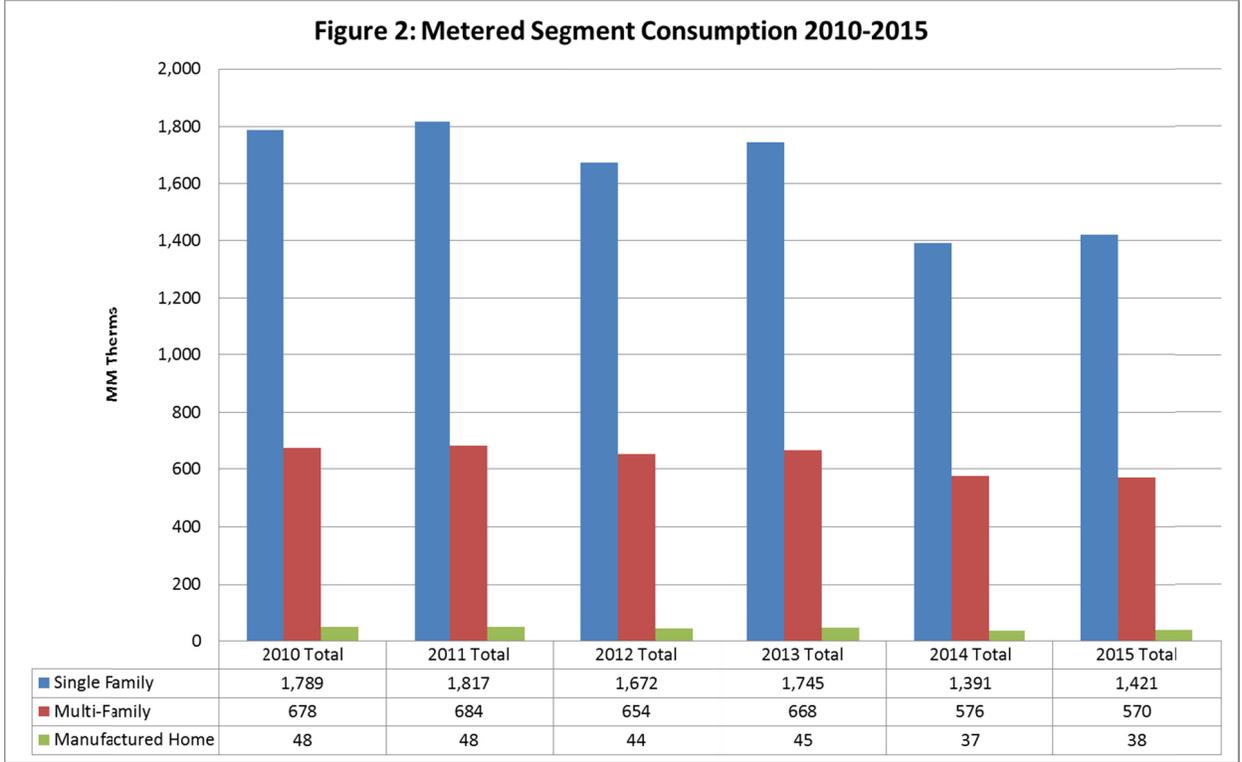
Metered Segment Type	Single Family	Multi-family	Manufactured Homes	Total
Individually Metered	3,683,251	1,742,353	-	5,425,604
Master Metered	-	34,369	1,469	35,838
Central Facility	-	74,104	10	74,114
Dual Facility	-	4,612	4	4,616
Total	3,683,251	1,855,438	1,483	5,540,172

Figure 1
Residential Sector - Market Characterization

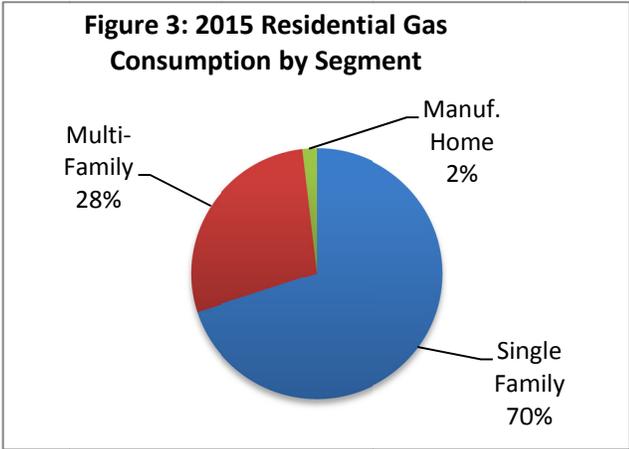


Residential Sector Energy Usage

In 2015, SoCalGas residential customers consumed over 2 billion therms, about 52% of the retail portfolio. The average use per SoCalGas residential customer (non-temperature adjusted) was 366 therms per year. Figure 2 below shows the residential consumption by segment since 2010.

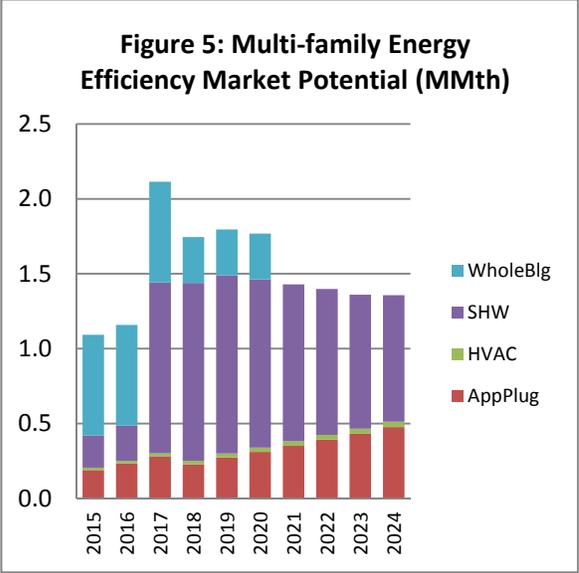
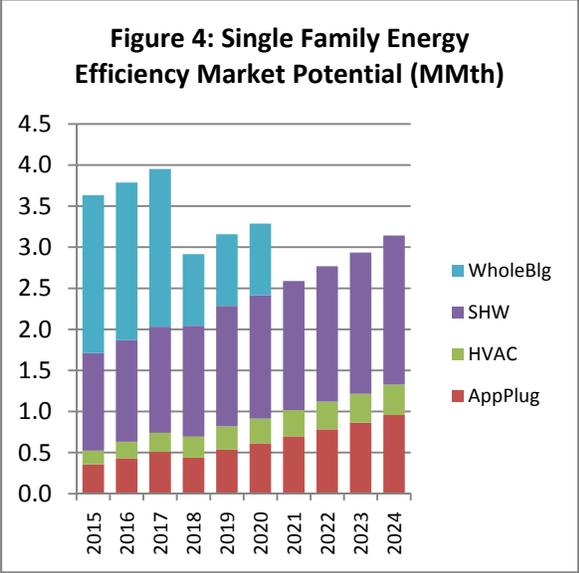


In 2015, single family use per household was approximately 20% more than multi-family. Since a majority of meters serve the single family segment, this market also consumes a majority of the gas served for the residential market, as shown in Figure 3.



Market & Economic Energy Efficiency Potential

The estimated market energy efficiency potential for the residential sector for SoCalGas, from 2015 through 2024, is shown in Figures 4 and 5.⁵³ The energy efficiency potential is projected to increase in the multi-family segment and, in contrast, single family segment appears to decline over the next few years. The two residential end uses with the highest energy efficiency potential are water heating (SWH) and appliances (AppPlug).

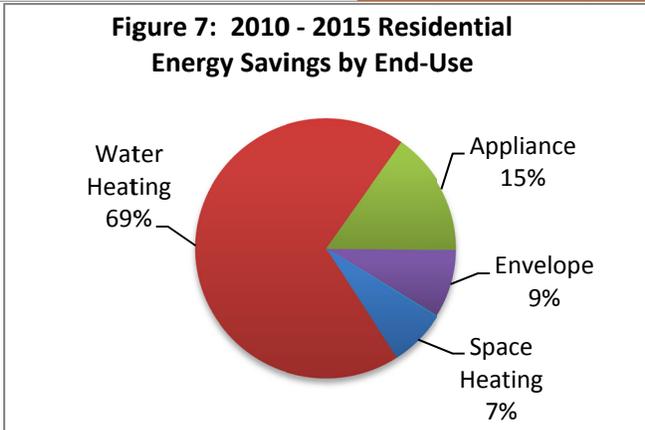
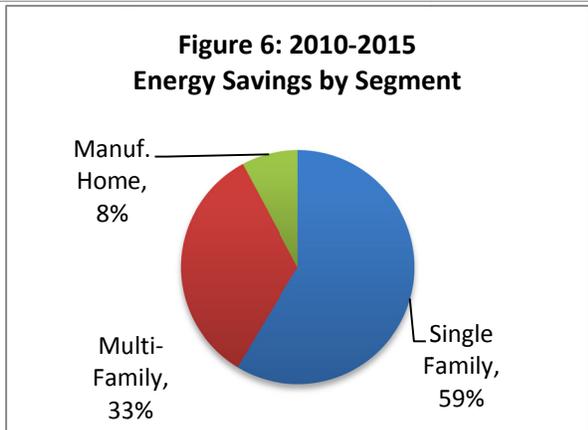


Historical Sector Performance

Segment

From 2010 to 2015, SoCalGas’ residential sector saved over 37.5 million therms of gas representing about 21% of the overall energy savings of SoCalGas’ energy efficiency portfolio. As shown in Figure 6, the single family segment accounted for the largest portion of residential sector savings with an average of 3.7 million therms saved annually.

⁵³ Navigant Consulting, Inc. (2015, September 25). *Energy Efficiency Potential and Goals Study for 2015 and Beyond, Stage 1 Final Report*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4033>



End-Use

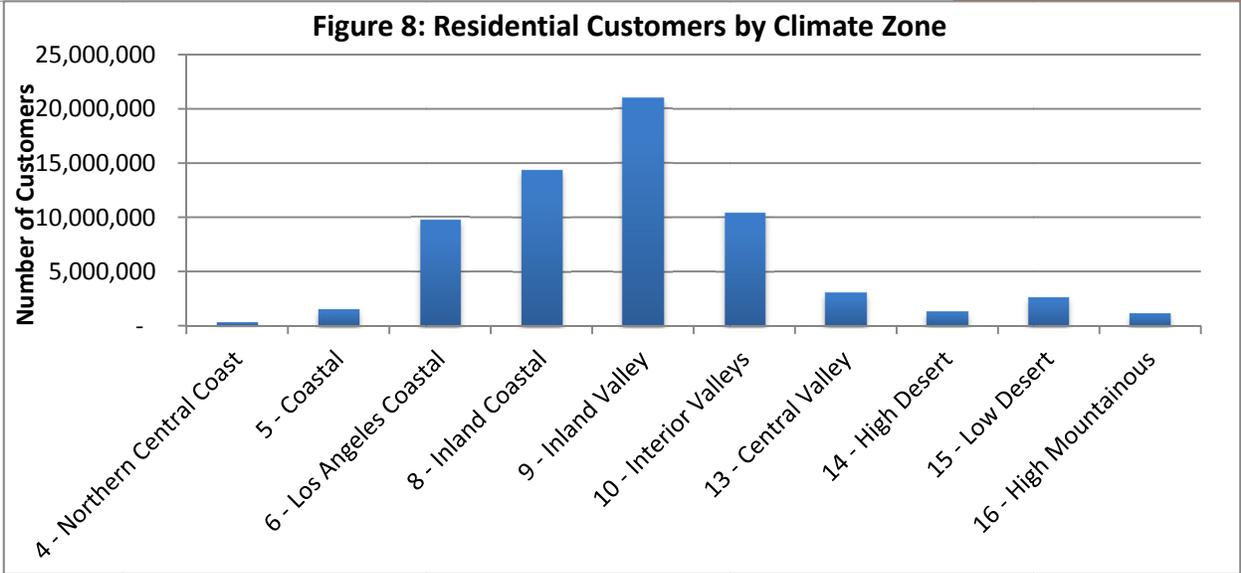
Figure 7 depicts the total energy savings from the residential sector by end use. Between 2010 and 2015, both the space and water heating end-uses had the greatest level of energy savings. The water heaters, low-flow aerators, and showerhead measures represented the largest energy savings, followed by clothes washers and recirculation pumps measures in the multi-family segment.

Residential Income Levels and Location

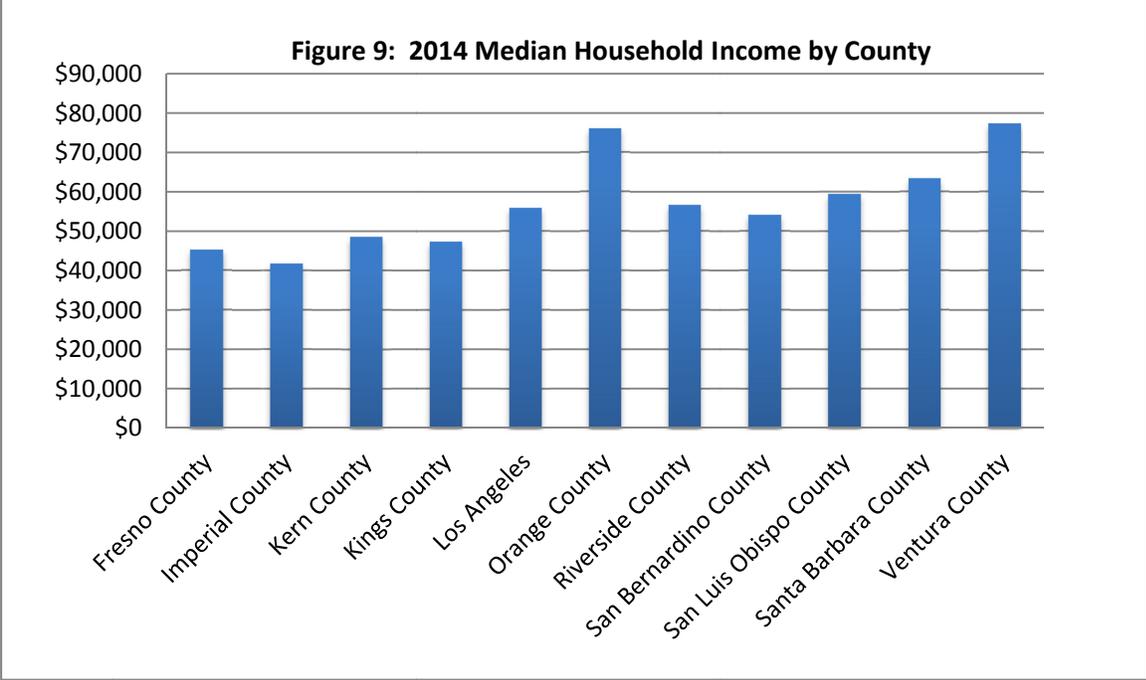
A deeper dive into identifying characteristics of the residential sector reveals more information on the number of households and a glimpse of income levels within the state. The residential sector in southern California has experienced an increase in rental demand in all segments since 2010,⁵⁴ causing issues regarding split-incentives to become more prevalent. Due to the high cost of home ownership relative to income, this trend is expected to continue.

SoCalGas service territory extends from the United States-Mexico border to Visalia. While the majority of SoCalGas residential customers reside in mild climate zones (California Energy Commission (CEC) Climate Zones 6,8,9) as shown in Figure 8, a large part of customers also reside in the inland valleys, foothills, high, and low deserts areas (CEC Climate Zones 4, 5, 10, 16, 13) where temperatures can dip to freezing in the winter.

⁵⁴ United States Department of Housing and Urban Development (HUD), Office of Policy Development and Research (PD&R). (2013, September 3). *HUD PD&R housing market profiles, Los Angeles-Long Beach-Glendale, California*, p.4. Retrieved from https://www.huduser.gov/periodicals/USHMC/reg/LosAngelesCA_HMP_508_Sep13.pdf

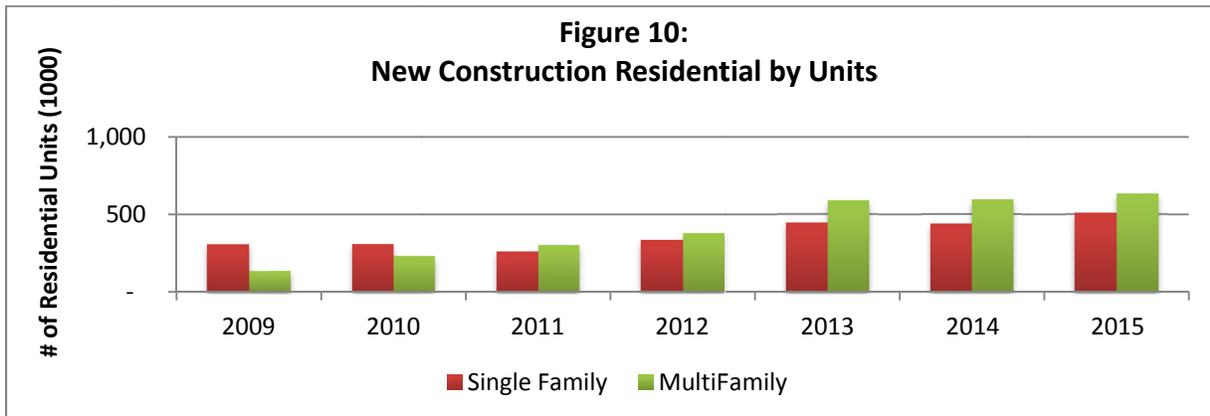


Location and climate zone also play a large role in indicating how people spend, what level of incomes reside in the service territory, and the customer’s ability to invest in energy efficiency upgrades. Figure 9 shows that the highest median incomes reside in counties with some of the lower household numbers, specifically Orange and Ventura County. There the average median income ranges from \$75,000 to \$77,000 whereas the median income in Los Angeles is only \$55,000.⁵⁵



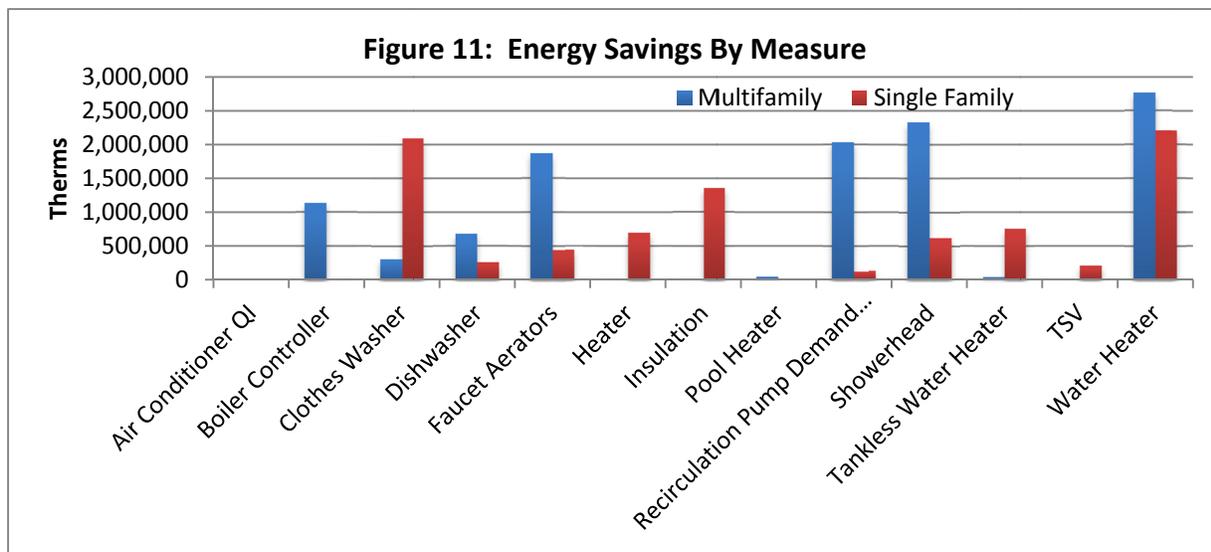
⁵⁵ United Census Bureau. (n.d.). *2014 California median household income by county*. Retrieved at http://www2.census.gov/programs-surveys/acs/summary_file/2014/data/1_year_by_state/

On average, California total residential new construction starts have been increasing annually by 19% from 2009 to 2015. In 2015 alone, 537,000 single family and 641,000 multi-family building permits were issued for new residential units, as shown in Figure 10.⁵⁶ New construction multi-family units have been increasing, with an average annual growth of 33% from 2009 to 2015, surpassing the growth of single family units.



Energy Efficiency Equipment Sales Share

The residential sector usage is driven primarily by water heating as shown in Figure 8. The most common measures used across the sector are primarily water heating measures, as shown in Figure 11. All residential segments rely mostly on these common measures. The multi-family segment also relies heavily on recirculation pumps because of centralized water heating applications common across the segment.



⁵⁶ California Department of Finance. (2016). *Construction permits*. Retrieved from http://www.dof.ca.gov/Forecasting/Economics/Indicators/Construction_Permits/

Key Market Actors

To increase market adoption of energy-efficient equipment in the residential sector, SoCalGas will focus on key market actors such as equipment manufacturers, installation contractors, property management companies, retailers, and distributors. Permanent modifications to stocking practices, installation, and information sharing practices, equipment performance uncertainties, and availability of efficient equipment will lead to transforming the market to achieve permanent behavior changes in customers' installation of efficient equipment.

Industry Trends

Key trends in the residential sector within SoCalGas' service territory include:

Builders' Focus on Multi-family New Construction. Due to higher construction and property costs, new homebuilders are building multi-family dwellings in areas in southern California historically dominated by the single family segment. For example, Orange County, an area where single family construction has dominated for decades, is now experiencing higher multi-family construction starts in metropolitan areas throughout the county.⁵⁷

Higher Levels of Owners in Multi-family Segment. With new construction focus on low-rise multi-family sub-segment, the southern California region is experiencing higher rates of homeownership within the multi-family segment.

Very High Levels of Renters in Single Family Segment. Over the past few years, the single family segment has experienced a growth in rentals of single family dwellings.

Escalating Building Code Driving Developers to Build Only to Code. California's aggressive Title 24 code changes are driving developers away from incorporating above-code energy efficiency into new construction. The higher costs to comply with California's building codes are causing developers to avoid above-code energy efficiency as a way to control costs and be competitive. This is further impacted by recent California Energy Commission (CEC) code changes to allow builders to incorporate solar-ready rooftop construction in lieu of energy efficiency upgrades. These industry trends are creating lost energy efficiency opportunities in the residential new construction market.

Residential Preference for Solar Photovoltaic (PV) Over Energy Efficiency. Lower solar PV costs (material, installation) coupled with higher energy efficiency costs are providing a reverse incentive for customers to "over" install PV (where PV install equals home energy consumption) and ignore dual-fuel energy efficiency opportunities.

⁵⁷ University of Southern California, Lusk Center for Real Estate. (2016). *Casden real estate economics forecast, 2016 multifamily report*, pp. 12, 22. Retrieved from <https://lusk.usc.edu/sites/default/files/attachments/2016-Multifamily-Forecast-Report.pdf>

Legislative Impacts on Strategy

There are a number of newly adopted legislative bills providing specific guidance for the future of energy efficiency in California. From Senate Bill (SB) 350 to Assembly Bills (AB) 758, 793 and 802, there are numerous directives that are helping to shape the next generation of energy efficiency program offerings. SoCalGas has reshaped existing program strategies and added new ones to meet these specific directives. A summary of the recent legislation along with SoCalGas’ proposed program strategies to address these directives is shown below.

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Residential Sector Customer		
Policy Drivers	Guidance	Response
SB 350 – Clean Energy and Pollution Reduction Act of 2015	Achieve a cumulative doubling of savings in electricity and gas retail customer’s final end uses by 2030.	SoCalGas will deliver a customer-friendly suite of energy efficiency program intervention strategies structured to significantly increase energy efficiency levels within the residential sector.
AB 793 – Energy Management Technology Incentive Offering	Must develop programs that provide incentives to help residential and small/medium business customers acquire energy management technology and educate them about these programs.	SoCalGas will offer EMT tactics to residential customer to enable consumer-friendly, on-going virtual communication that will allow customer to continuously monitor energy consumption within their household and buildings. This will empower customers to permanently modify their behavior.
AB 758 - Existing Buildings Energy Efficiency Action Plan	<p>Strategy 4.1.2 - Develop and compile information on building life-cycle and/or building occupant tenure cost reductions for energy and water efficiency measures.</p> <p>Strategy 3.4.2 – Identify building/business types well-suited for ZNE retrofits but where current ZNE guidance is scarce.</p>	As part of the Intelligent Outreach and Homeowner Resale program strategies, SoCalGas will promote customer understanding of energy efficiency benefits associated with retrofits and permanent behavior changes. SoCalGas will also partner with water agencies to support such endeavors. SoCalGas will partner with various residential sector agencies to promote a pathway to ZNE by improving the efficiency of gas end-use technologies.
AB 802 - Benchmarking and Changes to Energy Efficiency Baselines	Benchmarking - By January 1, 2017, for multi-unit buildings, utilities must provide aggregated energy usage data to its owner, its agent or the building operator. Commission will set	Through the Intelligent Outreach program strategy, promotion of tactics such as data sharing will provide usage data to the customer to support

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Residential Sector Customer

Policy Drivers	Guidance	Response
	requirements for public disclosure of information for benchmarking purposes. Baselines - Authorizes utilities to provide incentives to customers for energy efficiency projects based on normalized metered energy consumption as a measure of energy savings.	benchmarking activities. Program offerings such as pay-for-performance will encourage both energy efficiency retrofit and behavioral changes through incentives based on normalized metered energy consumption as of estimate of energy savings.

The Commission has also issued guidance to Program Administrators on how to further formulate the energy efficiency Business Plans. In response, SoCalGas has reshaped existing program strategies and added new ones to meet these specific directives. A summary of legislative and regulatory directives along with SoCalGas’ proposed program strategies to address these directives are detailed in Appendix A.

E. Goals, Strategies and Tactics for the Residential Sector

To realize the desired sector outcomes (i.e., sector goals); sector-level strategies summarize the approach to achieving each of sector level goals. These sector strategies will rely on a coordinated set of specific program intervention strategies that will reduce key market barriers and increase energy efficiency levels. The program intervention strategies will be deployed throughout the various market channels at different intervals to increase customer energy efficiency adoption levels. Due to the limited natural gas usage within this sector and the need to simplify customer engagement in the delivery of energy efficiency programs, SoCalGas proposes to coordinate program delivery with local utilities (electric, water), where practicable. SoCalGas has 17 POUs⁵⁸ operating in its territory, and has overlaps with the other IOUs, which requires specialized and concerted efforts to formulate and execute a program partnering and strategy integration. This will allow for a single customer engagement and will empower the customer to implement a complete energy (and water) efficiency plan.

⁵⁸ Anaheim Public Utilities, Azusa Light & Power, Banning Public Utilities, Burbank water and Power, Cerritos Electric Utility, City of Industry Public Utility, Colton Electric Utility, Corona Water and Power, Glendale Water & Power, Imperial Irrigation District, Lompoc Public Utility, Los Angeles Department of Water and Power, Moreno Valley Electric Utility, Pasadena Water & Power, Rancho Cucamonga Municipal Utility, Riverside Public Utilities, and Vernon Light & Power.

Goal 1: Achieve comprehensive, deep energy efficiency levels through a whole house approach. Develop, offer, and promote comprehensive solutions for single and multi-family homes, including energy efficiency measures, demand management tools and real-time information in order to maximize economic decision-making and energy savings.

Sector Strategy: In the near-term, to increase program cost-effectiveness and to maintain the ability to reach additional market potential in the service territory, SoCalGas will create additional partners with other electric providers, such as municipality utilities. In its service territory, SoCalGas has 17 POUs and currently only two are joint partners with SoCalGas on the Energy Upgrade California Home Upgrade program. Expanding partnerships would significantly reduce the burden for administering the program and assist in increasing the overall program cost-effectiveness. The longer-term strategy will be to encourage greater adoption of effective whole house energy efficiency solutions.

Goal 2: Increase energy efficiency adoption levels for all residential customers with a focus on multi-family customers with high energy efficiency potential through efficient outreach and effective offerings. Deliver effective, low touch customer solutions leveraging data analytic techniques to targeted customers to increase energy efficiency adoption. Provide increased incentives for customers installing more than one measure.

There are several actions that can help increase energy efficiency adoption levels including:

- Creating a targeted program that involves targeted metered sub-segments of the multi-family sub-sector and provides a split-incentive structure. Providing a well-designed split-incentive would encourage owners and tenants to invest in energy efficiency measures while achieving greater savings for the overall residential portfolio. In addition, the split-incentive structure could be tested and expanded to other metered sub-segments once proven successful.
- Offering programs that can assist in identifying stranded opportunities and capturing additional below code stranded savings.
- Pursuing data analytic methods to efficiently identify residential homes and buildings with higher energy efficiency potential and provide tailored energy assessment to lead customers to make immediate behavioral changes and energy efficiency equipment purchases.
- Promoting a multi-family targeted comprehensive direct install solution to residential customers with higher energy efficiency potential and in coordination with low income energy efficiency offerings.
- Targeting disadvantaged communities including rural and non-English speaking communities.
- Enhancing the single point-of-contact concept to increase program participation in the multi-family segment.
- Merging AMI technology with advanced energy management technologies to permanently modify residential customer behavior which will produce reliable energy savings.

- Creating partnering opportunities with other utilities, Program Administrators, water agencies and industry associations to: reach more residential customers; promote deeper energy efficiency; simplify customer engagement; and reduce costs through a cost-sharing partner model.

Goal 3: Increase adoption of energy-efficient gas appliances and energy management devices. Partner with manufacturers, retailers, contractors and other key market actors to move customers to efficient gas appliances. Promote energy management technologies and other behavioral-related energy efficiency solutions.

Sector Strategy: There are two primary actions that can help increase adoption of energy efficiency gas appliances and energy management devices including:

- Utilizing Mail-In Rebate Option. To address the large gap of POS rebates, SoCalGas will boost its efforts and programmatic campaign to solicit customer to mail-in rebates on their PLA energy efficiency measures. This will also help provide the PLA program an additional touchpoint with its market and allow for more outreach on additional measures/programs that the market can participate.
- Streamlining Current Rebates and Incorporate Mobile Technology. By shifting data collection and submission to a mobile platform, rebate applications can be submitted instantly after purchase. This step eliminates the normal one- to three-week delay and results in customers receiving their rebate checks sooner. In addition, if smart device functionality is leveraged, it can significantly reduce input errors and thus decrease application processing time.

Goal 4: Through the promotion of gas efficiency, enable new construction to achieve zero net energy performance levels to enable clean renewables. Partner with builders, CEC and other key market actors to build the most gas energy efficient single family and multi-family homes while moving to achieve California's ZNE goals to ensure energy efficiency is the first consideration in the design, build, and purchase of a new home.

Sector Strategy: To capture potential lost opportunities in both single and multi-family new construction, the relationship with building industry will need to be reset to improve the adoption of above code energy efficiency in residential new construction. This includes partnering with builders on code development in the multi-family segment as well as making a smooth transition to code adoption in the single family segment through code readiness activities. Also, resetting the program designs to provide incentives that truly encourage energy efficiency related above code upgrades.

Program Intervention Strategies

The following is a comprehensive list of program intervention strategies that will be directed at SoCalGas' residential sector customers at various intervals through 2025. To realize the desired sector outcomes (i.e., sector goals), several coordinated and integrated program intervention strategies will be deployed throughout the various market channels to increase customer

energy efficiency adoption levels. The strategies will be offered in tandem to the customer to enable freedom of choice based on the individual customer's preferences. The program strategies rely on a simple, low touch interface to deliver energy efficiency rebates to residential customers. This will increase adoption of energy efficiency products and behavioral practices. To support an adaptive program portfolio, incentives levels will vary throughout a program's lifecycle in response to customer reaction or inaction (e.g., higher equipment costs, lower perceived energy-related benefits).

Figure 12

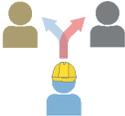
Residential Sector Strategies will leverage program intervention strategies to achieve goals and realize the 10-year vision

Vision Statement

Residential energy use will be transformed to ultra-high levels of energy efficiency. All cost-effective potential for energy efficiency will be routinely realized for all residential properties and will fully integrate with other customer demand-side management options - including clean renewables - on a site-specific basis.

Goal 1	Goal 2	Goal 3	Goal 4
35% increase in whole gas EE solutions by 2025	15% increase in energy savings in multi-family segment by 2025	15% increase in energy savings from home gas appliances by 2025	15% increase in energy savings from new construction

Program Intervention Strategies



Intelligent Outreach



Customer Incentives



Homeowner Resale



Partnering



Direct Install



Midstream Energy Efficiency



Residential Financing

Goal 1 Strategies	Goal 2 Strategies	Goal 3 Strategies	Goal 4 Strategies
<ul style="list-style-type: none"> • Partner in near-term with municipal utilities on whole home programs • Evolve program offerings to encourage whole house energy efficiency solutions 	<ul style="list-style-type: none"> • Create multi-family split-incentive programs and enhanced single-point-of-contact approaches • Capture below-code stranded savings • Use data analytics and AMI to target high energy efficiency potential for immediate behavior change and equipment upgrades • Targeted outreach and DI to disadvantaged, rural, non-English speaking communities • Partner with municipal utilities, water agencies, industry associations 	<ul style="list-style-type: none"> • Combine mail-in rebate for plug load and appliance energy efficiency measures with targeted outreach on additional measures • Streamline rebate application with mobile technology 	<ul style="list-style-type: none"> • Reset relationship with builders to improve new construction above-code energy efficiency adoption • Provide above-code energy efficiency incentives

The following is a comprehensive list of program intervention strategies that will be directed at SoCalGas' residential customer sector.

Program Intervention Strategy: **Partnering**



Partnering can create very effective alliances where there are common goals. Mutual collaboration and coordination as well as equitable contribution of resources and commitment are key to such program strategies. Partnering with other entities, through structured arrangements, is intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model.

The residential customer sector is vast with over 5.5 million customers in more than 500 communities. These customers are renters and owners spread over two primary segments: single family and multi-family. Partnering with other entities is an effective way to offer energy efficiency and other Demand Side Management (DSM) programs to the residential sector.

Utility partnering will be accomplished through the co-delivery of key program intervention strategies among gas and electric IOUs, POUs, other Program Administrators, and water agencies. For example, the Municipal Joint Utility Program Study recommended SoCalGas streamline municipality partnerships through engagement with Southern California Public Power Authority (SCPPA) directly.⁵⁹ SoCalGas is currently in discussion with SCPPA members to create a master partnership that will allow SoCalGas to partner with one or more SCPPA members at the same time in the delivery of energy efficiency programs.

Partnering will also be deployed, on an as needed-basis, among industry associations to promote energy efficiency solutions to specific customer-based groups as well as sharing of energy efficiency best practices. For example, partnering with multi-family associations⁶⁰ can directly inform and influence property owners. Such partnering will include collaboration with key industry groups to improve the residential program portfolio. Also, partnering with industry groups will provide an opportunity to promote segment-specific emerging technologies to the residential sector.

Customer partnering with larger property owners will lead to permanent changes to the customer's decision-making process that will lead to greater energy efficiency adoption. Creation of customer-specific, multi-year energy efficiency action plans will inform and improve the customer's renovation and new construction planning process in the multi-family segment.

⁵⁹ Nexant. (2016, June 2). *Municipal Utility Joint Program Study, CALMAC Study ID SCG0216.01*. Retrieved from

http://www.calmac.org/publications/Municipal_Utility_Joint_Program_Study_FINAL_7.22.16_v1.pdf

⁶⁰ Multi-family associations and councils support collaborative action among leaders in the multi-family industry.

Such partnering also lends itself to higher levels of technical assistance to overcome the hassle or transactional costs to adopting energy efficiency. Partnering will also promote adoption of purchasing agreements, by large property owners and managers of large multi-family property portfolios, to increase the efficiency of equipment and devices used by renters.⁶¹

Retail partnering will reduce the perceived performance uncertainty and increase awareness of energy-efficient products. Promotion within the retail location at the time of purchase is a powerful approach to influencing the customer’s purchase. For instance, the SoCalGas cold water washer process evaluation showed that retailer support services and co-marketing is integral for sales success, especially for a new product.⁶² Retailer partnering will include technical support services such as training and reinforcement to retailer staff, along with placement of promotional materials that highlight natural gas efficiency products. Co-marketing opportunities with manufacturers and sales channel partners will facilitate customer access to energy efficiency information and services, helping customers identify participating program retailers and qualified local contractors. Retail partnering is also an integral part of addressing unexpected local needs within the service territory. Partnering will enable such endeavors to quickly and effectively promote energy-efficient products to specific areas of the service territory. Marketing efforts will also promote tools to provide additional information on rebates, incentives and other energy efficiency opportunities.

Intervention Strategy: Partnering					
Objectives: to increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • Organizational practices • Diffused market • Hassle, transactional cost 	<p>Utility Partnering Facilitate the co-delivery of key program intervention strategies among gas and electric IOUs, publicly-owned utilities, Program Administrators, and water agencies.</p>	Existing	NR	On-going	
	<p>Customer Partnering Partnering with government entities to create energy efficiency action plans as part of the customer’s energy</p>	Existing	NR	On-going	

⁶¹ California Energy Commission. (2016, December). *California’s existing buildings energy efficiency action plan update, December 2016, CEC-400-2016-023CMF*. Retrieved from http://docketpublic.energy.ca.gov/PublicDocuments/16-EBP-01/TN214801_20161214T155117_Existing_Building_Energy_Efficiency_Plan_Update_Deceber_2016_Thi.pdf

⁶² Illume Advising. (2016, July 20). *SoCalGas Cold Water Default Clothes Washer Process Evaluation, CALMAC Study ID SCG0217.01*. Retrieved from http://www.calmac.org/publications/SoCalGas_CWDCW_Process_Evaluation_Final_Report_07-20-2016.pdf

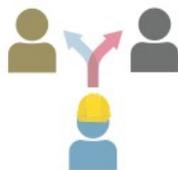
Intervention Strategy: Partnering

Objectives: to increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement

Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Lack of information • Performance uncertainties 	management plans.			
	Retailer Partnering Coordinate with retailer to increase awareness of energy efficient appliances and their performance benefits.	Existing	NR	On-going
	Industry Partnering Industry associations to promote energy efficiency solutions to a specific customer-based group.	Existing	NR	Near-term

Note: R=Resource; NR = Non-resource

Program Intervention Strategy: Intelligent Outreach



Intelligent outreach embodies several tactical solutions to: assist customers with greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s needs. Intelligent outreach uses energy consumption data, in concert with other sources, to effectively target and inform customers about energy efficiency opportunities within their homes and buildings. Through a multi-faceted approach, primarily enabled by SoCalGas’ advanced metering infrastructure (AMI),⁶³ customers can use their energy usage data to better optimize their energy usage.

The Intelligent Outreach program intervention strategy consists of several integrated program tactics efficiently and simply delivered to the residential customer. Data analytics will use AMI to quickly and efficiently target homes (single family and multi-family) with the highest energy efficiency potential per customer, overcoming the diffused market barrier. This will assist in encouraging the customer with the opportunity for immediate and direct financial benefits by incorporating energy efficiency into their homes thereby permanently modifying their decision-making practices regarding energy management. Benchmarking by segment and size will be a key element to this strategy. Virtual engagement will provide energy assessments by way of virtual audits that recommend behavioral actions to household decision-makers and property owners. Simple, low touch customer communications to provide energy assessments, on a repeated basis, will be leveraged to permanently change the customer’s behavior. The 2016 Low-Income Needs Assessment (LINA) report found through focus groups that low-income

⁶³ California Public Utilities Commission. (2010, April 14). D.10-04-027.

customers were enthusiastic about receiving usage alerts.⁶⁴ Energy usage alerts will be deployed to assist customers in managing their energy. Data sharing will also enable customers to access their energy usage. This will enable customers to use their tools to better manage their energy. The strategy will also implement other tactics to leverage AMI data and to confirm actual delivery of expected energy savings from energy efficiency retrofits and behavioral actions, where feasible.

The energy advisor offering will rely on more traditional outreach efforts by providing an integrated DSM audit delivered through mail-in and virtual environments that will be offered across the residential sector to help identify energy efficiency opportunities. The energy advisor tactic will leverage data-driven interactive tools (e.g., universal audit tools)⁶⁵ designed to engage and motivate customers to reduce their energy consumption through personalized program recommendations. Energy advisor will also provide unbiased responses to customer questions regarding participation in various energy efficiency programs (e.g., whole house offerings).

Intelligent Outreach will also promote energy management technologies to assist customers in actively managing their energy remotely. This will include merging AMI technology with advanced energy efficiency and management technologies (e.g., smart thermostats) to permanently modify residential customer behavior, resulting in reliable energy efficiency savings. These technologies will also focus on appliances that can assist the customer to manage their energy, including proper maintenance of appliances (e.g., HVAC self-diagnostic technology) to achieve optimal efficiency. Where practicable, the strategy will also partner with electric and water agencies with AMI technologies to provide a simple, one-touch efficiency experience helping to reduce the hassle factor that customers face.

The multi-family sector faces several barriers including organizational practices of property owners that may not factor in energy efficiency into their decision-making process. Where there exist opportunities to share among multi-family property owners, best practices forums will be created, typically in collaboration with industry groups. These best practices forums will also help to reduce performance uncertainties and to improve customer knowledge regarding energy efficiency practices pertinent to their properties.

The disadvantaged community outreach tactic will coordinate residential energy efficiency sector and low income offerings to target and overcome unique barriers facing disadvantaged communities.⁶⁶ The outreach offering will also include a non-English speaking component that

⁶⁴ Working Groups associated with development of 2016 Low-Income Needs Assessment report due December 2016.

⁶⁵ A process and impact evaluation on the universal audit tools is underway. SoCalGas will use any pertinent information to better this program offering once those studies are complete.

⁶⁶ Cal. Health & Safety Code § 39711 (2014) provides, "The California Environmental Protection Agency shall identify disadvantage communities for investment opportunities related to this chapter. These

will deploy multi-lingual outreach efforts to promote a better understanding of and increased participation in residential energy efficiency programs. Various program strategies will be bundled and enhanced (e.g., higher incentives, expanded direct install services, etc.) to achieve deeper energy efficiency among these communities. Unlike general awareness campaigns, this outreach tactic will leverage data analytics to identify customers with the highest energy efficiency potential in these communities so customers can benefit from immediate behavioral changes and act upon deep, comprehensive energy efficiency solutions over time.

The single point-of-contact (SPOC) will offer energy efficiency concierge services to integrate program offerings for multi-family property owners. Through data analytics and partnering arrangements with property owners, the strategy targets multi-family buildings with higher energy efficiency potential and assists property management and in-dwelling customers with participation in all applicable program offerings. A key element to success will be contractor involvement with SPOC and the customer as the customer will be working with the retrofit contractor. Technical services will also be provided for larger, more complex energy efficiency projects.

Intervention Strategy: Intelligent Outreach				
Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost-efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific needs.				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Lack of information • Performance uncertainties • Customer practices • Diffused market • Hassle, transactional 	<p>Data Analytics Leverage AMI data to identify customers with the highest energy efficiency potential. Benchmarking by segment and size will be a key element to this effort.</p>	New	NR	Short-term
	<p>Virtual Energy Audits Virtual energy audits will be able to recommend both behavioral and retrofit opportunities.</p>	Existing	R	Short-term
	<p>Data Sharing Provide customers access to their energy usage. This will enable customers to use tools to better manage their energy usage.</p>	Existing	NR	Short-term

communities shall be identified based on geographic, socioeconomic, public health, and environmental hazard criteria, and may include, but are not limited to, either of the following: (a) Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation. (b) Areas with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment.”

Intervention Strategy: Intelligent Outreach

Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost-efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific needs.

Barriers	Tactics	Status	Type	Timing
cost	Energy Advisor Offers an integrated DSM audit delivered through mail-in and virtual environments that will be offered across the residential sector to identify energy efficiency opportunities.	Existing	R	On-going
	Energy Management Technologies (EMT) EMTs will help customers better manage energy and will allow customers to achieve optimal efficiency with other equipment.	Existing	R	Short-term
	Sharing Energy Efficiency Best Practices Offer, along with industry groups, a collaborative forum to help inform, excite, and accelerate energy efficiency actions among like customers.	New	NR	On-going
	Disadvantaged Community Outreach Coordinates residential energy efficiency and low income offerings to target and overcome unique barriers facing disadvantaged communities. This strategy will also include a non-English speaking component that will deploy multi-lingual outreach efforts to promote a better understanding of and increased participation in residential energy efficiency programs.	Existing	NR	Short-term
	Single Point-of-Contact An energy efficiency concierge service approach that integrates program offerings targeted primarily to multi-family property owners in coordination with the project contractor.	Existing	NR	Short-term

Program Intervention Strategy: Customer Incentives



The customer incentive program intervention strategy is a simplified suite of financial incentive offerings directed at customers to reduce the high first cost barrier: a key market barrier for most customers. Recognizing the varied preferences among customers for different financial solutions, the program strategy offers a menu of tactics. Although incentive-based strategies like pay-for-performance may be suited for larger energy efficiency projects, in many circumstances, a one-payment approach (e.g., deemed and customized incentives) is very effective in motivating the customer to install energy efficiency equipment. Each of the tactics, within the overall customer incentive strategy, are intended to increase participation through simplified customer

engagement while encouraging deeper, more comprehensive energy efficiency solutions including permanent energy behavior modification.

The Customer Incentive program intervention strategy offers a variety of financial incentives to the residential sector to assist in overcoming the high first cost and split incentive market barriers. A new approach to the residential market, pay-for-performance (P4P), will target more comprehensive energy efficiency projects in the residential multi-family segment by offering a performance-based whole building approach. Where there are significant energy efficiency savings opportunities, customers will be encouraged to participate in a P4P strategy and to leverage the energy service provider community. The P4P strategy will provide incentive payments to the participating customer over a pre-determined period, on preset payment intervals. Payments will be based on installation activities, measured savings, and using normalized meter data, with a baseline of existing conditions.

To assist with a smooth transition to zero net homes during the next several years, a residential new construction incentive tactic will provide a comprehensive approach focused on energy-efficient, sustainable design and construction, green building practices, and promotion of emerging energy efficiency technologies. Through a combination of education, design assistance and financial support, the strategy works with building and related industries to exceed compliance with California Code of Regulations, Title 24, Part 6, Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Standards), to prepare builders for changes to the Standards and to create future pathways beyond compliance and traditional energy savings objectives. Participation is open to single family as well as low-rise and high-rise multi-family residential new construction. To encourage builders to design and construct homes with above-code energy efficiency, the strategy will accept partial single family and multi-family low-rise project enrollments. To promote ZNE and ZNE-ready design and construction, the tactic will include premium incentives to encourage early adoption of residential ZNE homes to further assist with code adoption.

Simple, easy program engagement will be essential to the success of the program offerings. The deemed incentive offering will provide financial incentives based on predetermined (a.k.a., deemed) energy savings. It also features rebates per unit measure for installed energy-saving projects and provides the IOU, equipment vendors, and customers a simple transaction and encourages greater market adoption of emerging energy efficiency technologies and applications. For example, the strategy will aggressively promote emerging energy management technologies that incents customer to efficiently manage gas along with electricity and water. A deemed incentive strategy will also work with retailers, where possible, to deliver rebates to customers through newer, more effective approaches (e.g., hand-held devices) than current retailer delivered channels (e.g., point-of-purchase).

Contractor incentives is a newer tactic that will encourage a greater number of qualified contractors to actively promote and properly install energy-efficient measures by offering incentives directly to contractors. To promote awareness and to increase the number of qualified contractors, an outreach component will also be offered in collaboration with industry

associations (through a partnering strategy). The contractor incentives will be coordinated with various residential program strategies (e.g., industry partnering) that rely on the general contractor community (e.g., multi-family, whole home, etc.). This will support the eventual desired market effect of a self-sustaining contractor community that will promote, install and maintain energy efficiency equipment for residential customers thereby reducing the performance uncertainties with energy efficiency-related improvements.

Bundled measures will also simplify the customer’s program experience by providing an integrated approach of bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage) primarily for multi-family buildings. The bundled measure offering will provide a simple, easy customer transaction that will integrate education, financing, and technical assistance in support of energy efficiency installations helping to reduce the transactional cost of such retrofits.

The whole house approach will be delivered as part of an overall simple, seamless offering with other residential program intervention strategies (e.g., Partnering, Intelligent Outreach), including other DSM solutions (e.g., low income energy efficiency, solar water heating, etc.). The achieved long-term effects will result in a self-sustaining market that naturally drives the customers, contractors and other key market actors towards a whole home energy efficiency solution. The tactic will be based on simplified incentives that use a holistic approach to identify and correct comfort and energy-related deficiencies in single family homes and multi-family buildings. The whole house approach will promote long-term energy benefits through deep energy efficiency retrofits, including building shell upgrades, high-efficiency HVAC units, heating and cooling systems, hot water heating, and other deep energy reduction opportunities. To capture a greater level of energy savings, the program offering will place an added emphasis on targeting inland climate zones. The strategy will also coordinate with the energy advisory hotline (see, Intelligent Outreach) where customers can receive unbiased answers to their home upgrade questions from their trusted utility energy advisor as well as an explanation of the whole house performance theory.

Intervention Strategy: Customer Incentives					
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Split incentive • Organizational practices • Diffused market • Hassle, 	<p>Pay-for-Performance Targets more comprehensive energy efficiency projects. The P4P strategy will provide for incentive payments to the participating customer over a pre-determined period on preset payment intervals based on measured savings, using normalized meter data, with a baseline of existing conditions.</p>	New	R	Near-term	

Intervention Strategy: Customer Incentives

Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification

Barriers	Tactics	Status	Type	Timing
transactional cost	Residential New Construction Incentives Offers a comprehensive approach focused on energy-efficient, sustainable design and construction, green building practices, and promotion of emerging technologies.	Existing	R	On-going
	Deemed Incentives Offers financial incentives based on predetermined energy savings. It also features rebates per unit measure for installed energy-saving projects and provides the IOU, equipment vendors, and customers a simple transaction. Encourages greater market adoption of emerging technologies.	Existing	R	On-going
	Contractor Incentives Encourages a greater number of qualified contractors to actively promote and properly install energy-efficient measures by offering incentives directly to contractors.	New	R	Short-term
	Bundled Measures Provides an integrated approach by bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage).	New	R	Short-term
	Whole Home Offers a simplified incentive that uses a holistic approach to identify and correct comfort and energy-related deficiencies in single family homes and multi-family buildings.	Existing	R	On-going

Program Intervention Strategy: Homeowner Resale



The Homeowner Resale strategy works with the real estate community, homeowners, lenders and multi-family property owners (including new construction) to promote the advantages of purchasing an energy-efficient home (single family and multi-family).

The Homeowner Resale strategy will use the unique market position of the real estate community to promote the energy efficiency characteristics of homes in the resale and new

construction markets. A significant amount of home improvement spending occurs during the initial years of homeownership.⁶⁷ Providing information to key actors (e.g., homebuyer, home seller, agent, etc.) throughout the home search and purchase process will help spur energy efficiency investments by current and future homeowners.⁶⁸ This strategy is intended to reshape the current practices of selling a home by incorporating energy efficiency into decision-making practices. The strategy will also inform existing homeowners on the potential benefits of pursuing whole house approaches, including increased home value, throughout the ownership lifecycle. Key elements of this strategy include:

- (1) support for a standardized energy performance rating system to create awareness and to promote the resale of energy-efficient homes;
- (2) encourage use of third-party certifiers to confirm home is energy-efficient;
- (3) partner with real estate community to include home energy efficiency rating (e.g., searchable green fields) in multiple listing services (MLS) to inform potential homebuyers;
- (4) encourage the use of certified green appraisers to properly evaluate a home's energy efficiency features;
- (5) encourage the promotion of ZNE homes; and
- (6) use data analytics to employ comparative and benchmarking approaches to identify energy-efficient homes.

Further, studies suggest most residential sale transactions are not valued for efficiency, yet energy-efficient homes sell for 3%-20% more than comparable non-certified homes. In addition, studies find most homebuyers rate energy costs and efficiency as somewhat to very important when purchasing a home. As a result, untapped opportunities exists to “spark interest in the market for more efficient homes and increase demand for residential energy efficiency.”⁶⁹

Ultimately, the strategy will result in reduced data collection burden, immediate awareness to home sellers, and a low-touch service to allow home sellers to directly share their energy efficiency home rating on MLS.

⁶⁷ United States Department of Energy. (2015, November). *capturing energy efficiency in residential real estate transactions*. p. 2. Retrieved from https://emp.lbl.gov/sites/all/files/c-1176_better_buildings_real_estate_white_paper6.pdf

⁶⁸ *Id.*

⁶⁹ *Id.* at 1.

Intervention Strategy: Homeowner Resale

Objectives: to promote the energy efficiency characteristics of homes in the resale market

Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Organizational practices • Lack of information • Performance uncertainties 	<p>Energy Performance Rating Collaborate with industry partners to create awareness and market demand for energy efficiency during real estate transactions and to promote resale of energy efficiency homes through MLS.</p>	New	NR	Near-term
	<p>Sales Training & Awareness Incorporate sales training and awareness of financing opportunities into contractor and technician training programs.</p>	New	NR	Near-term
	<p>Home Certification Use of third-party certifiers to confirm home is energy efficient.</p>	New	NR	Near-term
	<p>Benchmarking Use data analytics to employ comparative and benchmarking approaches to identify energy-efficient homes.</p>	New	NR	Near-term

Program Intervention Strategy: Direct Install



The direct install (DI) program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for multi-family properties. A comprehensive DI tactic will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits. Comprehensive DI will rely, in part, on ratepayer funds and, in part, on customer co-fund contributions and/or customer financing.

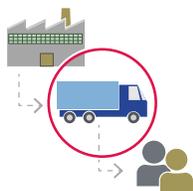
The DI program intervention strategy offers both a standard and comprehensive direct install approach primarily targeting multi-family properties with a special focus on disadvantaged communities including moderate income households to deliver natural gas and electric energy efficiency solutions, in a simple approach, to achieve near-term measurable energy efficiency benefits. The strategy will coordinate with the SoCalGas’ low income energy efficiency program and community-based organizations. The strategy will address the split-incentive market barrier as well as the high first cost barrier facing the multi-family segment.

The standard DI offering will provide a list of low/no cost energy efficiency measures. DI will install natural gas energy efficiency measures along with other similar electric and water efficiency measures, where practicable. It will use the Intelligent Outreach strategy to identify residential properties with the greatest energy efficiency opportunity.

The comprehensive DI tactic encourages deeper energy savings by offering more comprehensive energy efficiency measures that are typically used by the targeted customer segment. Comprehensive DI will provide qualified contractors who will engage directly with the customers to install measures. A co-pay option will be offered to the customer to offset the initial cost of the energy-efficient equipment. Customers can leverage alternate financing (e.g., Property Assessed Clean Energy (PACE)) to fund their co-pay portion. The DI strategy will also encourage property owners/managers of multi-family properties to install energy-efficient measures and appliances.

Intervention Strategy: Direct Install				
Objectives: to achieve near-term measurable results primarily for multi-family property owners and tenants				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Split incentive • Hassle, transactional cost • Lack of information • Performance uncertainties 	Standard Direct Install Targets multi-family property owners through the Intelligent Outreach strategy which will identify properties with the greatest energy efficiency opportunity. The standard DI offering will provide limited list of low/no cost energy efficiency measures.	New	NR	Near-term
	Comprehensive Direct Install Encourages deeper energy savings by offering more comprehensive energy efficiency measures. Comprehensive DI will offer qualified contractors who will engage directly with the customers to install measures. A co-pay option will be offered to the customer along with on-bill financing to offset the initial cost of the energy efficiency equipment.	New	NR	Near-term

Program Intervention Strategy: **Midstream Energy Efficiency**



The Midstream Energy Efficiency program intervention strategy provides deemed incentives to distributors to reduce the retail cost of natural gas energy efficiency equipment, promote stocking of energy-efficient equipment and inform contractors at the distributor level.

Incentives directed at midstream market actors can greatly simplify the end-use customer transaction while imparting lasting behavior change of key market actors in the promotion of

energy efficiency technologies to their end-use customer.⁷⁰ This approach can reduce the high cost of advanced energy efficiency equipment purchases along with the hassle associated with identifying the appropriate energy efficiency technologies. However, as incentives are moved away from the end-use customers, the stability of such energy savings can be concerning due to difficulty in tracking products to the end-use customer. Distributor training coupled with active product monitoring can greatly reduce these concerns. Distributor training also can have greater impact in transforming market adoption of energy-efficient equipment.⁷¹ Also, in the retail channel, retailers have expressed their concern with participating in point-of-sale tactics promoting energy-efficient equipment due to the rising cost to support such transactions.⁷² In such cases, alternate, more cost-efficient deemed incentives directed at the end-use customer will be offered.

This Midstream Energy Efficiency strategy will be coupled, where practicable, with a comprehensive, co-pay direct install strategy that can efficiently deliver on-demand installation by trained and qualified contractors. The strategy will also work with retailers to improve their stocking habits and with distributor and/or manufacturer-funded rebates/discounts, where possible.

Intervention Strategy: Midstream Energy Efficiency				
Objectives: to achieve near-term measurable results and long-term market adoption of energy efficiency technologies through incentives directed at midstream market actors				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Lack of information • Performance uncertainties 	<p>Midstream Incentives Provides incentives to midstream market actors to drive down the wholesale price of energy efficient technologies and to improve the stocking habits of energy efficient equipment. This will include point-of-sale retail transaction, where feasible.</p>	Existing	R	On-going
	<p>Distributor Training Provides distributor-assisted training to contractors to support promotion of energy efficiency equipment to contractors and, in turn, customers.</p>	Existing	NR	On-going

⁷⁰ NMR Group Inc. (2013, November 25). *A Review of Effective Practices for the Planning, Design, Implementation, and Evaluation of Market Transformation Efforts*, CALMAC Study ID PGE0330.01. Retrieved from http://www.calmac.org/publications/FINAL_NMR_MT_Practices_Report_20131125.pdf

⁷¹ Bickle, S., Burns, E., Rivett, B., Vlta, D., Nelson, M., Parson, J., & Merson, H. (2016). *Swimming to midstream: New residential HVAC program models and tools*. 2016 ACEEE Summer Study on Energy Efficiency in Buildings, pp.7-5 – 7-7. Retrieved from

http://aceee.org/files/proceedings/2016/data/papers/7_888.pdf

⁷² Source: SoCalGas Data

Program Intervention Strategy: **Financing**



The Residential Financing program strategy will promote REEL, On-Bill Financing, PACE and other financing vehicles to encourage residential customers, including multi-family property owners, to adopt deeper, more comprehensive energy efficiency solutions.

The Financing strategy will primarily promote the new finance pilot Residential Energy Efficiency Loan Assistance (REEL) program, which is based on some local government lending products created under the American Recovery and Reinvestment Act (ARRA). Related, there are two “local” versions of a similar residential lending products offered by SoCalREN and emPower (Santa Barbara County) that are funded by ratepayers. The strategy will educate and encourage home contractors to participate in the promotion of these products. Property Assessed Clean Energy will also be promoted, as it has experienced significant participation in the residential energy efficiency financing landscape.⁷³

Also, the strategy will promote other financing offerings such as the Green Preservation Plus financing program, developed by the Federal Housing Administration (FHA) and Fannie Mae to increase energy efficiency in multi-family housing. The strategy will connect energy efficient mortgage lenders with the real estate community support ZNE-type homes. For those customers willing to finance their home improvements,⁷⁴ these tactics are intended to be the primary way to significantly reduce the high first cost barrier facing residential customers.

Intervention Strategy: Financing					
Objectives: to assist customer with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions					
Market Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle factor 	Loan Awareness Promotes REEL, OBF, PACE and other financing offerings (e.g., Green Preservation Plus) to residential customers to encourage deeper energy efficiency retrofits.	Existing	NR, R	Near-term	
	Credit Enhancement Provides interest subsidies for financial institutions as an incentive for offering low-interest loans.	Existing	NR, R	Near-term	

⁷³ The Cadmus Group. (2014, April 22). *California Joint Utilities Financing Research: Existing Programs Reviews, CALMAC Study ID PGE0338.01, p. 24.* Retrieved from http://www.calmac.org/publications/Existing_Programs_Review_FINAL.pdf

⁷⁴ Opinion Dynamics Corp., & Dunskey Energy Consulting. (2016, March). *PY 2014 Finance Residential Market Baseline Study Report, Volume I of II, CALMAC Study ID CPU0131.01, p. 24.* Retrieved from http://www.calmac.org/publications/PY2014_Residential_Finance_Market_Baseline_Volume_1_FINAL.pdf

F. Performance Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the Business Plan proposes key sector metrics. To properly monitor progress, the metrics will rely on data currently collected, tracked and verified as part of the Program Administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels. The sector-specific metrics are presented below. Over time, metrics and targets may be adjusted and improved to more accurately reflect sector progress.

Residential Sector

Table 9 - Residential Sector Metric Table

10-year Vision

Residential energy use will be transformed to ultra-high levels of energy efficiency. All cost-effective potential for energy efficiency will be routinely realized for all residential properties and will fully integrate with other customer demand-side management options including clean renewables, on a site-specific basis.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10 years)
Whole House retrofits are too costly for customers and the current program design is cost-ineffective.	1. Increase the customer adoption of whole house gas energy efficiency solutions.	Partnering	Number of customers adopting whole house gas energy efficiency solutions.	2015 Participation Levels.	Program tracking data.	Increase the number of homes with whole house gas energy efficiency solutions by 15% over 2015 levels by Year 3.	Increase the number of homes with whole house gas energy efficiency solutions by 35% over 2015 levels by Year 7.	Increase the number of homes with whole house gas energy efficiency solutions by 50% over 2015 levels by Year 10.
		Intelligent Outreach						
		Customer Incentives						
		Direct Install						
		Financing						
		Homeowner Resale						
		Midstream Energy Efficiency						
Low participation across residential sector, especially in the multi-family segment.	2. Increase customer adoption of gas energy efficiency solutions, including behavioral-related actions, across all residential segments	Partnering	Amount of gas energy efficiency savings achieved in all residential segments including the multi-family segment.	2015 Participation Levels.	Program tracking data.	Increase gas energy savings in multi-family sub-segments by 5% over 2015 levels by Year 3.	Increase gas energy savings in multi-family sub-segments by 15% over 2015 levels by Year 7.	Increase gas energy savings in multi-family sub-segments by 35% over 2015 levels by Year 10.
		Intelligent Outreach						
		Customer Incentives						
		Direct Install						
		Financing						
		Homeowner Resale						
		Midstream Energy						

Residential Sector

Table 9 - Residential Sector Metric Table

10-year Vision

Residential energy use will be transformed to ultra-high levels of energy efficiency. All cost-effective potential for energy efficiency will be routinely realized for all residential properties and will fully integrate with other customer demand-side management options including clean renewables, on a site-specific basis.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10 years)
	especially the multi-family segment.	Efficiency						
Appliance retailers re-evaluating support for point-of-sale rebate program offering due to growing participation costs.	3. Increase adoption of energy efficiency gas appliances in single family and multi-family segments.	Partnering	Amount of energy efficiency savings achieved in gas appliance installations.	2015 Energy Saving Levels.	Program tracking data.	Increase energy efficiency savings through adoption of energy-efficient home gas appliances by 5% over 2015 levels by Year 3.	Increase energy efficiency savings through adoption of energy-efficient home gas appliances by 15% over 2015 levels by Year 7.	Increase energy efficiency savings through adoption of energy-efficient home gas appliance by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Customer Incentives						
		Midstream Energy Efficiency						
Diminishing returns and increasing costs are causing the residential new construction builder community not	4. Increase the amount of above code energy efficiency gas technologies into new homes to avoid	Partnering	Amount of gas-related energy efficiency achieved in residential new construction market.	2015 Energy Saving Levels.	Program tracking data.	Increase gas energy savings from residential new construction (single family) by	Increase gas energy savings from residential new construction (multi-family) by	Increase gas energy savings from residential new construction (multi-family) by 15% over
		Customer Incentives						
		Codes & Standards Advocacy						
		Midstream Energy						

Table 9 - Residential Sector Metric Table

10-year Vision

Residential energy use will be transformed to ultra-high levels of energy efficiency. All cost-effective potential for energy efficiency will be routinely realized for all residential properties and will fully integrate with other customer demand-side management options including clean renewables, on a site-specific basis.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10 years)
to pursue above code energy efficiency.	lost opportunities.	Efficiency				15% over 2015 levels by Year 3.	15% over 2015 levels by Year 5.	2015 levels by Year 10.

G. Key Partners

The success of the residential sector business plan will rely on a positive, collaborative relationship with a number of market actors, Program Administrators, regulators and other government entities. Below is a list of key partners that will help SoCalGas successfully achieve the ambitious vision for the residential sector.

Table 10 - Key Partners	
Key Partners	Support Activity
Program Administrators	<ul style="list-style-type: none"> • Deliver dual-fuel programs to reach more customers; • Leverage all available best practices and promote statewide consistency, where appropriate; • Simplify program engagement; • Capture all energy efficiency benefits including operational energy savings; and • Conduct market research that will identify unique barriers to energy efficiency investments.
Publicly-owned Utilities (POUs) and Water Districts	<ul style="list-style-type: none"> • Coordinate with POUs and water agencies to effectively deliver energy and water efficiency programs; • Engage in partnership and co-delivery arrangements with POUs and water agencies when there is a shared customer base (gas and electric) to simplify customer engagement and achieve higher levels of energy efficiency; and • Coordinate with POUs and water agencies throughout California and other regions to share best practices in program administration, design, and delivery.
State and federal agencies	<ul style="list-style-type: none"> • SoCalGas will work with state and federal agencies to promote greater levels of energy efficiency adoption throughout the residential segments.
California Public Utilities Commission and Key Stakeholders	<ul style="list-style-type: none"> • SoCalGas will work with the Commission and other key stakeholder to investigate ways to simplify program requirements and to identify policies that will recognize all energy efficiency benefits associated with residential sector energy efficiency programs.
Third-party Program Implementers	<ul style="list-style-type: none"> • Solicit new and innovative programs from third-party program implementers to address the residential sector and draw upon creative program solutions that can be quickly and effectively targeted to these customers; and • Continue to collaborate with program implementers throughout the program’s lifecycle to be an integral part of the program’s success.
Industry Associations	<ul style="list-style-type: none"> • Partner, when appropriate, with industry associations (e.g., property management companies, building associations, etc.) to increase program participation and achieve higher energy efficiency adoption levels with the residential sector.
Equipment Vendor and Manufacturers	<ul style="list-style-type: none"> • SoCalGas will actively work with equipment vendors and manufacturers to promote greater adoption of energy efficiency equipment among the various residential segments.

H. Cross-cutting Sector Coordination

Local Marketing and Statewide Marketing, Education & Outreach Integration

The sector programs will rely on a combination of statewide Marketing, Education, and Outreach (ME&O) efforts and targeted promotion of specific energy efficiency programs tailored to the various segments throughout the sector. There will be a focus on customers with higher energy efficiency potential, identified through data analytics, to encourage greater customer investment in energy efficiency opportunities.

Since the statewide ME&O program's short-term goal is focused on the mass market customer (i.e., residential and small business owners) the residential sector will rely on the statewide ME&O program to inform residential customers of the importance of energy efficiency, their opportunities to act, and the benefits of their actions. In order for the customer to take action, local promotion will target key customer groups to inform them how to participate in energy efficiency program offerings. SoCalGas will actively participate in both the development of the five-year ME&O Strategic Roadmap and Annual Joint Consumer Action Plans to coordinate program offerings with the statewide marketing efforts and to support the short and long-term goals of the ME&O program.

Workforce Education & Training Integration

The Workforce Education & Training (WE&T) is well-positioned in its role of facilitating training to impact the residential sector customers and market actors. WE&T will provide classes, seminars, consultations, and demonstrations to support training programs to promote quality installation, code compliance, and new technology adoption. Residential sector education and training offerings will align with energy savings potential data and focus on existing buildings and building shell measures. For new buildings, education and training programs will focus on cost-effectively realizing ZNE, high performance walls and attics, and code awareness focused on Title 20 and Title 24. These efforts will be primarily targeted to residential contractors, technicians, carpenters, insulation installers, and relevant trade superintendents.

WE&T will also collaborate with the residential sector staff to expand relationships with building industry, plumbing and mechanical trades, as well as realtor associations to develop the appropriate training approaches and materials to achieve more effective engagements for deeper energy savings attainment for the residential sector.

Emerging Technologies

The residential sector program offerings will coordinate with the Gas and Electric Emerging Technology programs (ETPs) to provide for a greater examination and market adoption of emerging and existing technologies to capture natural gas energy efficiency opportunities in the residential sector. The residential sector program will coordinate with the Gas and Electric ETPs to support market introduction of new and existing but underutilized technologies to the market, on a limited scale, through: technology-focused third-party pilot programs, customer demonstration, and market studies. Such technologies may include energy management technologies for whole building applications.

In the residential sector, some of the largest opportunities for savings are in mass-market programs that have a low per-intervention cost, specifically behavior, upstream, and performance-based programs. The statewide Gas and Electric ETPs will continue to support these types of measures in a number of ways. Additional activities in this sector include exploring new behavioral solutions and helping to implement new policies, such as SB 350, AB 793, AB 802, and ZNE efforts.

On the behavior front, the Gas and Electric ETPs continue to explore solutions that provide customers with detailed information on energy use, facilitate enhanced demand response activities, and boost energy and savings through the use of mobile applications. As this is still an emerging field, the Gas and Electric ETPs, in tandem with other utility and industry stakeholders, will seek to increase utility understanding of solutions in this space while investigating options that result in persistent energy savings. If practicable, the strategy will also work with manufacturers to draw down the wholesale cost of energy efficiency appliances, to encourage installation of the most efficient appliances (in recognition of federal preemption or lower cost-effectiveness) and to incorporate load management devices, software and other approaches to reduce standby consumption.

The statewide Gas and Electric ETPs are also monitoring the evolution of connected technologies within the home. California AB 793 stipulates that at least one such technology must be included in DSM portfolios and Gas and Electric ETPs will provide support in identifying and analyzing candidate products. As connected appliances continue to proliferate, the Gas and Electric ETPs will monitor this industry and will look for individual technologies and suites of products that are an appropriate fit for DSM portfolios. The programs will also continue to evaluate products, hold demonstrations, identify barriers, and generate data that support all legislative mandates while delivering positive results for customers.

Codes & Standards

The Statewide Codes and Standards (C&S) Program advances technologies into code through advocacy work with standards and code-setting bodies, such as the California Energy Commission (CEC) and the Department of Energy (DOE), to strengthen energy efficiency regulations by improving compliance with existing C&S. The C&S Program will work with the residential sector customers and contractor community to increase awareness of new codes and to support code compliance. The C&S effort will also draw upon the practical knowledge of the contractor community in the early stages of code development. C&S will also assist in the development of ZNE retrofit design tool kits to advance ZNE retrofits in residential buildings.

Integrated DSM

Integrated Demand-Side Management (IDSM) encourages the integration of a full range of DSM options such as energy efficiency, advanced metering, low-income energy efficiency, distributed generation, and alternative fuel vehicles. SoCalGas will continue identifying, designing, developing, and incubating new program partnering and integration ideas and opportunities with its peer utilities. It will also continue maintaining successful energy and

water efficiency offerings that it operates jointly with various POUs. SoCalGas and its implementers will continue maintaining a close working relationship with the program staffs at other utilities, as well as ensuring that all aspects of joint program operations, such as reporting and billing, remain at the highest standard. Having a smooth and positive working relationship with the staff at the other utilities allows both SoCalGas and the other utilities to build confidence and continue expanding partnering and integration opportunities.

The internal integration of SoCalGas' residential strategies will include building relationships outside of its energy efficiency portfolio, for example, the Energy Savings Assistance Program and Solar Thermal Program, will be targeted to market actors that will offer the greatest return on investment, primarily for residential homebuilders and multi-family property owners. These market actors control a significant portion of the residential market, and their decisions can affect the future direction of energy efficiency in a large number of homes in California. By investing the resources to target and influence these decision-makers, IDSM efforts aim to steer these homes and their communities toward meeting the objectives of the CLTEESP.

Demand Response

The residential sector Business Plan proposes to leverage emerging energy management technologies to assist customers in actively managing their energy. This will include merging AMI technology with advanced energy efficiency and energy management technologies to permanently modify customer behavior, which will result in reliable energy savings and serve to support utility demand response activities. Where practicable, these efforts will also partner with electric and water agencies that have AMI technology to provide a simple, one-touch energy efficiency and demand response experience.

Alternative Fuel Vehicles

To advance the use of alternative fuel vehicles in California, SB 350 states the following goal: "Advanced clean vehicles and fuels are needed to reduce petroleum use, to meet air quality standards, to improve public health, and to achieve greenhouse gas emissions reduction goals."⁷⁵ The residential sector Business Plan proposes to increase awareness of alternative fuel vehicle options to single family residential customers, new construction builders and residential property owners to significantly reduce nitrogen oxides (NOx) and greenhouse gas (GHG) emissions. Consistent with SB 350's goals to address barriers to access for low-income customers to zero-emission and near-zero-emission transportation options,⁷⁶ outreach efforts directed at disadvantaged communities will also emphasize the benefits and opportunities for alternative fuel vehicles supporting the residential sector.

⁷⁵ Cal. Public Utilities Code § 740.12(a)(1) (2015).

⁷⁶ See Clean Energy and Pollution Reduction Act of 2015, California Senate Bill 350 (2015). See California Public Utilities Code § 25327(d).

Energy Savings Assistance

The Energy Savings Assistance (ESA) program supporting the multi-family segment will be coordinated with the residential energy efficiency Business Plan. The Single Point-of-Contact (SPOC) will serve as the primary conduit between the residential energy efficiency sector program offerings and the ESA program. Disadvantaged Outreach efforts will be coordinated with local ESA outreach to increase energy efficiency adoption levels among all residential segments. The SPOC will also coordinate new strategies with the low income property owners such as residential financing (e.g., REEL) and the Homeowner Resale strategy.

Statewide Implementation

SoCalGas will collaborate and coordinate with other Program Administrators on the effective implementation of statewide program offerings. Programs designed to engage directly with specific market actors at the midstream and upstream market channels will be implemented on a statewide basis. Other downstream programs, beyond what is presented in the Business Plan, may also be considered candidates for statewide implementation.

Local Implementation

Local and regional solutions are necessary for the achievement of the residential sector vision, goals and objectives. Many of the current programs offered are done so in coordination with POUs; such collaborations with POUs will continue at a local level. For example, SoCalGas has a strong partnership with the LADWP to jointly design and deliver energy efficiency programs to a shared customer base. Such activities will continue whether implemented by the POU and/or implemented by a SoCalGas selected and managed third-party program implementer(s). SoCalGas will also work with other POUs to identify good program candidates to join the statewide implementation efforts, where feasible.

IOU Program Implementation and Support

SoCalGas proposes to continue implementation of certain downstream programs (i.e., programs delivered directly to the customer) where it is reasonable and practicable to do so. SoCalGas will also continue to actively support the delivery of third-party programs. For example, customer services such as incentive payments and inspections will be provided to support third-party program implementers and safeguard ratepayer funds. At times, it is more efficient and productive to leverage the natural relationship between SoCalGas and its customers. As the trusted energy advisor, SoCalGas has an ongoing relationship with its customers on all energy matters, including energy efficiency. SoCalGas proposes to continue to promote energy efficiency programs to the customers and customer groups to improve the likelihood that customers will adopt energy efficiency. SoCalGas will also continue to seek partnerships with other utilities and public agencies in its delivery of programs and services, including third-party implemented programs, to minimize program costs and maximize customer participation.

I. Evaluation, Measurement & Verification (EM&V) Considerations

The residential sector consists of two primary segments with varied characteristics. There is a need for a deeper level of research on both segments within the residential sector.

The residential customer can benefit from permanent changes to their energy consumption practices. For instance, there are several operational changes that can have a great impact on the amount of energy consumed by the residential sector. Estimating the impact of behavioral measures will be paramount to the near- and long-term success in achieving the overall goals of the residential sector.

With the changing environment, the IOUs propose to conduct a study that will provide information on baselines. This is a high priority since there have been rule changes and now in some sectors, the baseline is existing conditions. Also, the IOUs will leverage information collected from the Residential Appliance Saturation Survey (RASS) and California Lighting and Appliance Saturation Study (CLASS), to inform the design of new programs. If the information from RASS (collected from mail or on-line surveys) does not provide the level of detail and accuracy needed for program design, the IOUs plan to use the increase of the EM&V funding split from 27.5% to up a maximum of 40 to fund additional data collection activities, such as on-site visits, to verify and supplement with detailed information.

The IOUs agreed that a process evaluation should be conducted on AB 793-type programs; however, the timing of these studies has not been decided to date. The programs need to be in effect for a sufficient time period that will allow a useful participant sampling, which may not be until 2018.

Lastly, SoCalGas proposed to do a multi-family boiler study in the 2016 EM&V roadmap. SoCalGas has a need to gather information about the current stock of boilers and the decision-making process of multi-family owners/property managers. This information will assist multi-family programs and the multi-family High Opportunity Program.

The following are recommendations to improve the body of knowledge regarding the residential sector.

Market Research and Process Evaluation:

- Conduct a market study to examine the unique characteristics of the segments and trends within their specific segment or sub-segment.
- Survey residential customers to identify where program participation processes can be simplified.
- Conduct a market study on disadvantaged communities to identify unique market characteristics, market barriers, and customer preferences and energy habits.
- Perform additional research on the whole home market and key market actors to identify elements for encouraging deep, comprehensive whole home upgrades.

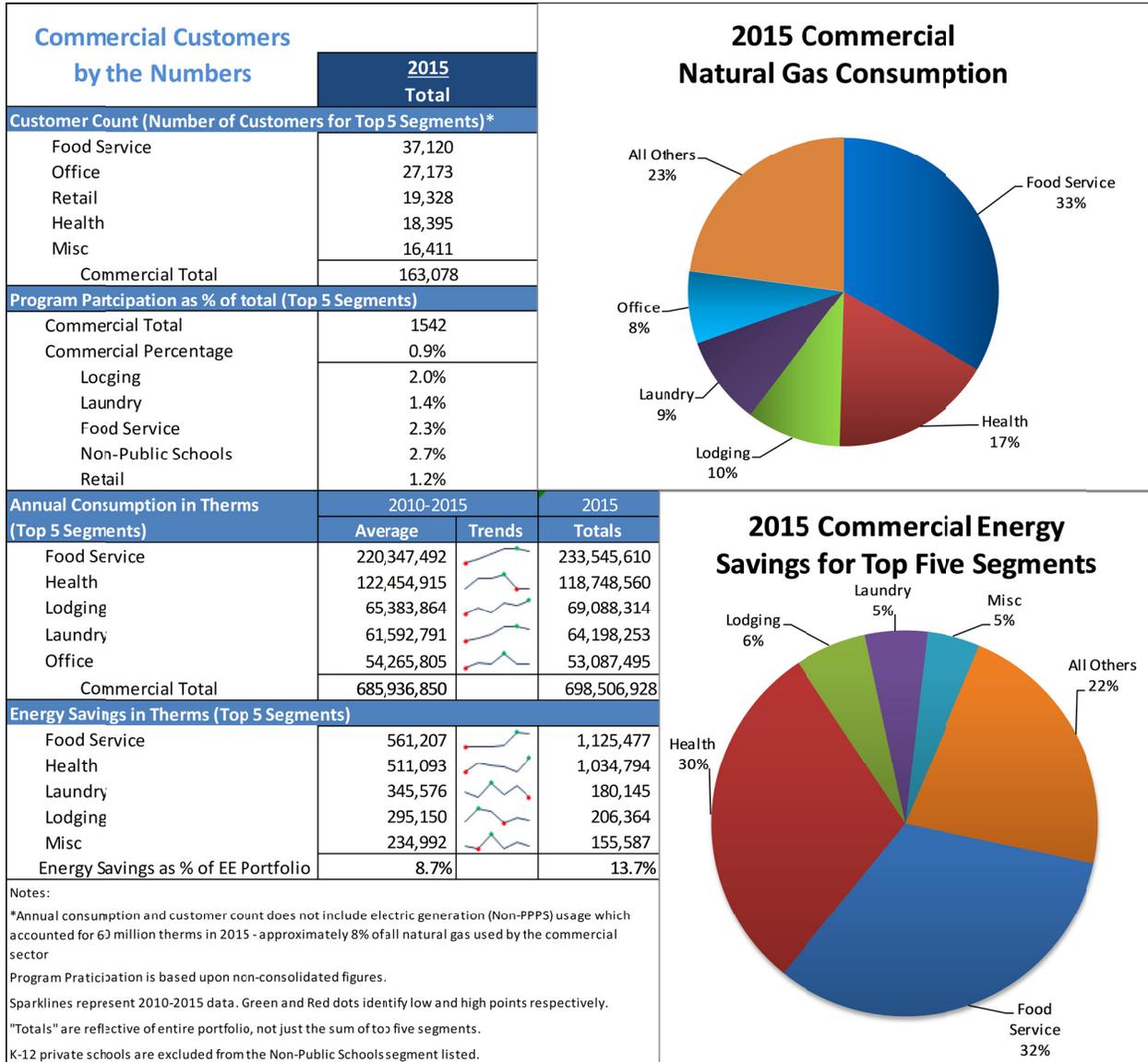
- Assess the emerging energy management technologies to identify potential energy efficiency applications.

Load Impact:

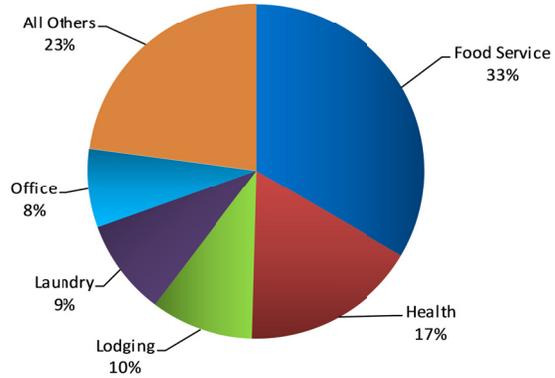
- Use normalized metered energy consumption data to determine the overall impact of behavior measures as an enhanced approach to quantify energy savings. For this approach, energy savings are calculated as the difference between the normalized metered energy consumption for baseline and post-intervention time periods.

COMMERCIAL CHAPTER

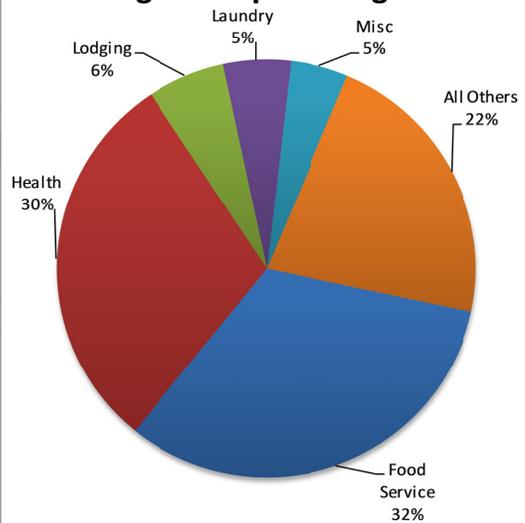
Commercial Sector Snapshot



2015 Commercial Natural Gas Consumption



2015 Commercial Energy Savings for Top Five Segments



A. Commercial Sector Chapter Summary

SoCalGas' commercial sector represents nearly 18% of the natural gas consumed by all of its customers.⁷⁷ Southern California, and specifically, the SoCalGas service area, includes a very large commercial market due to the large, vibrant, and diverse southern California economy. The California economy ranks as one of the top economies in the world.⁷⁸ In recent years, the SoCalGas commercial sector has remained relatively stable, and has strongly recovered since the economic recession of 2008-2009.

SoCalGas' commercial sector represents a very large and diverse customer base with many unique customer segments. Most of SoCalGas' commercial accounts are small to medium-sized businesses, which account for approximately 67% of the commercial sector energy usage annually. Many of these smaller customers use gas in a manner much like a residential customer. Across most customer segments, there is a significant amount of untapped energy savings associated with potential changes in customer operations and practices.

Energy efficiency in the commercial sector integrates the ideals of innovation, partnership, and customer-centric approaches. SoCalGas seeks to influence the commercial building environment by creating impactful solutions that are valued by customers, sensitive to the environment, stimulate the economy, and make a difference in the communities served.

Commercial Sector Vision

Commercial buildings will realize the highest natural gas efficiency levels to support a pathway to zero net energy by 2030 for all new, and a substantial proportion of existing, buildings. Innovative technologies, enhanced building design, and operational practices will dramatically grow in use in the coming years.

State goals must be addressed at statewide levels and supported with local solutions, strategic collaboration, and cost-effective implementation. Some examples of concepts, initiatives, and legislation that require effective implementation and collaboration include:

- New construction commercial buildings achieve Zero Net Energy (ZNE) by 2030
- All major renovations of existing commercial buildings reach ZNE goal by 2030
- Assembly Bill (AB) 758 – Implementing the Existing Buildings Action Plan
- Senate Bill (SB) 350 – Clean Energy and Pollution Reduction Act of 2015

Commercial Goals

⁷⁷ 2015 consumption does not include electric generation.

⁷⁸ Vekshin, A. (2016, June 14). California overtakes France to become sixth-largest economy. *Bloomberg, L.P.* Retrieved from <https://www.bloomberg.com/politics/articles/2016-06-14/california-overtakes-france-to-become-sixth-largest-economy>

- **Goal 1: Increase energy efficiency adoption levels for commercial customers with high energy efficiency potential through efficient outreach and effective offerings.** Deliver effective, low touch customer solutions by leveraging data analytics techniques to target customers to increase natural gas savings in commercial business operations.
- **Goal 2: Increase energy efficiency levels in the commercial leased properties by reducing the split-incentive market barrier.** Align the interests of owner and renter to adopt higher levels of energy efficiency in commercial leased facilities.
- **Goal 3: Increase number of ZNE-ready buildings across most commercial segments through increased gas energy efficiency levels.** Support the development of a standardized, market-accepted ZNE definition for new construction and retrofitted buildings to enable a pathway for ZNE.
- **Goal 4: Support the proper installation, maintenance, and use of HVAC systems in the commercial sector.** Partner with electric utilities and key market actors to offer a simplified suite of programs that capture and recognize all realized HVAC-related energy savings.

These goals are focused on significantly increasing energy efficiency levels across all commercial segments of all customer sizes through reducing market barriers these customers face. The commercial sector business plan includes a combination of proven and newer program strategies coupled with new approaches to effectively identify customers with the greatest energy efficiency opportunities using data analytic advancements enabled by SoCalGas' Advanced Meter Infrastructure (AMI), where feasible. Using data analytics and traditional outreach approaches, SoCalGas will offer an integrated set of program strategies that meet the customer's unique energy efficiency needs. The commercial sector also presents an opportunity to capture significant amounts of behavioral energy savings opportunities. Specific program strategies will be offered to the customer to permanently capture these energy savings. To encourage greater adoption of energy efficiency among all commercial customer segments, SoCalGas will offer a simple, low-cost suite of programs that are tailored to the commercial sector. A targeted focus will also be applied to the small business customers who operate in disadvantaged communities throughout the service area.

B. Approach to Achieve Commercial Sector Goals

In past program cycles, program portfolios were structured based on specific programs and/or technologies. The sectorial business plan approach is based on customer needs and expectations, within like customer groups, proactively offered in a deliberate and efficient manner to significantly increase the adoption of customer energy efficiency solutions among all customer types within the sector. Taking advantage of AMI technology, customer energy usage habits can now be examined and categorized, through efficient data analytics, to identify how customers can incorporate energy efficiency into their business operations.

Sector Challenges

The commercial sector challenges represent a collection of existing market barriers, of varying degrees, created by various market actors. There are several market barriers present within the commercial sector that inhibit the customer from achieving higher levels of energy efficiency. These market barriers are a byproduct of the market sector characteristics and the

customer's behavior within that specific market sector. The following are perceived market barriers, specific to the commercial sector, identified during the business planning process, which includes input from key stakeholders. These barriers form the basis of the challenges in the commercial sector.

Challenge 1: Varied and unique segments with specific needs make it difficult to offer standard program that fits the needs of all customers.

Many segments of the commercial sector, with high energy savings potential, have low participation rates in energy efficiency programs. Traditionally, current program designs do not fit the underserved markets because of the segments' specific needs and program policies that hinder program participation.⁷⁹

- **Smaller customers are diverse and spread throughout SoCalGas' large service territory.** The smaller commercial customer markets are very diverse and geographically spread throughout a large territory. This limits program participation and, ultimately, results in lower levels of energy efficiency adoption. For example, on average, the SoCalGas commercial restaurant program only has about 1% of total restaurant customers enrolled.
- **Smaller customers do not have time or resources to learn about energy efficiency programs and opportunities.** Limited access to energy efficiency opportunities coupled with the limited effectiveness of mass market programs that are not tailored to the small commercial segment lead to lower participation levels among smaller and rural customers.

Challenge 2: The commercial sector is trending towards more leased properties creating a larger split-incentive barrier between owners and tenants.

The commercial market is trending towards more leased properties than owned, thus program design needs to address the split incentive issue between owners and tenants to avoid program confusion.⁸⁰ At the heart of this issue is the question: Who pays for the work and who benefits from it?⁸¹

⁷⁹ Amann, J. T., & Mendelsohn, E. (2005, April). Comprehensive commercial retrofit programs: A review of activity and opportunities. *American Council for an Energy-Efficient Economy*, pp. 11-12. Retrieved from <http://aceee.org/sites/default/files/publications/researchreports/a052.pdf>

⁸⁰ Rocky Mountain Institute. *Split incentives*. Retrieved from http://www.rmi.org/tools_and_resources#split_incentives

⁸¹ Fletcher, D., & Vrkic, D. (2014, February 24). The split incentive dilemma: Strategy from a customer perspective. *Emerging Technologies Coordinating Council*. Retrieved from http://www.etcc-ca.com/sites/default/files/field/eventfile/ETCC%20Q1%20Quarterly%20Meeting%20Presentation%20Slides.FINAL_0.pdf

- **Split-incentive between tenant and owner.** Under most commercial leases, energy costs are paid directly by tenants, therefore, building owners are not motivated to invest in efficient building systems. For some leases, however, building owners pay energy expenses and tenants have little incentive to save energy in their leased space.⁸²
- **There are displaced incentives between commercial property owners and tenants.** Program design and policy require the benefits goes to the entity that is recorded as the meter owner. Program design does not consider the implications to the asset manager, tenants, property managers, design team, and building owner should they differ from the meter owner.⁸³
- **Renewal of lease agreements and capital planning extend beyond program influence.** In most cases, the building's capital plan and the new lease agreement are already planned in advance of the program design and marketing catches up to the owners' intentions to retrofit. The ability to foster program assistance is greatly reduced because the market segment's actions were planned ahead of time.

Challenge 3: Builder confusion on how to achieve Zero Net Energy (ZNE) in new construction and retrofiting of commercial buildings.

There is a lack of unified stakeholder understanding of the implementation of ZNE in new construction and retrofit for commercial whole buildings.⁸⁴

- **Zero Net Energy is cost-prohibitive.** The incremental time and cost of additional design/labor to achieve ZNE for both new and retrofit whole building projects is not currently feasible for the commercialization of ZNE. The customer business model is not structured to incorporate ZNE building standards. The businesses operating within ZNE buildings want to ensure an increase in employee productivity and that their buildings will operate better than traditional buildings.⁸⁵
- **Customers pursuing sustainability over energy efficiency solutions.** Designers and owners now look at a more holistic approach to buildings to increase their return on investment on new construction. These holistic approaches include water efficiency,

⁸² United States Department of Energy. (2016, April). *Energy Efficiency in separate tenant spaces - A feasibility study*, p.1. Retrieved from https://energy.gov/sites/prod/files/2016/04/f30/DOE%20-%20Energy%20Efficiency%20in%20Separate%20Tenant%20Spaces_0.pdf

⁸³ Bird, S., & Hernandez, D. (2012, September 1). Policy options for the split incentive: Increasing energy efficiency for low-income renters. *Energy Policy*. Volume 48, pp.506-514. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4819331>

⁸⁴ Crawley, D., Pless, S. & Torcellini, P. (2009, September). Getting to net zero. *ASHRAE Journal*, NREL/JA-550-46382, pp.2-3. Retrieved from <http://www.nrel.gov/docs/fy09osti/46382.pdf>

⁸⁵ Nelson, R. (2010, May 1). *Building Energy Labeling: A Path to Improved Energy Performance for Commercial Buildings* (Doctoral dissertation).. Retrieved from http://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=1002&context=arch_etds

thermal comfort, health, and productivity. Building developers are focused on sustainability attributes rather than energy efficiency upgrades.⁸⁶

- **Whole Building Approach.** The whole building approach currently requires improvement within the development of ZNE buildings. There is opportunity to improve the integration of different subject matter experts through the design process of the building. The inclusion of whole building solutions versus equipment replacement is not prominent yet due to value engineering or cost cutting. In addition, there should be a differentiation of whole building solutions applied to new construction versus retrofit opportunities.

Challenge 4: Improper HVAC replacement and maintenance of equipment limits the potential for significant energy savings.

Proper replacement and maintenance of equipment holds the potential for significant energy savings. However, market fragmentation, cost-effectiveness challenges, measurement and evaluation challenges, regulatory risk, program complexity, industry skill gaps, customer awareness, and variances in program offerings have all impacted the potential for commercial HVAC program effectiveness.⁸⁷

- **Customers are presented with varied and disconnected information regarding HVAC solutions.** Various market actors promote their own respective interests in the HVAC industry. These actors include independent manufacturers, distributors, retailers, and contractors. As a result, there are ongoing efforts by the Western HVAC Performance Alliance (WHPA) to align all these market actors towards a common energy efficiency purpose.⁸⁸
- **HVAC industry skill gaps.** HVAC certifications are widely regarded as non-essential or secondary to field experience, and although many HVAC contractors value workforce education and training, many are not willing to invest in their staff.
- **Customers are uncertain of claimed benefits associated with energy efficiency equipment.** Limited lab testing creates a sole reliance on engineering work papers to estimate energy savings. EM&V challenges including research design issues, lab simulations, and challenges obtaining representative field data have impeded program

⁸⁶ World Business Council for Sustainable Development. (2007, October). *Energy efficiency in buildings: Business realities and opportunities, A summary report*. Retrieved from <https://www.c2es.org/docUploads/EEBSummaryReportFINAL.pdf>

⁸⁷ Harvey, C. (2013, March). Best practices in small commercial HVAC programs at California utilities. *University of California, Davis*, Retrieved from <https://eec.ucdavis.edu/files/03-25-2013-Best-Practices-in-Small-Commercial-HVAC-Programs-1.pdf>

⁸⁸ Western HVAC Performance Alliance, (2013, April). *Charter of the Western HVAC Performance Alliance*, pp. 1-3. Retrieved from <http://www.performancealliance.org/Portals/4/Documents/Charter/WHPA%20Charter%20Updated%2006-10-2016.pdf>

implementation and cost-effectiveness. Not enough work has been completed to measure and validate energy savings generated by the programs. Typically, deemed energy savings (work papers) are the only marker to value the energy efficiency savings and corresponding benefits.

Desired Outcome

The sector business plan identifies key milestones in the advancement towards a permanent market effect through a set of desired sector outcomes. In many cases, the desired outcome is expected well beyond the near and mid-term planning horizon, and ties to the 10-year vision for the sector. The Business Plan identifies the corresponding sector level strategies which, in turn, will rely on specific program intervention strategies that will be deployed to reduce the market barriers, which will result in the desired sector outcome (i.e., sector-level goal).

Table 1 - Desired Outcome	
<p>10-year Vision: Commercial buildings will realize the highest natural gas efficiency levels to support a pathway to zero net energy by 2030 for all new, and a substantial proportion of existing, buildings. Innovative technologies, enhanced building design, and operational practices will dramatically grow in use in the coming years.</p>	
Challenges	Desired Outcome
<p>Varied and unique segments with specific needs make it difficult to offer standard program that fits the needs of all customers.</p>	<p>1. Increase adoption of energy efficiency solutions by customers within untapped energy efficiency potential across all customer segments and sizes.</p>
<p>The commercial sector is trending towards more leased properties creating a larger split incentive barrier between owners and tenants.</p>	<p>2. Increased energy efficiency levels in commercial leased properties.</p>
<p>Builder confusion on how to achieve ZNE in new construction and retrofitting of commercial buildings.</p>	<p>3. Increase number of ZNE-ready buildings across most commercial segments through increased gas energy efficiency levels.</p>
<p>Improper HVAC replacement and maintenance of equipment limits the potential for significant energy savings.</p>	<p>4. Increase the number of properly installed and maintained HVAC systems.</p>

To continuously track the commercial sector progress towards achieving these goals, specific metric targets are presented below:

Goal 1: Metric Target - Achieve greater levels of natural gas savings from all commercial segments by 15% over 2015 levels by 2025.

Goal 2: Metric Target - Increase participation in energy efficiency programs from commercial leased properties by 15% over 2015 levels by 2025.

Goal 3: Metric Target - Increase program participation of ZNE-ready commercial buildings across various customer segments by 15% of 2015 levels by 2025.

Goal 4: Metric Target - Achieve greater levels of HVAC-related natural gas energy savings by increasing the number of properly installed and maintained HVAC systems by 15% over 2015 levels by 2025.

Commercial Sector Budget, Cost-Effectiveness, and Savings

To facilitate the achievement of the commercial sector goals, SoCalGas will rely on a coordinated combination of existing and new program intervention strategies. Table 2 contains the commercial sector budget for the 2018-2015 timeframe.

Table 2 – Sector Budget (\$000s)										
Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Commercial	\$12,633	\$13,438	\$13,438	\$15,440	\$16,121	\$16,808	\$17,501	\$18,201	\$18,907	\$19,620

**2016 and 2017 are shown for historical purposes.

Table 3 contains the net therm savings forecast for the 2018-2025 timeframe, based on the 2015 Potential and Goals Study and the AB 802 Technical Analysis.

Table 3 – Annual and Cumulative Net Savings (MM Therms)										
Savings	2016**	2017	2018	2019	2020	2021	2022	2023	2024	2025
Annual	2.76*	3.41*	2.81	3.89	4.16	4.44	4.71	4.98	5.26	5.53
Cumulative			2.81	6.70	10.86	15.29	20.00	24.87	29.98	35.31

* Public sector was included in the commercial sector in 2016 and 2017.

**2016 and 2017 are shown for historical purposes. The number reflects net energy savings from compliance filings.

Table 4 presents annual and lifecycle gross emissions avoided forecasts for 2018-2020 for commercial sector programs.

Table 4 – Near-Term (2018-2020) Gross Emissions Avoided			
Gross Emissions Avoided	CO ₂ (tons)	NO _x (lbs)	PM-10 (lbs)
Annual	91,763	144,319	(21)
Lifecycle	1,215,601	1,911,891	(416)

Table 5 shows the near-term cost-effectiveness for the commercial sector.

Table 5 – 2018-2020 Cost-Effectiveness		
Sector	TRC	PAC
Commercial	1.28	1.81

C. Overview of New Program Strategies and Tactics

In addition to proven program strategies, SoCalGas will incorporate new program strategies and corresponding program tactics to arrive at a complete energy efficiency solution set for the commercial customer. The existing and new program strategies are further detailed in the

Program Intervention Strategies section. New program approaches and proposed implementation timeframes are summarized in Table 6.

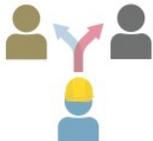
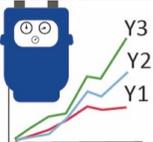
Table 6 - New Program Strategies			
Program Intervention Strategy	Descriptions	New Tactics	Timing
 <p>Partnering</p>	Limited-partnership arrangements, deployed on an as needed basis that are intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model based on equitable sharing of customer incentives and administrative costs among partners.	<ul style="list-style-type: none"> • Customer Partnering 	Near, Mid-term
 <p>Intelligent Outreach</p>	To assist customers in identifying the greatest energy efficiency opportunities, improve cost efficiency in program delivery, segment-specific benchmarking and provide deeper, comprehensive energy savings solutions.	<ul style="list-style-type: none"> • Data Analytics • Industry Best Practice Sharing 	Near, Mid-term
 <p>Strategic Energy Management</p>	Provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the production line to corporate management.	<ul style="list-style-type: none"> • Pay-for-Performance • Modified Savings Analysis • Use of AMI Data • Cross-Promotion • Meter Large Projects 	Near-term
 <p>Customer Incentives</p>	Facilitates customer choice by offering a simplified suite of financial incentives strategies to customers to reduce the high first cost barrier, a key market barrier for most customers.	<ul style="list-style-type: none"> • Pay-for-Performance • Bundled Measures 	Near-term

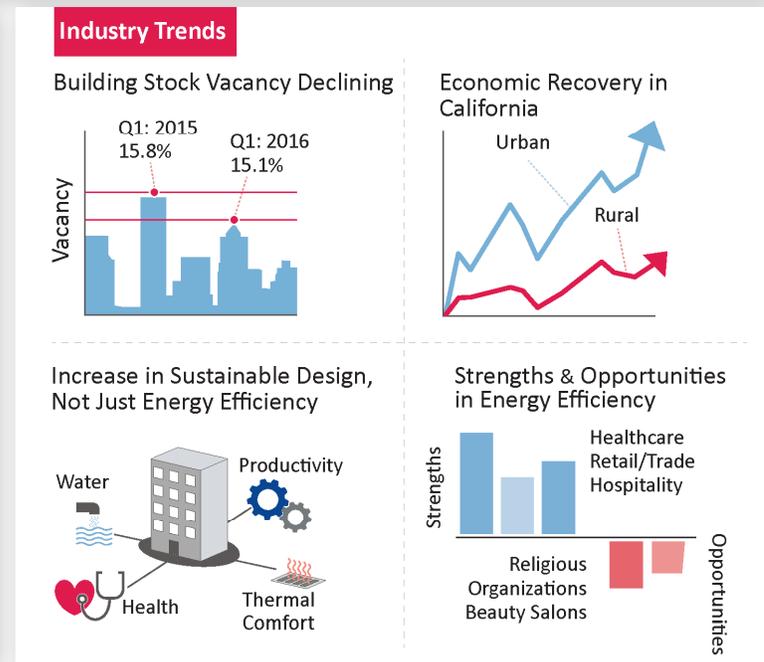
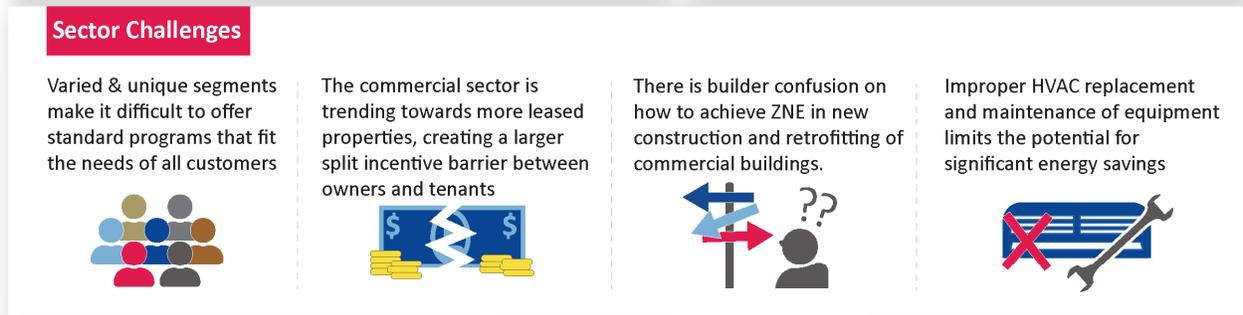
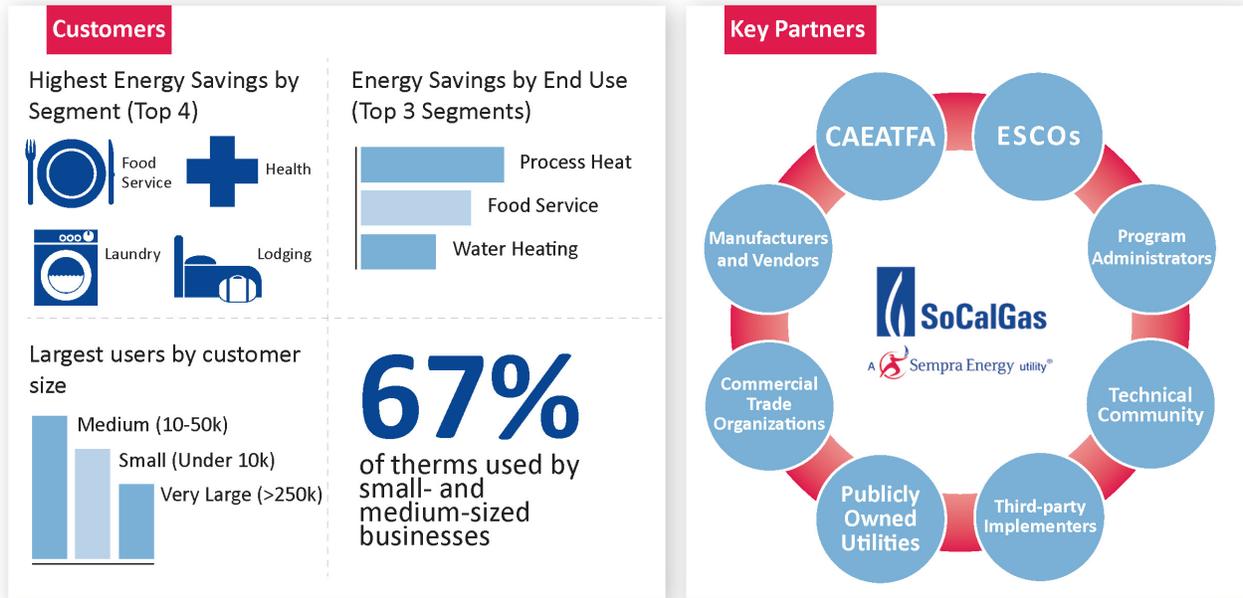
Table 6 - New Program Strategies			
Program Intervention Strategy	Descriptions	New Tactics	Timing
Direct Install 	The comprehensive direct install program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for commercial properties.	<ul style="list-style-type: none"> • Comprehensive Direct Install 	Near-term
Financing 	The Commercial Financing program strategy relies on various financing vehicles including on/off bill repayment solutions to encourage customers to adopt deeper, more comprehensive energy efficiency solutions.	<ul style="list-style-type: none"> • On-Bill Repayment 	Near-term

D. Commercial Sector Market Characterization

The commercial sector represents several unique customer segments that vary in size and type of operations. Figure 1 shows the characteristics of the commercial sector.

Figure 1

Commercial Sector - Market Characterization



Key Characteristics of the Commercial Sector include:

- Diffused market sector with a number of unique and varied customer segments;
- Small number of large customers who consume the vast majority of natural gas;
- Large number of smaller customers who use gas similar to a residential customer; and
- Significant amount of untapped energy savings associated with changes in customer operations and practices.

To simplify customer engagement in the delivery of energy efficiency programs which will lead to increase program effectiveness, SoCalGas proposes to coordinate program delivery with local utilities (electric, water), where practicable. This will allow for a single customer engagement and will empower the customer to implement a complete energy (and water) efficiency plan.

In certain instances, a customer may behave in a manner similar to those in other sectors. For example, a commercial retail customer may also act as an industrial processing plant in a shared facility. In those instances, strategies from various sectors will be offered to these multi-dimensional customers in a coordinated offering.

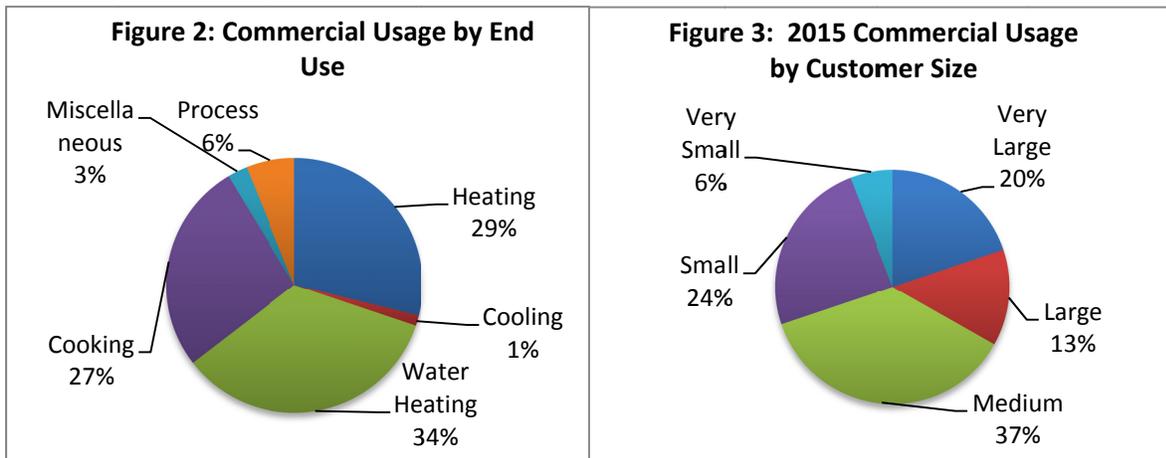
Customer Landscape

Commercial Sector Energy Usage

SoCalGas has approximately 163,000 commercial customers that collectively consumes just over 698 million therms of natural gas in 2015, as shown in Table 7.

Table 7 - Energy Consumption by Customer Size (does not include electric generation and cogeneration)		
Customer Size (therms/yr)	2015 Number of Customers	2015 Usage MM Therms
Very Large (>250k)	187	138.6
Large (50k-250k)	1,029	93.4
Medium (10k - 50k)	13,580	255.5
Small (2 - 10k)	33,263	169.7
Very Small (<2,000)	115,019	41.3
Total	163,078	698.5

Commercial customers primarily use gas for water heating, cooking, and space heating, as shown in Figure 2.⁸⁹ The vast majority of SoCalGas’ commercial accounts are small to medium-sized businesses that account for about 67% of the commercial sector energy usage annually, as shown in Figure 3.



Usage by Customer Size

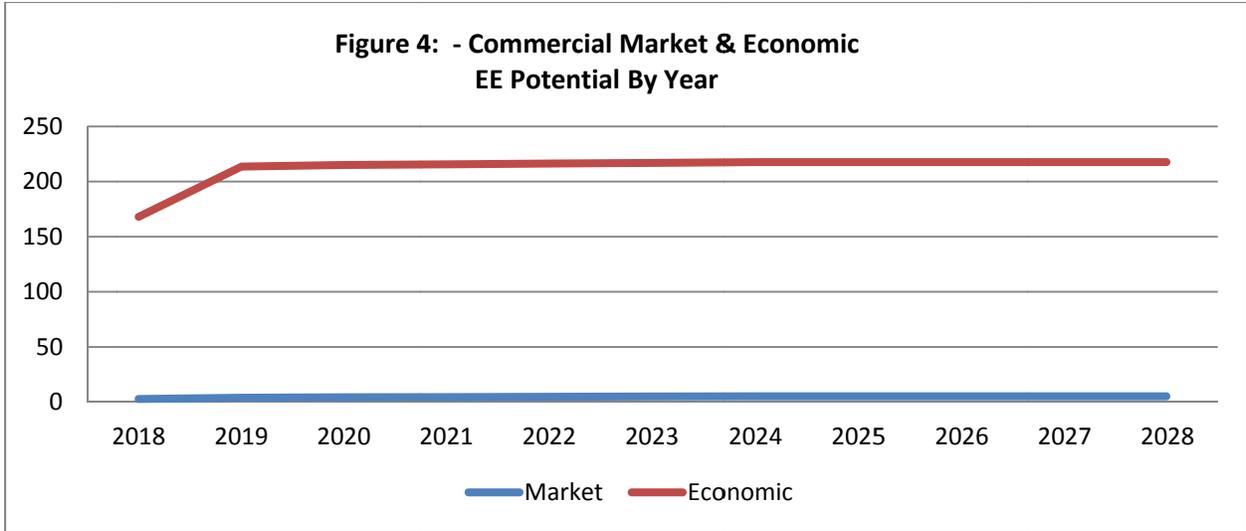
SoCalGas has divided its commercial customers into five usage categories: Very Small (0-2,000 therms per year), Small (2,000 to 10,000 therms per year), Medium (10,000 to 50,000 therms per year), Large (50,000 to 250,000 therms per year), and Very Large (more than 250,000). Medium-sized commercial customers make up the highest gas usage, followed by Small customers - as shown in Figure 3 and Table 7 above.

Market & Economic Energy Efficiency Potential

The estimated market and economic energy efficiency potential for the commercial sector, over the next ten years, is shown in Figure 4.⁹⁰ Historically, public sector customers have been included in the commercial sector analyses (e.g., market potential studies). However, public customers are addressed as part of the public sector Business Plan. As a result, Figure 4 removes the estimated public sector potential from the commercial energy efficiency potential.

⁸⁹ Itron, Inc. (2006, March). *California Commercial End-Use Survey, CEC-400-2006-005*. Retrieved from <http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF>

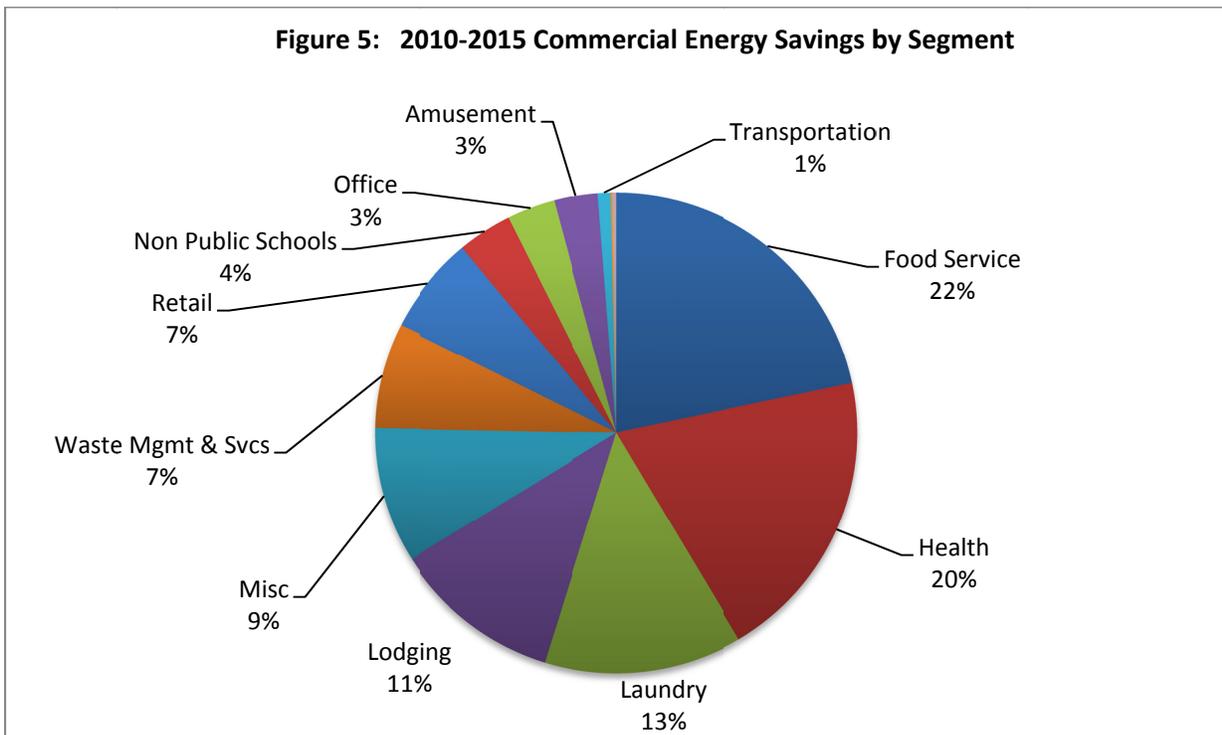
⁹⁰ Navigant Consulting, Inc. (2015, September 25). *Energy Efficiency Potential and Goals Study for 2015 and Beyond, Stage 1 Final Report*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4033>



Historical Sector Performance

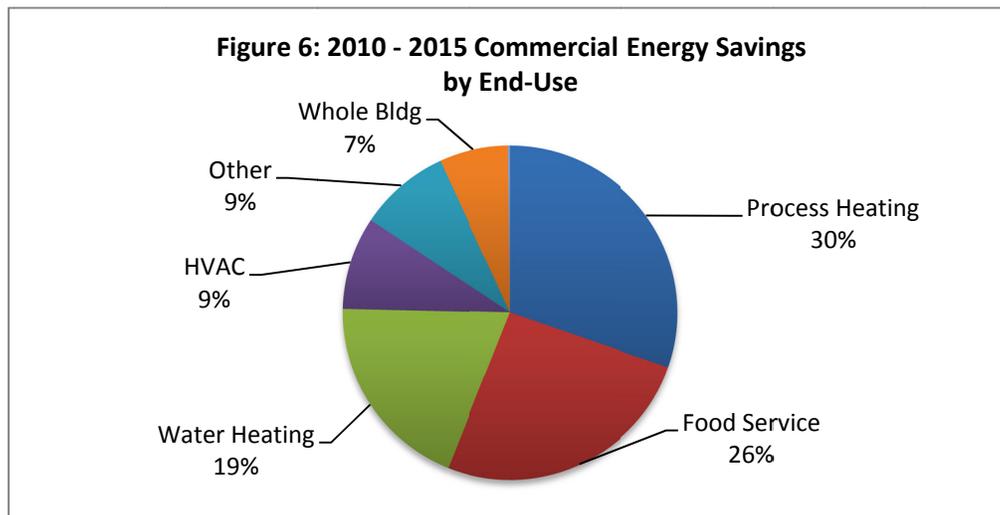
Segment

From 2010 to 2015, SoCalGas commercial customers saved over 15 million therms of natural gas annually, or approximately 9% of total portfolio savings. The food service segment accounted for the largest portion of the commercial sector energy savings with nearly 22% of the saving from 2010 to 2015, as shown in Figure 5. Process heating and food service end-uses account for the largest portion of energy savings during this same period.



End-Use

Figure 6 depicts annual energy savings of the commercial sector by end use.⁹¹ Approximately (30%) of the energy savings are associated with process heating, followed by cooking/food service (26%). Most commercial sector energy efficiency savings results were produced through the Statewide Calculated program. Most energy savings processed through the Statewide Calculated program came from the end uses Process Heating, and HVAC.



Energy Efficiency Equipment Sales Share

Due to the diverse segments within the commercial sector, there is no common equipment used across the sector. Similar equipment is common within each of the segments within the commercial sector. Market adoption levels of energy efficiency equipment vary among segments and equipment. In order to increase the purchase of energy efficiency equipment to realize permanent market effects, SoCalGas will place a heavy focus on increasing market adoption of energy efficiency equipment where market adoption is low.

Key Market Actors

In order to increase market adoption of energy efficiency equipment in the commercial sector, there are key market actors that can assist in transforming the market through various program intervention strategies and policies. The market actors include equipment manufacturers, distributors, and retailers to assist in permanently modifying equipment stocking habits as well as customer perception and acceptance of energy-efficient equipment. Other market actors include industry associations that can inform and influence specific-customer segments within the commercial sector.

⁹¹ Itron, Inc. (2006, March). *California Commercial End-Use Survey, CEC-400-2006-005*. Retrieved from <http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF>

Industry Trends

Southern California, and specifically, the SoCalGas service area, includes a very large commercial market due to the large, vibrant, and diverse economy. The SoCalGas commercial sector has largely recovered since the economic recession of 2008-2009. The vacancy rate of commercial real estate, a key economic indicator, has steadily declined.⁹² The overall vacancy rate for the Greater Los Angeles region decreased from 15.8% in the first quarter of 2015 to 15.1% in the first quarter of 2016.⁹³

Key trends in the commercial market within southern California include:

Employment. Employment rates are slowly rising in the southern California region.⁹⁴ In particular, employment in Los Angeles County is forecast to grow at its population growth rate of approximately 0.6%.⁹⁵

Sustainability. Designers and owners now look at a more holistic approach to buildings to increase return on investments. These holistic approaches include water efficiency, thermal comfort, health, and productivity. The developers of these buildings are not just looking at energy savings, but also into sustainability to attract talent within their businesses.

Leading Industries. Healthcare and social assistance; professional and business services; retail trade; and leisure and hospitality.⁹⁶

⁹² Los Angeles County Economic Development Corporation, Economic and Policy Analysis Group (2013, April). *Industry and labor market intelligence for Los Angeles County, Section 4.2*, p.39. Retrieved from http://laedc.org/wp-content/uploads/2013/06/Industry-and-Labor-Market-Intelligence_LAC_FINAL.pdfhttp://www.keegancoppin.com/pdf/market/commercial_real_estate_forecast_2016.pdf

⁹³ Cushman & Wakefield. (2016). *Marketbeat industrial snapshot Q1 2016 greater Los Angeles*, p.2. Retrieved from http://www.cushmanwakefield.com/~/_media/marketbeat/2016/04/Greater_LA_Americas_MarketBeat_Industrial_Q12016.pdf

⁹⁴ Los Angeles County Economic Development Corporation, Kyser Center for Economic Research (2016, February). *2016-2017 Economic forecast and industry outlook*, p.27. Retrieved from <http://laedc.org/wp-content/uploads/2016/02/LAEDC-2016-2017-February-Forecast.pdf>

⁹⁵ Los Angeles County Economic Development Corporation, Institute for Applied Economics, (2016, December). *Economic update for Los Angeles County*. Retrieved from http://economy.scag.ca.gov/Economy%20site%20document%20library/2016_econsummit_LOSANGELES.pdf

⁹⁶ Los Angeles County Economic Development Corporation, Kyser Center for Economic Research (2016, February). *2016-2017 Economic forecast and industry outlook*, p.27. Retrieved from <http://laedc.org/wp-content/uploads/2016/02/LAEDC-2016-2017-February-Forecast.pdf>

Recession Continues in Rural Communities. Recent economic studies project rural communities in California, especially in the San Joaquin Valley, will continue to have sluggish economies - in contrast to other areas within the state.⁹⁷

Legislative Impacts on Strategy

There are a number of newly adopted legislative bills providing specific guidance for the future of energy efficiency in California. From Senate Bill (SB) 350 to Assembly Bills (AB) 793, and 802, there are numerous directives that are helping to shape the next generation of energy efficiency program offerings. SB 350 sets forth a goal to double the levels of energy efficiency in California by 2030. A summary of the recent legislation along with SoCalGas’ proposed program strategies to address these directives is shown below in Table 8.

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Commercial Sector Customer		
Policy Drivers	Guidance	Response
SB 350 – Clean Energy and Pollution Reduction Act of 2015	Achieve a cumulative doubling of savings in electricity and gas retail customers’ final end uses by 2030.	SoCalGas will deliver a customer-friendly suite of energy efficiency program intervention strategies structured to significantly increase energy efficiency levels within the commercial sector.
AB 793 – Energy Management Technology (EMT) Incentive Offering	IOUs must develop programs by January 1, 2017 that provide incentives to help residential and small/medium business customers acquire energy management technology and educate them about these programs.	SoCalGas will offer EMT tactics to the small/medium-sized commercial-type facilities to enable consumer-friendly, on-going virtual communication that will allow customers to continuously monitor energy consumption within their facilities. This will empower customers to permanently modify their energy consumption behavior.

⁹⁷ Los Angeles County Economic Development Corporation, Kyser Center for Economic Research (2016, February). *2016-2017 Economic forecast and industry outlook*, p.64. Retrieved from <http://laedc.org/wp-content/uploads/2016/02/LAEDC-2016-2017-February-Forecast.pdf>

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Commercial Sector Customer		
Policy Drivers	Guidance	Response
AB 758 - Existing Buildings Energy Efficiency Action Plan	<p>Strategy 3.4.1 - Look for opportunities in specific building sectors where there is evidence of ZNE technical potential, current ZNE guidance, and available financing.</p> <p>Strategy 3.4.3 - Make financing widely available for ZNE retrofits.</p>	<p>SoCalGas will partner with various commercial agencies to promote a pathway to ZNE by improving the efficiency of gas end-use technologies. Financing strategies will include an enhanced on-bill financing offering and assistance to identify and apply for alternative financing vehicles.</p>
AB 802 - Benchmarking and Changes to Energy Efficiency Baselines	<p>Benchmarking - By January 1, 2017, for multi-unit buildings, utilities must provide aggregated energy usage data to its owner, its agent, or the building operator. California Energy Commission will set requirements for public disclosure of information for benchmarking purposes.</p> <p>Baselines - Authorizes utilities to provide incentives to customers for energy efficiency projects based on normalized metered energy consumption (NMEC) as a measure of energy savings.</p>	<p>While focused on benchmarking and baselines, SoCalGas will leverage this effort to support its Intelligent Outreach program strategy. Tactics such as data sharing will provide usage data to the customer to support benchmarking activities. Program offerings such as pay-for-performance will encourage both energy efficiency retrofits and behavioral changes through incentives based on NMEC as an estimate of energy savings.</p>

The Commission has also issued guidance to Program Administrators on how to further formulate the energy efficiency Business Plans. In response, SoCalGas has reshaped existing program strategies and added new ones to meet these specific directives. The recent legislative and regulatory directives along with SoCalGas’ proposed program strategies to address these directives are detailed in Appendix A.

E. Goals, Strategies, and Tactics for the Commercial Sector

To realize the desired sector outcomes (i.e., sector goals), several coordinated, and integrated program intervention strategies will be deployed throughout the various market channels to increase customer energy efficiency adoption levels. This will support the achievement of increases in the adoption of energy efficiency products and behavioral practices. Due to the limited natural gas usage within the commercial sector and the need to simplify customer engagement in the delivery of energy efficiency programs, SoCalGas proposes to coordinate program delivery with local utilities. This coordination has shown to be an effective strategy to allow for single customer engagement as it empowers the customer to implement a complete energy (and water) efficiency plan.

Goal 1: Increase energy efficiency adoption levels for commercial customers with high energy efficiency potential through efficient outreach and effective offerings. Deliver effective, low touch customer solutions by leveraging data analytics techniques to target customers to increase natural gas savings in commercial business operations.

Sector Strategy: To address low energy efficiency adoption levels, there are several actions that can encourage greater program participation including:

- Creating programs that target commercial customers with high energy efficiency potential. Data analytics will pinpoint the high potential customers by segment and strategies, such as Direct Install, that will guide program designs to encourage the customer to adopt energy efficiency solutions.
- Capturing operational energy savings and permanently modifying the customer's organizational practices to consider energy efficiency.
- Highlighting non-energy benefits including improved comfort and productivity may improve participation from the underserved markets.
- Approaching the commercial sector based on segment-specific solutions for high potential customers. For example, a program may be designed specifically for nursing homes, labs, medical offices, and not just broadly target the healthcare segment.

Goal 2: Increase energy efficiency levels in the commercial leased properties by reducing the split-incentive market barrier. Align the interest of owner and renter to adopt higher levels of energy efficiency in the commercial leased facilities.

Sector Strategy: There are several approaches that can assist in reducing the split-incentive market barrier, including:

- Improving on all program design and reducing program confusion between owners and tenants, through a Direct Install strategy that includes a bundled approach specific to leased buildings.⁹⁸
- Capturing additional energy savings. AB 802 has led the way for High Opportunity Projects and Programs (HOPPs) to be implemented by IOUs. These programs may capture stranded energy efficiency opportunities and should measure pre- and post- building performance. SoCalGas' HOPPs, including the Commercial Restaurant Retrofit program, will explore and address the owner/tenant split-incentive.
- Promoting green leases as a long-term solution. Green leases integrate sustainability practices, including energy efficiency, water conservation, comfort, and productivity, into the entire commercial leasing process.⁹⁹ Through green leases, both owners and tenants commit to sustainability in their operations, addressing the split-incentive market barrier.

⁹⁸ Bell, C., Sienkowski, S., & Kwatra, S. (2013, July 31). *Financing for multi-tenant building efficiency: Why this market is underserved and what can be done to reach it*, pp.6-7. Retrieved from <http://aceee.org/research-report/e13e>

⁹⁹ California Sustainability Alliance, Southern California Gas Company, & USCGC-LA Existing

Goal 3: Increase number of ZNE-ready buildings across most commercial segments through increased gas energy efficiency levels. Support the development of a standardized, market-accepted ZNE definition for new construction and retrofitted buildings to enable a pathway for ZNE.

Sector Strategy: There are several actions that can help to reduce builder confusion with ZNE, including:

- Creating specific examples of ZNE buildings in different climate zones and building types will help assure that other builders, not just early adopters, understand that ZNE buildings can be achieved. This framework will encourage more owners to think about designing and retrofitting their buildings to be ZNE. This action plan should be simple for industry experts, tenants, and owners to replicate.
- Encouraging passive design strategies will help achieve ZNE buildings, as these strategies are less energy intensive than equipment-based strategies. Passive design strategies help ensure early involvement with professionals because implementing these strategies typically requires careful planning. These strategies are often cost-effective because they use ambient energy sources to achieve ZNE.¹⁰⁰
- Quantifying non-energy benefits will increase the adoption of ZNE because it plays into the customer centric portion of the ZNE argument. The non-energy benefits sometimes outperform the viability of retrofitting or building a new building because it is based on occupants' needs/wants and the businesses' business model to increase profitability.
- Having workshops on how to create a ZNE building and to how to create a business proposition for these buildings will help commercialize ZNE. These hands-on workshops may consist of exercises that investigate building envelope design, passive design, and climate specific strategies to improve thermal comfort. This is important because it will be a live demonstration on a "how to" versus a report out type of workshop.

Goal 4: Support the proper installation, maintenance, and use of HVAC systems in the commercial sector. Collaborate with electric utilities and key market actors to offer a simplified suite of programs that capture and recognize all realized HVAC-related energy savings.

Sector Strategy: There are several approaches that can be used to address improper HVAC replacement and maintenance, including:

- Consistent and effective enforcement and verification of applicable building and appliance standards. California law requires contractors to obtain permits for the installation of new

Buildings Committee. *Emerging trends for green existing buildings, 2014 Think Tank Roundtable report.* Retrieved from

http://sustainca.org/sites/default/files/Emerging_Trends_for_Greening_Existing_Buildings_B_C.pdf

¹⁰⁰ Amann, J. T. (2014, December 17). *Energy codes for ultra-low-energy buildings: a critical pathway to zero net energy buildings.* Retrieved from <http://aceee.org/research-report/a1403>

HVAC equipment, however fewer than 10 percent of contracts obtain such permits.¹⁰¹ Through CALBO (California Building Officials), SoCalGas will work with local trades and cities to develop online HVAC replacement permitting.

- Develop and expand training for contractors, technicians, and sales agents. Currently, HVAC installation is often performed incorrectly and maintenance is not routine.¹⁰² To address this, consumers and the service industry will need education on the value of properly installed and maintained systems.
- Evaluate and update existing standards to include increased emphasis on HVAC aspects of whole building approaches. As whole building design becomes the statewide direction, fundamental changes in current building design and practices are necessary. SoCalGas intends to place more emphasis on the whole building as a complete interactive system and improving the thermal integrity of the building shell to reduce heating and cooling loads. SoCalGas will review priorities of Public Interest Energy Research and Emerging Technologies activities to more fully support newer HVAC technologies and systems.

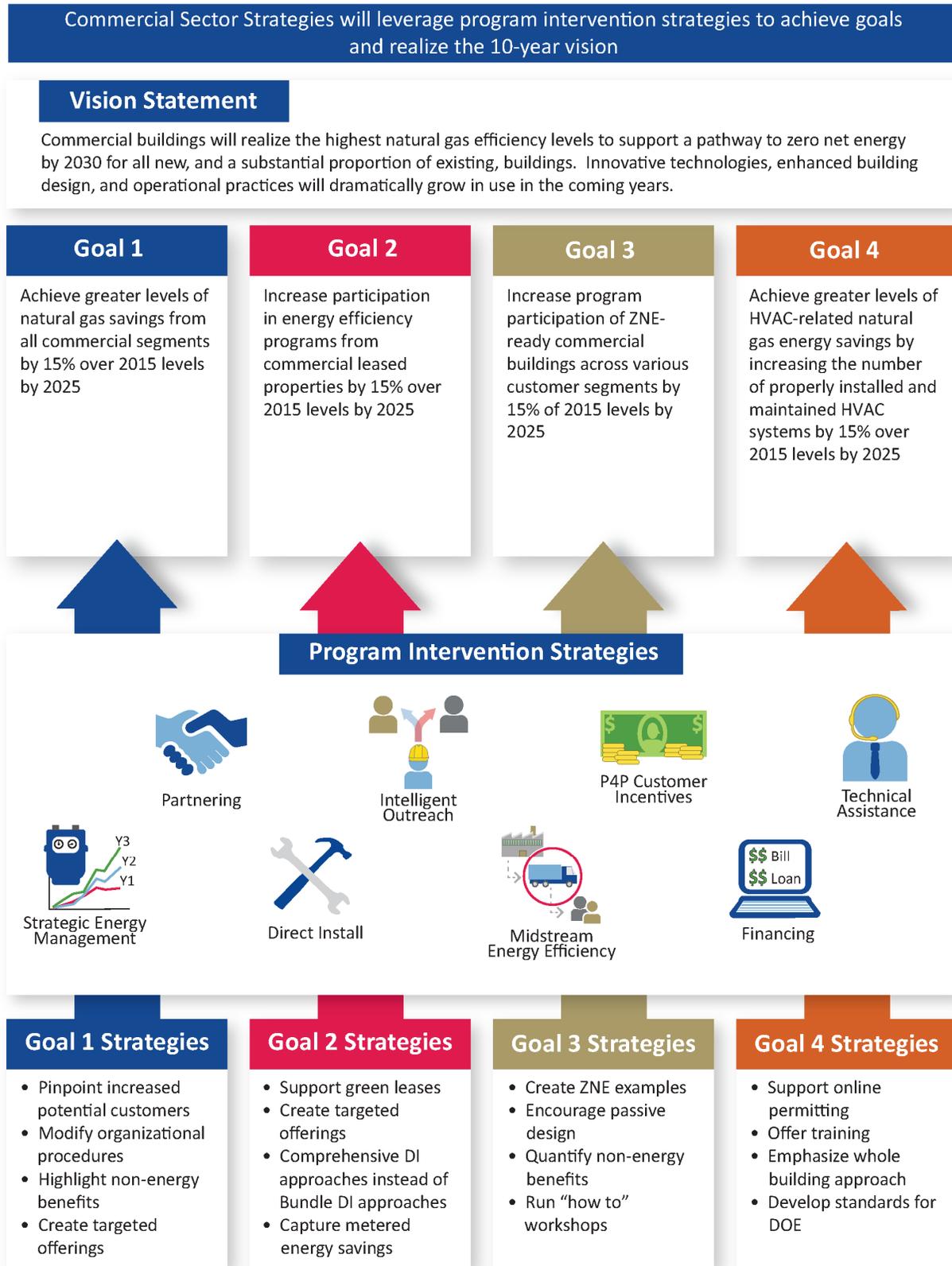
Program Intervention Strategies

The following is a comprehensive list of program intervention strategies that will be directed at SoCalGas' commercial sector customers at various intervals through 2025. This approach supports an adaptable program portfolio that can react quickly to the dynamic market and future changes to energy efficiency policies. The strategies are intended to overcome the various market barriers and summarized into the sector challenges to achieve the desired sector outcomes (i.e., sector goals). These strategies will be deployed in a cohesive manner at various stages during the execution of the Business Plan consistent with the sector-level strategies that are linked to the achievement of the sector-level goals.

¹⁰¹ California Senate Bill 1414. (2015-2016). See Cal. Public Utilities Code § 399.4.

¹⁰² Davis Energy Group (2010, December 29). *HVAC Energy Efficiency Maintenance Study, CALMAC Study ID SCE0293.01*. Retrieved from http://www.calmac.org/publications/HVAC_EE_Maintenance_Final.pdf

Figure 7



Program Intervention Strategy: **Partnering**



Partnering can create very effective alliances where there are common goals. Mutual collaboration and coordination as well as equitable contribution of resources and commitment are key to such program strategies. Partnering with other entities, through structured arrangements, is intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model.

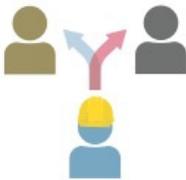
Utility partnering will be accomplished through the co-delivery of key program intervention strategies among gas and electric IOUs, publicly-owned utilities (POUs), other Program Administrators, and water agencies. For example, SoCalGas is currently working with several local water agencies to support water-energy nexus efforts. SoCalGas will expand on such utility partnerships including the 17 municipalities that share the same customer base with SoCalGas' service territory.

Partnering will also be deployed, on an as needed-basis, among industry associations to promote energy efficiency solutions to specific customer-based groups as well as sharing of energy efficiency best practices to address both lack of awareness and performance uncertainty regarding energy efficiency solutions. Industry partnering will effectively reach a diverse customer sector most efficiently. Commercial trade organizations can provide an effective path to commercial sector collaboration, particularly by serving as a trusted source of information about business concerns facing specific commercial segments. For instance, local organizations like the American Institute for Architecture, United States Green Building Council, and American Society of Heating, Refrigerating, and Engineers, can bring together the professionals that design, build, and consult with building owners to ensure 100% penetration rate for ZNE Buildings. Trade organizations can survey their membership to find common concerns and potential solutions. Understanding these concerns can help Program Administrators construct value propositions and tailor their program offerings to best serve these customers. Trade organizations have established communications channels with the industry that can facilitate education of commercial customers about energy efficiency programs through a variety of forums, such as social and print media, ad hoc round tables, and regular meetings. SoCalGas will collaborate with trade allies to increase program promotion and customer awareness of the benefits of energy efficiency investments thereby permanently modifying customer practices in favor of energy-efficient solutions.

Intervention Strategy: Partnering				
Objectives: to increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> Organizational practices Diffused market Lack of information Performance uncertainties 	Utility Partnering Facilitate the co-delivery of key program intervention strategies among gas and electric IOUs, POUs, Program Administrators, and water agencies.	Existing	NR	On-going
	Industry Partnering Industry associations to promote energy efficiency solutions to specific customer-based groups.	Existing	NR	Near-term
	Customer Partnering Partnering with larger property owners to create energy efficiency action plans as part of the customer’s property management plans.	New	NR	Near-term

Note: R=Resource; NR = Non-resource. Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years

Program Intervention Strategy: **Intelligent Outreach**



Intelligent outreach embodies several tactical solutions to: assist customers with greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operations. Intelligent outreach uses energy consumption data, in concert with other sources, to effectively target and inform customers about energy efficiency opportunities within their own facilities. Through a multi-faceted approach, primarily enabled by SoCalGas’ advanced metering infrastructure (AMI),¹⁰³ customers can use their energy usage data to better optimize their business operations.

The Intelligent Outreach program intervention strategy consists of several integrated program tactics efficiently and simply delivered to the customer. Data analytics will use AMI to quickly and efficiently target customers with the highest energy efficiency potential, overcoming the diffused market barrier. This will assist in encouraging the customer with the opportunity for immediate and direct financial benefits by incorporating energy efficiency into their operations thereby permanently modifying their decision-making practices regarding energy management. Benchmarking by segment and size will be a key element to this strategy. Mixed-use properties¹⁰⁴ will be identified and the appropriate program, based on the user profile, will be

¹⁰³ California's Public Utilities Commission. (2010, April 14). D.10-04-027.

¹⁰⁴ Blend of commercial and, typically, residential uses in one facility.

offered to the customer. Virtual engagement will provide energy assessments by way of virtual audits that recommend behavioral actions to commercial customers. Simple, low touch customer communications to provide energy assessments, on a repeated basis, will be leveraged to permanently change the customer’s behavior. Energy usage alerts will be deployed to assist customers in managing their energy. Data sharing will also enable customers to access their energy usage. This will enable customers to use their tools to better manage their energy. The strategy will also implement other tactics to leverage AMI data and to confirm actual delivery of expected energy savings from energy efficiency retrofits and behavioral actions, where feasible.

The facility energy audits tactic will provide onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations. This will increase customer awareness of energy efficiency opportunities.

Intelligent Outreach will also promote energy management technologies to assist customers in actively managing their energy remotely. This will include merging AMI technology with advanced energy efficiency and management technologies (e.g., smart thermostats) to permanently modify customer behavior, resulting in reliable energy efficiency savings. These technologies will also focus on appliances that can assist the customer to manage their energy, including proper maintenance of appliances (e.g., HVAC self-diagnostic technology) to achieve optimal efficiency.

Intervention Strategy: Intelligent Outreach				
Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operation				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Lack of information • Performance uncertainties • Customer practices • Diffused market 	Data Analytics Leverage AMI data to identify facilities with the highest energy efficiency potential for customer. Benchmarking by segment and size will be a key element to this effort.	New	NR	Short-term
	Virtual Energy Audits Virtual energy audits will be able to recommend both behavioral and retrofit opportunities to customer decision-makers and facilities staff.	Existing	R	Short-term
	Data Sharing Provide customer access to their energy usage. This will enable customers to use tools to better manage their energy.	Existing	NR	Short-term

Intervention Strategy: Intelligent Outreach				
Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operation				
Barriers	Tactics	Status	Type	Timing
	Facility Energy Audits Offers onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations.	Existing	R	On-going
	Energy Management Technologies EMTs will help customers better manage energy and will allow customers to achieve optimal efficiency with other equipment.	Existing	R	Short-term
	Disadvantaged Community/Small Customer Outreach A targeted focus will also be applied to small business customers who operate in disadvantaged communities throughout the service territory.	Existing	NR	On-going
	Sharing Energy Efficiency Best Practices Offer, along with industry groups, a collaborative forum to help inform, excite, and accelerate energy efficiency actions among like customers.	New	NR	On-going

Program Intervention Strategy: Technical Assistance



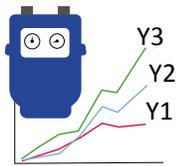
Technical assistance is an information strategy focused on educating and training key facility personnel on energy efficiency practices and providing supplemental assistance in energy efficiency project development and implementation.

The lack of in-house technical expertise or the resources to hire outside staff for the development and operation of end-use efficiency projects can create missed opportunities. Without this expertise, there is an overall lack of awareness regarding energy efficiency opportunities and/or concern that the energy efficiency investment will result in benefits (including non-energy benefits) to the customer (i.e., performance uncertainty). Technical assistance can help modify customer decision-making practices by showing the customer the energy efficiency and non-energy benefits associated with making capital improvement decisions directed at their facilities. Training customers’ staff to become in-house experts on

energy efficiency will help foster permanent energy efficiency practices, improved process efficiency, and on-going energy monitoring and benchmarking.

Intervention Strategy: Technical Assistance					
Objectives: to assist customer with identification and implementation of energy efficiency in their businesses					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • Organizational practices • Lack of information • Performance uncertainties 	Technical Training Educates and trains key facility personnel on energy efficiency practices to promote long-lasting behavioral changes.	Existing	NR	Near-term	
	Technical Support Provides supplemental technical assistance to customers in energy efficiency project development and implementation.	Existing	NR	Near-term	

Program Intervention Strategy: **Strategic Energy Management**



SEM is a program intervention strategy focused on achieving deeper and permanent energy efficiency levels for larger operations through improved customer operational and maintenance practices and energy-efficient equipment installations. SEM provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the production line to corporate management. Continuous monitoring of energy usage confirms the energy savings realized by the SEM program strategy.

Larger commercial customers can benefit from permanent operational process-related changes to improve energy efficiency levels and the customer’s overall productivity.¹⁰⁵ A key market barrier to realizing this energy efficiency potential is the customer’s organizational practices. To effectively capture this energy efficiency potential, the SEM program strategy will focus on permanently modifying the customer’s decision-making process so energy efficiency is factored into capital and process improvement decisions.¹⁰⁶ To overcome performance uncertainties,

¹⁰⁵ Haeri, H., Ochsner, H., & Stewart, J. (2012, October). Efficiency beyond the low fruit. *Public Utilities Fortnightly Magazine*. Retrieved from <https://www.fortnightly.com/fortnightly/2012/10/efficiency-beyond-low-fruit>

¹⁰⁶ Volkman, J., Schick, S., Kesting, O., & Belkhat, K. (2014). Energy trust of Oregon and commercial strategic energy management: A catalyst for accelerating customer energy savings. *2014 ACEEE Summer*

continuous monitoring of energy usage will be a key tactic to this program strategy. Previous SEM approaches have been troubled with infrequent availability of energy consumption data.¹⁰⁷ With AMI, data collection may significantly improve SEM’s effectiveness thereby expanding the strategy to more customers. To encourage a greater level of retrofits and behavioral changes, a pay-for-performance tactic will be offered to customers thereby helping to reduce the high first cost barrier.

Intervention Strategy: Strategic Energy Management				
Objectives: to increase energy efficiency in the business operations				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle, transactional cost • Lack of information • Performance uncertainties 	Pay-for-Performance Multi-year pay-for-performance incentive based on realized energy savings that will balance the customer need for greater operational efficiency and ensure ratepayer benefit.	New	NR	Near-term
	Modified Savings Analysis A “bottom-up” approach of enumerating measures to demonstrate the impact of SEM on the customer operations.	New	NR	Near-term
	Use of AMI data When estimating energy savings with regression, the probability of detecting savings increases with higher data frequency. Savings are more likely to be detected with more frequent data collection using AMI data.	New	NR	Near-term
	Cross Promotion SEM’s multi-year engagement allows an opportunity to promote other energy efficiency offerings as well as clean renewable opportunities, including renewable natural gas.	New	NR	Near-term
	Meter Large Projects When the customer implements both capital and O&M measures during the same period, the program may employ metering of the capital project(s) to identify capital energy savings separately from O&M energy savings.	New	NR	Near-term

Study on Energy Efficiency in Buildings. Retrieved from <http://aceee.org/files/proceedings/2014/data/papers/4-616.pdf>

¹⁰⁷ The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, pp. 34-35. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

Program Intervention Strategy: **Customer Incentives**



The customer incentive program intervention strategy is a simplified suite of financial incentive offerings directed at customers to reduce the high first cost barrier: a key market barrier for most customers. Recognizing the varied preferences among customers for different financial solutions, the program strategy offers a menu of tactics. Although incentive-based strategies like pay-for-performance may be suited for larger energy efficiency projects, in many circumstances, a one-payment approach (e.g., deemed and customized incentives) is very effective in motivating the customer to install energy efficiency equipment. Incentive levels may vary to address locational issues, increase customer participation, or adjust for climate zones. Each of the tactics, within the overall customer incentive strategy, are intended to increase participation through simplified customer engagement while encouraging deeper, more comprehensive energy efficiency solutions including permanent behavior modification.

The Customer Incentive program intervention strategy offers a variety of financial incentives to the commercial sector to assist in overcoming the high first cost and split-incentive market barriers.

A new pay-for-performance (P4P) incentive tactic will target more comprehensive energy efficiency projects by offering a performance-based whole building approach. Where there are significant energy efficiency savings opportunities, customers will be encouraged to participate in a P4P tactic and to leverage the energy service provider community. The P4P tactic will provide incentive payments to participating customers over a pre-determined period, on preset payment intervals based on installation activities, measured savings, and using normalized metered data, with a baseline of existing conditions.

The comprehensive incentive tactic will offer a simplified, one-payment incentive approach to encourage customers to pursue deeper energy savings. The comprehensive incentive offering provides financial incentives for customized energy efficiency projects, including new construction. This tactic features incentives based on calculated energy savings for measures installed as recommended by comprehensive technical and design assistance for customized retrofits and new construction. It offers a calculation method that can consider system and resource interactions, to support integrated, whole system, and multi-resource management strategies. Such an approach can provide the foundation for various targeted programs. For example, a targeted program can be developed that involves specific segments, like Class B office space, mixed-use properties, and restaurants, to help overcome the split-incentive market barrier. The deemed incentive tactic offers financial incentives based on predetermined energy savings. It also features rebates per unit measure for installed energy-saving projects and provides the IOU, equipment vendors, and customers a simple transaction and encourages greater market adoption of emerging energy-efficient technologies and applications.

Bundled measures will also simplify the customer’s program experience by providing an integrated approach of bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage). The bundled measure offering will provide a simple, easy customer transaction that will integrate education, financing, and technical assistance in support of energy efficiency installations helping to reduce the transactional cost of such retrofits.

To permanently modify the customer’s operational practices, a commissioning offering will assist customers in reducing their operating costs through cost-effective energy savings, focused on the identification and implementation of low-cost operational improvements and on optimizing how existing equipment operates as an integrated system. The offering will rely on a combination of data analytics and metered interval data to identify O&M repair and optimization opportunities to increase energy efficiency of a facility. The tactic will typically be offered in tandem with other program strategies (e.g., Intelligent Outreach, Comprehensive Direct install, etc.) to simplify customer engagement and to efficiently deliver a complete energy efficiency solution.

The strategy will also include a whole building approach. Whole building is a process that views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting. This tactic is also directed at the new construction segment by promoting integrated design through owner incentives, design team incentives, and design assistance to participants who design spaces that are energy-efficient as well as the integration of active and passive design elements. Design assistance could also involve water efficiency and other non-energy benefits to promote sustainability. Over time, the whole building approach will create specific examples of ZNE buildings in different climate zones and building types, such as hotels and private colleges, to help assure that builders understand that ZNE buildings can be achieved. This framework will encourage more owners to think about designing and retrofitting their buildings to be ZNE. This will help overcome several market barriers especially the customer’s high first cost and organizational practices towards energy efficiency while advancing commercial buildings towards ZNE.

Intervention Strategy: Customer Incentives					
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Organizational practices • Diffused market • Hassle, transactional cost 	<p>Pay-for-Performance</p> <p>Will provide for incentive payments to the participating customer over a pre-determined period on preset payment intervals based on measured savings, using normalized meter data, with a baseline of existing conditions associated with O&M and behavioral actions and equipment retrofits.</p>	New	R	Near-term	

Intervention Strategy: Customer Incentives				
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification				
Barriers	Tactics	Status	Type	Timing
	Customized Incentives Offers financial incentives for customized retrofit energy efficiency projects, including new construction.	Existing	R	On-going
	Deemed Incentives Offers financial incentives based on predetermined energy savings.	Existing	R	On-going
	Bundled Measures Provides an integrated approach by bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage).	New	R	Short-term
	Retro-Commissioning Assist customers with operational improvements to optimize how existing equipment operates as an integrated system.	Existing	R	Near-term
	Monitoring-Based Commissioning Combines ongoing building energy system monitoring with standard retro-commissioning practices with the aim of providing substantial, persistent, energy savings.	Existing	R	Near-term
	Whole Building A process that views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting.	Existing	R	On-going

Program Intervention Strategy: **Direct Install**



The direct install (DI) program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for smaller-sized customers. A comprehensive DI tactic will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits. Comprehensive DI will rely, in part, on ratepayer funds and, in part, on customer co-fund contributions and/or customer financing.

The DI program intervention strategy offers both a standard and comprehensive DI approach primarily targeted at smaller-sized commercial customers to deliver natural gas and electric energy efficiency solutions, in a simple approach, to achieve near-term measurable energy efficiency benefits. The strategy is intended to overcome the high first cost associated with

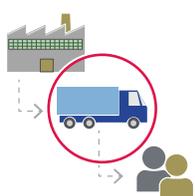
retrofits and to address the split-incentive barrier common to leased facilities in the commercial sector.

The standard DI offering will provide limited list of low/no-cost energy efficiency measures. DI will include natural gas energy efficiency measures along with other similar electric and water efficiency measures, where practicable. It will use the Intelligent Outreach strategy to identify commercial facilities with the greatest energy efficiency opportunities.

The comprehensive DI tactic encourages deeper energy savings by offering more comprehensive energy efficiency measures that are typically used by the targeted customer segment. Comprehensive DI will provide qualified contractors that will engage directly with the customers to install measures. A co-pay option will be offered to the customer to offset the initial cost of the energy-efficient equipment. Customers can leverage on-bill financing or other financing offerings (e.g., on-bill repayment) to fund their co-pay portion.

Intervention Strategy: Direct Install				
Objectives: to achieve near-term measurable results primarily for smaller-sized customers.				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Split incentive • Lack of information • Performance uncertainties 	<p>Standard Direct Install</p> <p>Targets smaller-sized customers through the Intelligent Outreach strategy, which will identify properties with the greatest energy efficiency opportunity. The standard DI offering will provide a limited list of low/no-cost energy efficiency measures.</p>	Existing	R	Near-term
	<p>Comprehensive Direct Install</p> <p>Encourages deeper energy savings by offering more comprehensive energy efficiency measures. Comprehensive DI will offer qualified contractors that will engage directly with the customers to install measures. A co-pay option will be offered to the customer along with on-bill financing to offset the initial cost of the energy efficiency equipment.</p>	New	R	Near-term

Program Intervention Strategy: **Midstream Energy Efficiency**



The Midstream Energy Efficiency program intervention strategy provides incentives to distributors to reduce the retail cost of natural gas energy efficiency equipment, the design of manufactured commercial buildings, promote stocking of energy efficient equipment and inform contractors at the distributor level.

Incentives directed at midstream market actors can greatly simplify the end-use customer transaction while having lasting behavior change of key market actors in the promotion of energy efficiency technologies to their end-use customer. This approach can reduce the high cost of advanced energy-efficient equipment purchases along with the hassle associated with identifying the appropriate energy efficiency technologies. However, as incentives are moved away from the end-use customers, the stability of such energy savings can be concerning due to difficulty in tracking products to the end-use customer. Distributor training coupled with active product monitoring can greatly reduce these concerns. Distributor training also can have greater impact in transforming market adoption of energy-efficient equipment.¹⁰⁸

The Midstream Energy Efficiency strategy will be coupled with a comprehensive, co-pay DI strategy that can efficiently deliver on-demand installation by trained and qualified contractors. The strategy will also work with retailers to improve their stocking habits and with distributor and/or manufacturing-funded rebates/discounts, where possible.

Intervention Strategy: Midstream Energy Efficiency				
Objectives: to achieve near-term measurable results and long-term market adoption of energy efficiency technologies through incentives directed at midstream market actors				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Lack of information • Performance uncertainties 	Midstream Incentives Provides incentives to midstream market actors to drive down the wholesale price of energy-efficient technologies, the design of manufactured commercial buildings, and to improve the stocking habits of energy-efficient equipment.	Existing	R	Near-term
	Distributor Training Provides distributor-assisted training to contractors to support promotion of energy efficiency equipment to contractors and, in turn, customers.	New	NR	Near-term

Program Intervention Strategy: **Financing**



The Commercial Financing program strategy relies on various financing vehicles including on/off bill repayment solutions to encourage customers to adopt deeper, more comprehensive energy efficiency solutions. On-Bill Financing

¹⁰⁸ Bickle, S., Burns, E., Rivett, B., Vlta, D., Nelson, M., Parson, J., & Merson, H. (2016). Swimming to midstream: New residential HVAC program models and tools. *2016 ACEEE Summer Study on Energy Efficiency in Buildings*, pp.7-5 – 7-7. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/7_888.pdf

(OBF) and the statewide California Hub for Energy Efficiency Finance (CHEEF) pilots will be leveraged as an essential part of this strategy.

Energy efficiency financing solutions are a pathway to address the high first cost barrier and to permanently modify organizational decision-making practices regarding energy efficiency-related improvements. The new finance pilots developed as part of the CHEEF program will utilize innovative features to attract the development of energy efficiency finance products to the market. Financing solutions are most effective when offered jointly with a customer incentive¹⁰⁹ thereby making it an ideal program strategy to overcome the high first cost barrier to energy efficiency. On-bill financing yields positive customer feedback for its simple, low-touch customer interaction approach.¹¹⁰ The low hassle factor of financing is especially attractive to the smaller-sized customer, with limited staff resources. Smaller-sized customers can further leverage financing solutions in combination with a comprehensive direct install program strategy to further reduce the high cost and hassle factor market barriers. To support an uptake in smaller-sized customer participation, the strategy will collaborate with financial market actors to enhance financing options for small commercial customers. A recent study by ACEEE found that financing encourages comprehensive retrofits and deeper energy savings, especially programs with 0% financing.¹¹¹ It found zero-interest loans avoid credit entanglements, as technically, these are not loans, but scheduled payments over time.

Intervention Strategy: Financing				
Objectives: to assist customer with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle factor 	<p>On-Bill Financing Offers interest-free, utility ratepayer financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects, which are repaid over time via the customer’s utility bill.</p>	Existing	NR, R	Near-term

¹⁰⁹ The Cadmus Group. (2014, April 22). *California Joint Utilities Financing Research: Existing Programs Reviews, CALMAC Study ID PGE0338.01*, p. 4. Retrieved from http://www.calmac.org/publications/Existing_Programs_Review_FINAL.pdf

¹¹⁰ *Id.* at 6.

¹¹¹ Nowak, S. (2016, November 21). *Big opportunities for small business: Successful practices of utility small commercial energy efficiency programs*, p. v. Retrieved from <http://aceee.org/research-report/u1607>

Intervention Strategy: Financing				
Objectives: to assist customer with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions				
Barriers	Tactics	Status	Type	Timing
	Credit Enhancement Provides interest subsidies for financial institutions as an incentive for offering low-interest loans.	Existing	NR, R	Near-term
	Loan Awareness Promotes OBF, PACE, commercial OBR financing pilots, and other financing offerings to commercial customers to encourage deeper energy efficiency retrofits.	Existing	NR, R	Near-term
	On-Bill Repayment Privately financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects, which are repaid over time via the customer’s utility bill.	New	NR, R	Near-term

F. Performance Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the Business Plan proposes key sector metrics. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the Program Administrator’s data requirements (e.g., energy savings, customer participation, etc.). This approach facilitates metric tracking while keeping the monitoring costs to reasonable levels. The sector-specific metrics are presented in Table 9 below. Over time, metrics and targets may be adjusted and improved to more accurately reflect sector progress.

Table 9 - Commercial Sector Metric Table

10-year Vision

Commercial buildings will realize the highest natural gas efficiency levels to support a pathway to zero net energy by 2030 for all new, and a substantial proportion of existing, buildings. Innovative technologies, enhanced building design, and operational practices will dramatically grow in use in the coming years.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10 years)
Varied and unique segments with specific needs make it difficult to offer standard programs that fit the needs of all customers.	1. Increase adoption of energy efficiency solutions by commercial customers with untapped energy efficiency potential.	Partnering	Achieve greater levels of energy efficiency savings from all commercial segments.	2015 energy efficiency levels.	Program tracking data.	Increase energy savings from targeted customer groups by 5% over 2015 levels by Year 3.	Increase energy savings from targeted customer groups by 15% over 2015 levels by Year 7.	Increase energy savings from targeted customer groups by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Technical Assistance						
		Strategic Energy Management						
		Customer Incentives						
		Direct Install						
		Midstream Energy Efficiency						
Financing								
The commercial sector is trending towards more leased properties creating a larger split-incentive barrier between owners and tenants.	2. Increased energy efficiency levels in commercial leased properties.	Partnering	Increase participation in energy efficiency programs from commercial leased properties.	2015 energy efficiency levels.	Program tracking data.	Increase participation in energy efficiency programs from leased properties by 5% over 2015 levels by Year 3.	Increase participation in energy efficiency programs from leased properties by 15% over 2015 levels by Year 7.	Increase participation in energy efficiency programs from leased properties by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Technical Assistance						
		Strategic Energy Management						
		Customer Incentives						
		Direct Install						
		Midstream Energy Efficiency						
Financing								

Table 9 - Commercial Sector Metric Table

10-year Vision

Commercial buildings will realize the highest natural gas efficiency levels to support a pathway to zero net energy by 2030 for all new, and a substantial proportion of existing, buildings. Innovative technologies, enhanced building design, and operational practices will dramatically grow in use in the coming years.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10 years)
There is builder confusion on how to achieve ZNE in new construction and retrofitting of commercial buildings.	3. Increase number of ZNE-ready buildings across most commercial segments through increased gas energy efficiency.	Partnering	Increase amount of ZNE-ready commercial building stock across most customer segments.	2015 commercial building stock levels.	Program tracking data.	Increase number of ZNE-ready buildings in most segments by 5% of 2015 levels by Year 3.	Increase the number of ZNE-ready building in most segments by 15% of 2015 levels by Year 7.	Increase number of ZNE-ready building in most segments by 25% of 2015 levels by Year 10.
		Intelligent Outreach						
		Technical Assistance						
		Strategic Energy Management						
		Customer Incentives						
		Direct Install						
		Midstream Energy Efficiency						
Financing								
Improper HVAC replacement and maintenance of equipment limits the potential for significant energy savings.	4. Increase the number of properly installed and maintained HVAC systems.	Partnering	Achieve greater levels of HVAC-related natural gas energy efficiency savings.	2015 Number of properly installed and maintained HVAC units.	Program tracking data.	Increase number of properly installed and maintained HVAC systems by 5% over 2015 levels by Year 3.	Increase number of properly installed and maintained HVAC systems by 15% over 2015 levels by Year 7.	Increase number of properly installed and maintained HVAC systems by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Technical Assistance						
		Strategic Energy Management						
		Customer Incentives						
		Direct Install						
		Midstream Energy Efficiency						
Financing								

G. Key Partners

The success of the commercial sector Business Plan will rely on positive, collaborative relationships with several market actors, Program Administrators, regulators and other government entities. Table 10 lists key partners that will help SoCalGas successfully achieve the ambitious vision for the commercial sector.

Table 10 - Key Partners	
Key Partners	Support Activity
Program Administrators	<ul style="list-style-type: none"> • Deliver dual-fuel programs to reach more customers; • Leverage all available best practices and promote statewide consistency, where appropriate; • Simplify program engagement; • Capture all energy efficiency benefits including operational energy savings; and • Conduct market research that will identify and better understand unique barriers to energy efficiency investments.
Publicly-owned Utilities (POUs) and Water Districts	<ul style="list-style-type: none"> • Actively coordinate with POUs and water agencies to deliver energy and water efficiency programs; • Engage in partnerships and co-delivery arrangements with POUs and water agencies when there is a shared customer base (gas and electric) to simplify customer engagement and achieve higher levels of energy efficiency; and • Actively coordinate with POUs and water agencies throughout California and other regions to share best practices in program administration, design, and delivery.
California Public Utilities Commission and Key Stakeholders	<ul style="list-style-type: none"> • SoCalGas will work with the Commission and other key stakeholder to investigate ways to simplify program requirements and to identify policies that will recognize all energy efficiency benefits associated with commercial sector energy efficiency programs.
Third-Party Program Implementers	<ul style="list-style-type: none"> • Solicit new and innovative programs from third-party program implementers to address the commercial sector to draw upon creative program solutions that can be quickly and effectively targeted to these customers; and • Continued collaboration with program implementers throughout the program’s lifecycle will be an integral part of the program’s success.
Commercial Trade Organizations	<ul style="list-style-type: none"> • Commercial trade organizations can provide an effective path to commercial sector collaboration, particularly by serving as a trusted a source of information about business concerns facing specific commercial segments; • Trade organizations have the ability to survey their membership to find common concerns and potential solutions. Understanding these concerns can help Program Administrators construct value propositions and tailor their program offerings to best serve these customers; • Trade organizations have established communications channels with the industry that can facilitate education of commercial customers about energy efficiency programs through a variety of forums, such as social and print media, ad hoc round tables, and regular meetings; and • SoCalGas will collaborate with trade allies to increase program promotion and customer awareness of the benefits of energy efficiency investments.

Table 10 - Key Partners	
Key Partners	Support Activity
Industry Technical Community	<ul style="list-style-type: none"> Specialized technical assistance with expertise in specific commercial segments can be highly effective in identifying energy savings opportunities at commercial facilities; and The expertise can be provided by resources that include utility in-house experts, independent technical consultants, and equipment vendors.
Equipment Vendor and Manufacturers	<ul style="list-style-type: none"> SoCalGas will actively work with equipment vendors and manufacturers to promote greater adoption of energy efficiency equipment among the various commercial segments.
California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) for financing	<ul style="list-style-type: none"> Financing will be a key program intervention strategy to overcome the high first cost of energy efficiency in the sector; and SoCalGas will continue its long-term collaboration with CAEATFA to design and promote innovative financing strategies that will encourage greater customer investment in energy efficiency.
Local and State Governments	<ul style="list-style-type: none"> SoCalGas will leverage its existing partnerships with local and state governments to assist in the development and implementation of program strategies targeting the broader local and state government public sector customers, including those who serve rural and disadvantaged communities.
State and federal agencies	<ul style="list-style-type: none"> SoCalGas will work with state and federal agencies (e.g., DFA, DWR, USDA) to promote greater levels of energy efficiency adoption throughout the various commercial segments.
Office of Statewide Health Planning and Development (OSHPOD)	<ul style="list-style-type: none"> SoCalGas will work with OSHPOD to incorporate energy efficiency in hospital design guidelines and for approval of energy efficiency retrofits.

H. Cross-cutting Coordination

Workforce Education & Training

Workforce Education & Training (WE&T) is well positioned in its role of facilitating training on the skills needed by the workforce to perform the type, level, and quality of work to reduce energy consumption and achieve State energy savings goals. WE&T will provide classes, seminars, consultations, and demonstrations to commercial customers, particularly emphasizing the options available to the food services segment at the SoCalGas Energy Resource Center test kitchens. WE&T will also assist commercial customers (and their staffs) by providing technical education and/or in-field training to help the commercial customer convert interest into energy efficiency actions.

Other commercial education and training offerings will focus on mechanical equipment for existing buildings, whole building and integrated design approaches, water efficiency, as well as Title 24 for new construction. Training programs will be targeted to those viewed to have a high potential to reduce energy across building types, including designers, engineers, architects, building officials, urban planners, contractors, building operators, building owners, property managers and facility managers.

WE&T will also collaborate with the commercial sector to expand relationships with key customers, market actors, and industry organizations in this sector, including: building owners and manager associations, United States Green Building Council, American Society of Heating, Refrigeration, and Air Conditioning Engineers, California Building Officials Association, American Institute of Architects, International Facility Managers Association, and the Association of Energy Engineers.

Marketing, Education & Outreach Integration

The sector programs will rely on a combination of locally targeted promotion of specific energy efficiency programs tailored to the various segments throughout the sector. There will be a focus on historically underserved customers with higher energy efficiency potential, through data analytics, to encourage greater program participation.

Since the statewide Marketing, Education, and Outreach (ME&O) program's short-term goal is focused on the mass market customer (i.e., residential and small business owners), the commercial sector will rely on the statewide ME&O program to inform small business customers on the importance of energy efficiency, their opportunities to act, and the benefits of their actions. The commercial sector will also rely on targeted Intelligent Outreach efforts to inform larger commercial customers on energy efficiency options. SoCalGas will actively participate in the both the development of the five-year ME&O Strategic Roadmap and Annual Joint Consumer Action Plans to coordinate program offerings with statewide marketing efforts and to support the short and long-term goals of the ME&O program.

Emerging Technologies

There are emerging opportunities in the commercial sector that can capture previously unavailable energy savings. Many of these opportunities lie at the convergence of new data streams, connected building systems, and advanced envelope and control strategies. Though challenging to bring together such a large number of new technologies and strategies, the energy efficiency community is beginning to explore the potential, particularly when multiple solutions can be bundled together into a single integrated solution. Further emerging opportunities lie in meter-based verification and behavior strategies that the statewide Gas and Electric ETPs are exploring.

The convergence of data analytics, inexpensive connected building components, and evolving energy management tools have the combined potential to unlock new energy efficiency opportunities. This technological convergence will facilitate a new generation of energy

efficiency programs that address the whole building approach, rather than just standalone widgets. These integrated energy solutions can capitalize on many formerly disparate energy savings opportunities at once—a major benefit for business owners who are busy and for whom energy use is not necessarily a top priority. Furthermore, a building designed with the interaction of whole systems in mind can avoid such systems interfering with each other's smooth operation and can provide non-energy benefits such as greater occupant comfort, increased productivity, or enhanced security—thus allowing utilities to potentially reach customers for whom energy efficiency is not a high priority.

To help facilitate adoption of new integrated solutions, the statewide Gas and Electric ETPs are investigating advanced meter-based verification approaches, which directly measure energy savings of facility upgrades (traditional methods typically can only offer an estimate based on field or laboratory testing). Thus, a meter-based approach offers IOUs and commercial customers a more accurate picture of energy savings—particularly with complex, integrated systems—while also identifying unexpected performance issues.

For those businesses that are not a good fit for integrated systems or comprehensive energy management solutions, the Gas and Electric ETPs will continue to work on strategic single-technology measures. Indeed, the statewide ET program has a long track record of interventions in the commercial sector with projects that include work on: advanced lighting controls; finned cooking pots that save gas in commercial kitchens; high bay LED lighting luminaires; retail display lighting; advanced rooftop units that provide heating or cooling; enhanced ventilation controls; laundry systems that utilize ozone gas to reduce water and associated heating energy needs; and LED lighting in refrigerated display cases.

Because balancing advanced, integrated solutions with traditional, standalone measures is a critical strategy for reaching the largest possible swath of commercial customers, the Gas and Electric ETPs have made this dual approach a long-term priority. To successfully execute this dual approach, Gas and Electric ETPs will work upstream with developers to integrate energy-saving attributes in the design phase, motivate technology developers to build integrated solutions, and build on existing partnerships with the Electric Program Investment Charge (EPIC) and Public Interest Energy Research (PIER) programs.

Finally, AB 802, passed in 2015, seeks to significantly increase building efficiency in this sector. The Gas and Electric ETPs will continue to evaluate products, hold demonstrations, identify barriers, and generate data that support these mandates while delivering positive results for customers and informing future program designs.

Codes and Standards

The Statewide Codes and Standards (C&S) Program advances technologies into code through advocacy work with standards and code-setting bodies, such as the California Energy Commission (CEC) and the Department of Energy (DOE), to strengthen energy efficiency regulations by improving compliance with existing C&S, and assisting local governments to develop ordinances (reach codes) that exceed statewide minimum requirements. The C&S

effort will also draw commercial customers into the code development process in the early stages, such as reach and form-based codes, to advocate for codes and compliance-related matters.

Financing

Please refer to the Finance portion of the Cross-cutting chapter for more information on the CHEEF pilots. The commercial sector will have access to the non-residential pilots, which will have on-bill, off-bill, credit enhancement, and non-credit enhancement features.

Integrated DSM

Integrated Demand-Side Management (IDSM) encourages the integration of a full range of DSM options such as energy efficiency, advanced metering, low income energy efficiency, distributed generation, and alternative fuel vehicles. SoCalGas will continue identifying, designing, developing, and incubating new program partnering and integration ideas and opportunities with the other IOUs. It will also continue maintaining successful energy and water efficiency offerings that it operates jointly with various municipal utilities. SoCalGas and its implementers will continue maintaining a close working relationship with the program staffs at other utilities, as well as ensuring that all aspects of joint program operations, such as reporting and billing, remain at the highest standard. Having a smooth and positive working relationship with the staff from the other utilities allows both SoCalGas and the other utilities to build confidence and continue expanding partnering and integration opportunities.

Demand Response

The commercial sector Business Plan proposes to leverage emerging energy management technologies to assist customers in actively managing their energy. This will include merging AMI technology with advanced energy efficiency and energy management technologies to permanently modify customer behavior, which will result in reliable energy savings and serve to support utility demand response activities. Where practicable, these efforts will also partner with electric and water agencies that have AMI technology to provide a simple, one-touch energy efficiency and demand response experience.

Urban Agriculture

New trends in farming, such as farm-to-table and urban or peri-urban farming place a high priority on local and sustainable produce, as well as community connections. SoCalGas will integrate agriculture and commercial ideologies to reduce energy consumption while creating an opportunity for urban farms to market themselves as “green” and sustainable as well as contributing to the well-being of the community.

Alternative Fuel Vehicles

In California, SB 350, codified in Public Utilities Code § 740.12(a)(1), states the following goal: “Advanced clean vehicles and fuels are needed to reduce petroleum use, to meet air quality standards, to improve public health, and to achieve greenhouse gas emissions reduction

goals.”¹¹² The commercial sector Business Plan proposes to increase awareness of natural gas vehicles to serve the commercial sector transportation needs to significantly reduce NOx and GHG emissions. Consistent with SB 350’s goals to address barriers to access for low-income customers to zero-emission and near-zero-emission transportation options,¹¹³ outreach efforts directed at commercial customers within disadvantaged communities will also emphasize the benefits and opportunities for natural gas vehicles supporting the commercial sector.

With the passing of Measure R, transit-oriented development will eventually lead into transit-oriented communities. The commercial business sector envisions future communities that are energy-efficient, walkable, and bikeable, which include a variety of commercial segments such as mixed-use development and creative work-live spaces. This will spur energy-efficient adaptive reuse of buildings and reevaluating the urban design of the community, thus contributing to the goal of AB 758.

Statewide Implementation

SoCalGas will collaborate and coordinate with other program administrators on the effective implementation of any statewide program offerings. Programs designed to engage directly with specific market actors at the midstream and upstream market channels will be implemented on a statewide basis. Other downstream programs, beyond what is presented in the Business Plan, may also be considered candidates for statewide implementation.

Local Implementation

Local and regional solutions are necessary for the achievement of the commercial sector vision, goals, and objectives. Many of the current programs offered are done so in coordination with publicly-owned utilities (POUs). Such partnerships with POUs will continue at a local level. For example, SoCalGas has a strong partnership with the Los Angeles Department of Water and Power (LADWP), the largest municipality in the nation, to jointly design and deliver energy efficiency programs to a shared customer base. Such activities will continue to be implemented by the POU and/or implemented by SoCalGas-selected and managed third-party program implementers. SoCalGas will also work with other POUs to identify good program candidates to join statewide implementation efforts, where feasible.

IOU Program Implementation and Support

SoCalGas proposes to continue implementation of certain downstream programs (i.e., programs delivered directly to the customer) where it is reasonable and practicable to do so. SoCalGas will also continue to actively support the delivery of third-party programs. For example, customer services, such as incentive payments and inspections, will be provided by SoCalGas to support third-party program implementers and to safeguard ratepayer funds. For program efficiency, the customers will also be directed to the SoCalGas portal to maintain a

¹¹² Cal. Public Utilities Code § 740.12(a)(1) (2015).

¹¹³ See Clean Energy and Pollution Reduction Act of 2015, California Senate Bill 350 (2015). See California Public Utilities Code § 25327(d).

simple, easy program participation experience for the customer. In addition, at times, it is more efficient and productive to leverage the natural relationship between SoCalGas and its customers. As the trusted energy advisor, SoCalGas has an ongoing relationship with its customers on all energy matters including energy efficiency. SoCalGas proposes to continue to promote energy efficiency programs to the customers and customer groups in order to improve the likelihood that customers will adopt energy efficiency.

I. Evaluation, Measurement & Verification (EM&V) Considerations

The commercial sector contains a wide variety of segments with very unique and diverse ways they use energy. There is a need for more extensive research in each of the different segments and sub-segments within the commercial sector, especially a deeper examination of potential barriers to ZNE adoption.

The commercial customer can benefit greatly from permanent changes in their energy usage. For instance, there are several maintenance and operational changes that can have a great impact on the amount of energy consumed. Estimating the impact of behavioral measures will be paramount to the near- and long-term success in achieving the overall goals of the commercial sector.

The following are recommendations to improve the body of knowledge regarding the commercial sector.

Market Research and Process Evaluation:

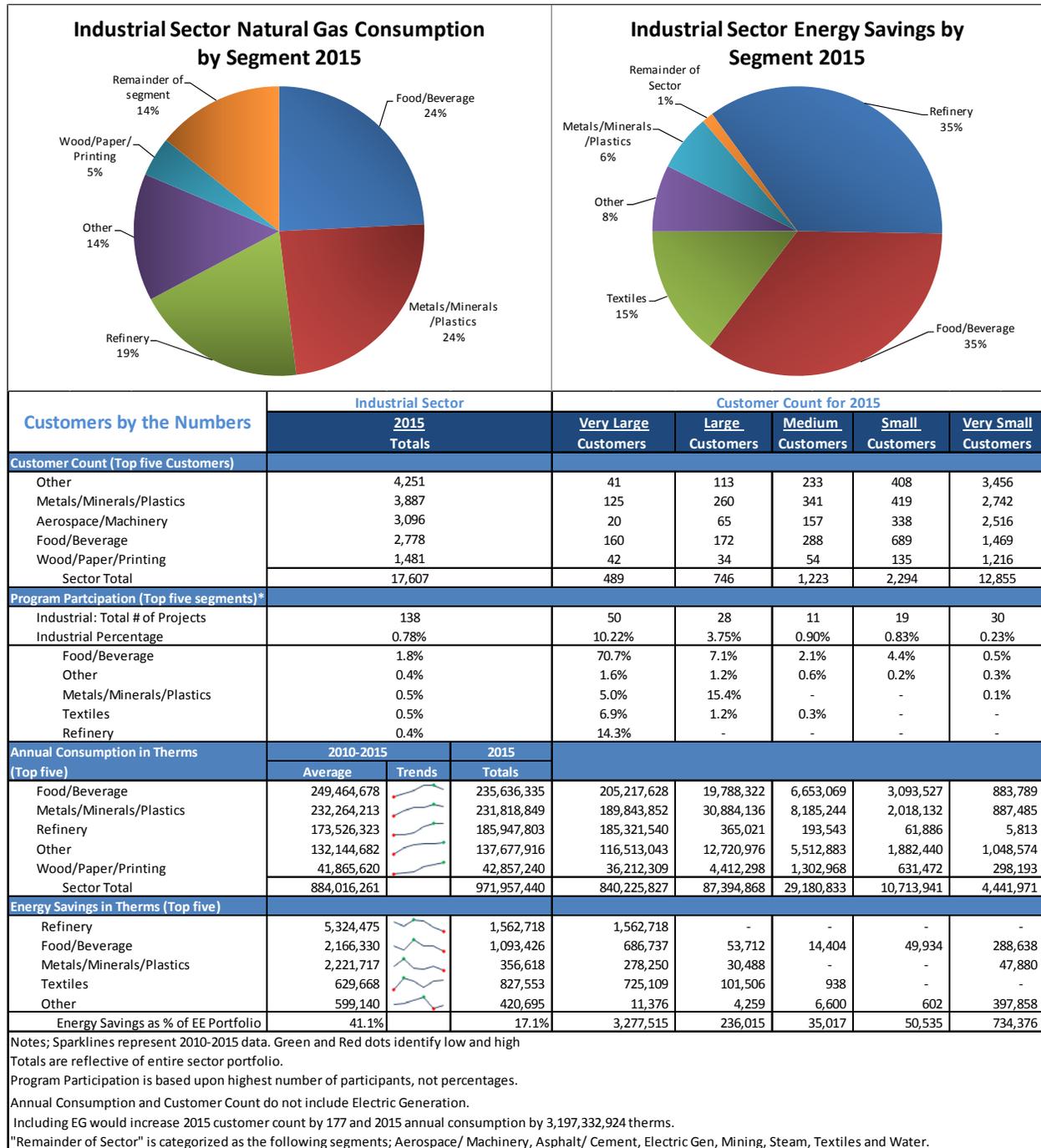
- Conduct a market study to identify the unique segments within the commercial sector and to examine their unique characteristics, barriers, and trends within their specific segment or sub-segment.
- Evaluate the results of SoCalGas' Commercial Restaurant Retrofit HOPP program for possible expansion to other sectors (lodging, laundry, health care, etc.)
- Evaluate the results of the To-Code study (E2e) to design programs with various incentive levels at existing condition to maximize participation in code triggering projects.
- Interview commercial customers to identify where program participation processes can be simplified.

Load Impact:

- Use normalized metered energy consumption (NMEC) data to determine the overall impact of O&M and behavior measures as an enhanced approach to quantify energy savings. For this approach, energy savings are calculated as the difference between the NMEC for baseline and post-intervention time periods.
- Consistent with AB 793 (§717(3)) requirements, evaluate gas energy savings claims achieved pursuant to the incentives for energy management technologies to determine if the program strategies shall continue or be modified.

INDUSTRIAL CHAPTER

Industrial Sector Snapshot



A. Industrial Sector Chapter Summary

Southern California, and specifically the SoCalGas service area, has been a prime industrial market primarily due to the proximity of the ports of Los Angeles and Long Beach. SoCalGas has approximately 17,600 industrial customers that collectively consumed nearly 972 million therms of natural gas in 2015. In recent years, the SoCalGas industrial sector has remained relatively stable, and has strongly recovered since the economic recession of 2008-2009. The vacancy rate of industrial real estate, a key economic indicator, has steadily declined from a high of about 6% in 2011 to 1.3% in 2016¹¹⁴, and Los Angeles exhibits the lowest vacancy rates of the ten largest markets across the United States.¹¹⁵ Aside from economic cycles and macro-economic trends, other key industrial market drivers include: equipment efficiency code increases (boilers), emissions standards increases (NOx, GHG), state-specific legislation such as the passage of Assembly Bill (AB) 32, and transportation and logistics (port congestion, E-commerce), among many others.

Southern California Gas Company's industrial customer sector represents nearly 25% of the natural gas consumed by all program-eligible customers. The industrial sector usage is dominated by a few, very large customers that consume just over 86% of the natural gas within the industrial sector. There are nine distinct customer segments that make up the industrial sector. Customer sizes can vary greatly within these unique segments creating a much diffused energy efficiency market. There is a significant amount of untapped energy savings associated with changes in customer operations and practices.

Industrial Sector Vision

California industry will be vibrant, profitable and double its level of energy efficiency by 2030 through a suite of energy efficiency programs intended to:

- Facilitate, sustain, and transform the long-term delivery and adoption of energy efficient products and services;
- Cultivate, promote and sustain lasting energy-efficient operations and practices; and
- Offer a range of simplified solutions that address the customer's energy efficiency needs.

¹¹⁴ Cushman & Wakefield. (2016). *Marketbeat industrial snapshot Q3 2016 greater Los Angeles*.

Retrieved from

http://www.cushmanwakefield.com/~/_media/marketbeat/2016/10/Greater_LA_Americas_MarketBeat_Industrial_Q32016.pdf?_ga=1.68247249.1171461221.1483133397

¹¹⁵ CBRE Group, Inc. (2014, April 4). Industrial markets in southern California show sustained strength in Q1 2014. *CBRE Media Center*. Retrieved from <http://www.cbre.us/o/losangelesmarket/los-angeles-media-center/Pages/INDUSTRIAL-MARKETS-IN-SOUTHERN-CALIFORNIA.aspx>

Ultimately, industrial customers fall into two distinct groups: customers that rely on natural gas as part of their industrial processes and those customers who have an energy consumption profile like that of a commercial or residential customer. However, both groups face several obstacles in adopting greater levels of energy efficiency in their business operations. To realize the vision for the industrial sector customers, SoCalGas has developed the following goals:

- Goal 1:** Increase adoption of energy efficiency solutions by smaller-sized industrial customers.
- Goal 2:** Provide simple, no hassle, low cost customer transactions that encourage greater customer investment in energy efficiency.
- Goal 3:** Reshape industrial organizational practices to enable adoption of energy efficiency solutions as part of customer's industrial processes.
- Goal 4:** Increase energy efficiency adoption levels across all industrial segments.

B. Approach to Achieve Industrial Sector Goals

According to a study recently prepared for the California Public Utilities Commission (Commission), SoCalGas' deemed and calculated industrial incentive programs rank first and second among 163 energy efficiency programs offered statewide based on depth of retrofit and cost-effectiveness.¹¹⁶ The industrial Business Plan includes a combination of proven program strategies coupled with new approaches to efficiently identify customers with the greatest energy efficiency opportunities using data analytic advancements enabled by SoCalGas' Advanced Meter Infrastructure (AMI). Using data analytics and traditional outreach approaches, SoCalGas will offer an integrated set of program strategies that meet the customer's unique energy efficiency needs. The industrial sector offers an abundance of energy savings opportunities for the customer including operational changes in production processes and improvements to operations and maintenance (O&M) practices. Specific program strategies will be offered to the customer to permanently capture these energy savings. To encourage greater adoption of energy efficiency among small business owners, SoCalGas will offer a simple, low cost suite of strategies that are tailored for smaller operations.

The industrial sector has a unique set of barriers facing the industrial customer. SoCalGas will reduce these barriers by a complimentary, integrated set of program intervention strategies that will actively engage the customer to capture both stranded market and economic energy efficiency potential. SoCalGas has distilled these barriers into the following sector challenges:

Challenge 1: Low adoption of energy efficiency solutions by smaller-sized industrial customers.

Customer lacks capital to pursue EE. Access to funds for any capital expenditure is the largest barrier for industrial customers, both large and small. Many small industrial customers have

¹¹⁶ Itron, Inc. (2016, July 8). *Comprehensiveness Analysis Report, Phase I, CALMAC Study ID CPU0146.01*. Retrieved from http://www.calmac.org/publications/Comprehensiveness_Analysis_Report_-_Phase_I.pdf

very little natural gas energy efficiency potential. The small size of the investment may not meet or exceed current financing thresholds (e.g., On Bill Financing has a \$5,000 minimum loan amount). For instance, in a Measure, Application, Segment, Industry (MASI)¹¹⁷ study conducted by Navigant, many minor oil producers stated that they have extremely limited resources to pursue energy efficiency opportunities. Due to their small size, they do not have the personnel to research whether energy efficiency technologies should be considered or the technical resources to install and operate such technologies. They also have limited financial resources for the upfront investment in new energy efficient equipment.¹¹⁸

Due to the split-incentive barrier, it is difficult to influence energy efficiency decision-makers in the small industrial customer group. Small industrial customers have a greater likelihood of leasing their facilities. Energy costs are paid directly by tenants; therefore, facility owners are not motivated to invest in efficient building systems. Incentives need to offset a portion of the rater and energy upgrades to motivate property owners. Due to the split-incentive issue, whereby property owners are reluctant to invest in upgrades in individually metered units, greater incentives are required to overcome this barrier.¹¹⁹

Industrial customer energy use varies greatly. The industrial sector, especially with smaller-sized customers, is very diverse in their business operations and how they use natural gas. The customer diversity (e.g., aerospace/machinery, food/beverage, textiles, etc.) creates challenges to positioning energy efficiency in the market as customer awareness, perceptions, and energy usage vary greatly. For example, there are no common measures that are applicable to the entire industrial sector, as industrial processes vary.

Industrial customers lack in-house expertise. Most industrial customers do not have the in-house expertise to develop benchmarking and baselines needed to track on-going energy use and efficiency gains.¹²⁰

¹¹⁷ Navigant Consulting, Inc. (2015, April 10). *Measure, Application, Segment, Industry (MASI): New Opportunities for Oil and Gas Extraction and Produced Water Management and Recycling*, CALMAC Study ID SCE0377.07, p. 29. Retrieved from

http://www.calmac.org/publications/MASI_Oil_and_Gas_Final_Report.pdf

¹¹⁸ Navigant Consulting Inc. (2015, February 9). *Measure, Application, Segment, Industry (MASI): Chain Operations* CALMAC Study ID SCE0377.04, pp. 29-30. Retrieved from

http://www.calmac.org/publications/MASI_Chain_Operations_Final_Report.pdf

¹¹⁹ Heschong Mahone Group. (2013, July 1). *Lessons Learned through Piloting Energy Upgrade California Multifamily Programs*, CALMAC Study ID SDG0271.01, p. 125. Retrieved from

http://www.calmac.org/publications/Lessons_Learned_Energy_Upgrade_California%99_Multifamily_2013-10-30_%282%29.pdf

¹²⁰ The Cadmus Group, Inc. (2012, October 26). *Process Evaluation of California's Continuous Energy Improvement Pilot Program*. CALMAC Study ID SCE0394.01, p. 39. Retrieved from

http://www.calmac.org/publications/CA_CEI_Process_Evaluation.pdf

Lack of awareness of energy efficiency program assistance. Many smaller customers are not aware of the energy efficiency benefits or the programs that promote energy efficiency, especially, programs that are designed to assist the smaller industrial customer to achieve higher levels of energy efficiency.

Challenge 2: Complex and time-consuming process to pursue retrofits and energy-related operational changes.

Complex and diverse industrial processes have high potential for energy savings but require specialized expertise. Industrial processes typically have large energy savings potential because of the energy intensity applied in production and the sub-optimum processes. However, many customers do not have the resources to obtain the expertise that could identify the potential energy efficiency savings¹²¹. A recent Navigant study suggests that opportunities for saving energy continue to increase in complexity; for example, more and more chain operations are implementing energy management systems where equipment at individual establishments is controlled from a centralized location.

Smaller-sized customers tend not to pursue energy efficiency due to the complexity of the energy efficiency project and the resources needed to support upgrades. Smaller-sized customers tend not to pursue energy efficiency due to the complexity of energy efficiency projects and the resources needed to support such retrofits.¹²² The investment of time and resources often fall onto the smaller business owner who does not have the time to manage a retrofit. In addition, the investment of time and resources often fall onto the smaller business owner who does not have the time to manage an energy efficiency retrofit along with other responsibilities.

Challenge 3: Current industrial organizational practices do not realize the benefits of energy efficiency.

Industrial customers do not establish energy use benchmarks or baseline. Establishing benchmarks and baselines for energy use is complicated by the variability of operations of facilities across the industrial sector. Even among organizations with very similar products, the manner in which energy is applied to form those products can be markedly different.¹²³

¹²¹ Pew Center of Global Climate Change. (2010, August). Barriers and solutions to corporate energy efficiency,. *Center for Climate and Energy Solutions*, p. 4. Retrieved from <http://www.c2es.org/docUploads/Barriers%20and%20Solutions%20to%20Energy%20Efficiency%20Chart-Internal%20Operations.pdf>

¹²² The Cadmus Group, Inc. (2012, October 26). *Process Evaluation of California's Continuous Energy Improvement Pilot Program. CALMAC Study ID SCE0394.01*, p. 64. Retrieved from http://www.calmac.org/publications/CA_CEI_Process_Evaluation.pdf

¹²³ Freeman, S. L., Niefer, M. J., & Roop, J. M. (1997). Measuring industrial energy intensity: Practical issues and problems." *Energy Policy* 25(7-9): 703-714. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0301421597000621>

Customers lack in-house energy efficiency champions. Industrial customers often do not have sufficient staff to champion or pursue energy efficiency from within their organization. Moreover, staff members who manage industrial facilities have competing operational priorities that inhibit adoption of energy efficiency practices.

Low priority for energy efficiency. Achieving operational goals is paramount to the customer's continued business success. Large capital expenditures are focused primarily on achieving certain payback periods, production targets, safety and regulatory compliance standards, and production schedules. Energy efficiency is of no or low consideration in the organization's decision-making process.

Complex decision-making processes. Industrial customers often involve numerous staff members in capital expenditure proposals; these employees have competing operational priorities. This complex decision-making process can result in very long project timelines, making it difficult for customers to plan for and participate in energy efficiency programs.

Difficulty stopping production for improvements. Industrial operations often produce year-round with multiple production shifts including 24-hour operations. Energy efficiency improvements that require shutting down processes do not appeal to these process-intensive customers.

Challenge 4: Diffused industrial market¹²⁴ makes it difficult and costly to convince diverse customer segments to pursue energy efficiency.

Industrial customer energy use varies greatly. The industrial sector, especially with the smaller-sized customers, is very diverse in their business operations and how they use natural gas. The customer diversity (e.g., aerospace/machinery, food/beverage, textiles, etc.) creates challenges to positioning energy efficiency in the market as customer awareness, perceptions, and energy usage vary greatly. For example, there are no common measures that are applicable to the entire industrial sector, as industrial processes vary.

Industrial customers lack in-house expertise. Most industrial customers do not have the in-house expertise to develop benchmarking and baselines needed to track on-going energy use and efficiency gains.

Lack of awareness of energy efficiency program assistance. Many smaller customers are not aware of the energy efficiency benefits or the programs that promote energy efficiency,

¹²⁴ The diffused market is a challenge facing market actors (ESCOs, contractors, manufacturers, etc.) that offer energy efficiency solutions to a diverse market. As a result, customers are unaware of energy efficiency opportunities and/or remain unconvinced of the associated benefits to adopting energy efficiency solutions.

especially, programs that are designed to assist the smaller industrial customer to achieve higher levels of energy efficiency.

Desired Outcome

The industrial sector Business Plan identifies key milestones in the advancement towards a permanent market effect through a set of desired sector outcomes.¹²⁵ In many cases, the desired outcome is expected well beyond the near and mid-term planning horizon, and ties to the 10-year vision for the sector. The Business Plan identifies the corresponding program intervention strategies that will be deployed to reduce the market barriers that will realize the desired sector outcome.

Table 1 - Desired Outcome	
<p>10-year Vision: There will be high adoption of energy efficiency solutions across all industrial segments with particular emphasis on ensuring high adoption among smaller (<10k annual therm usage) industrial customers that demonstrate high energy efficiency potential relative to their segment and size. Industrial organizational practices and simple customer engagement with reduced customer transactional costs will facilitate the investment in and pursuit of energy efficiency solutions.</p>	
Challenges	Desired Outcome
Low adoption of energy efficiency solutions by very small/small industrial group.	Increase adoption of energy efficiency solutions by very small/small industrial group.
Complex and time consuming process to pursue energy efficiency solutions.	Provide greater number of simple, no hassle, low cost program transaction that encourages greater customer investment in energy efficiency.
Current industrial organizational practices do not realize the benefits of energy efficiency.	Permanently modify industrial practices to have organizations naturally consider and adopt energy efficiency solutions.
Diffused industrial market makes it difficult and costly to convince diverse customer segments to pursue energy efficiency.	Increase energy efficiency adoption levels across all industrial segments.

Goal 1: Metric Target – Increase energy savings from targeted smaller-sized customer group by 15% over 2015 levels by 2025.

Goal 2: Metric Target – Increase in program participants from all industrial segments by 35% over 2015 levels by 2025.

¹²⁵ "A market effect is a [permanent] change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficiency products, services, or practices and is causally related to market interventions [i.e., program or government]." Eto, J., Prahl, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Ernest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*, p. xii. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

Goal 3: Metric Target – Increase energy savings from process-related projects by 15% over 2015 levels by 2025.

Goal 4: Metric Target – Increase energy savings from targeted larger and medium-sized customer group by 15% over 2015 levels by 2025.

Industrial Sector Budget, Cost-Effectiveness, and Savings

To facilitate the achievement of the industrial sector goals, SoCalGas will rely on a coordinated combination of existing and new program intervention strategies. The Table 2 contains the industrial sector budget for the 2018-2025 timeframe.

Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Industrial	\$12,976	\$12,373	\$12,373	\$12,534	\$12,700	\$12,871	\$13,046	\$13,225	\$13,410	\$13,599

**2016 and 2017 are shown for historical purposes.

Table 3 contains the net therm savings forecast for the 2018-2025 timeframe, based on the 2015 Potential and Goals Study and the AB 802 Technical Analysis.

Savings	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Annual	4.26	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Cumulative	-	-	5.15	10.30	15.45	20.60	25.75	30.90	35.15	39.28

**2016 and 2017 are shown for historical purposes. The number reflects net energy savings from compliance filings.

Table 4 presents annual and lifecycle gross emissions avoided forecasts for 2018-2020 for industrial sector programs.

Gross Emissions Avoided	CO ₂ (tons)	NO _x (lbs)	PM-10 (lbs)
Annual	178,835	281,245	(1)
Lifecycle	2,653,727	4,173,393	(23)

Table 5 shows the near-term cost-effectiveness for the industrial sector.

Sector	TRC	PAC
Industrial	2.54	4.25

C. Overview of New Program Strategies and Tactics

In addition to proven program strategies, SoCalGas will incorporate new program strategies and corresponding program tactics to arrive at a complete energy efficiency solution set for the industrial customer. The proven and new program strategies are further detailed in the Program Intervention Strategies section. The new program approaches and the proposed implementation timeframe are summarized below:

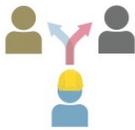
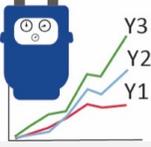
Table 6 - New Program Strategies			
Program Intervention Strategy	Descriptions	New Tactics	Timing
Partnering 	Limited-partnership arrangements, deployed on an as needed basis that are intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model based on equitably sharing of customer incentives and administrative costs among partners.	<ul style="list-style-type: none"> • Utility Partnering • Industry Partnering • Customer Partnering 	Near, Mid-term
Intelligent Outreach 	To assist customers in identifying the greatest energy efficiency opportunities, improve cost efficiency in program delivery, segment-specific benchmarking and provide deeper, comprehensive energy savings solutions.	<ul style="list-style-type: none"> • Data Analytics • Virtual Energy Audits • Energy Mgmt. Technologies • Industry Best Practice Sharing • Small Industrial Outreach 	Near, Mid-term
Strategic Energy Management 	Provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the production line to corporate management.	<ul style="list-style-type: none"> • Pay-for-Performance • Modified Savings Analysis • Use of AMI Data • Cross-Promotion • Meter Large Projects 	Near-term
Customer Incentives 	Facilitates customer choice by offering a simplified suite of financial incentives strategies to customers to reduce the high first cost barrier, the key market barrier for most customers.	<ul style="list-style-type: none"> • Pay-for-Performance • Bundled Measures 	Near-term

Table 6 - New Program Strategies

Program Intervention Strategy	Descriptions	New Tactics	Timing
Direct Install 	The direct install program strategy, including a comprehensive component, that delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for smaller-sized industrial customers.	<ul style="list-style-type: none"> • Standard Direct Install • Comprehensive Direct Install 	Near-term

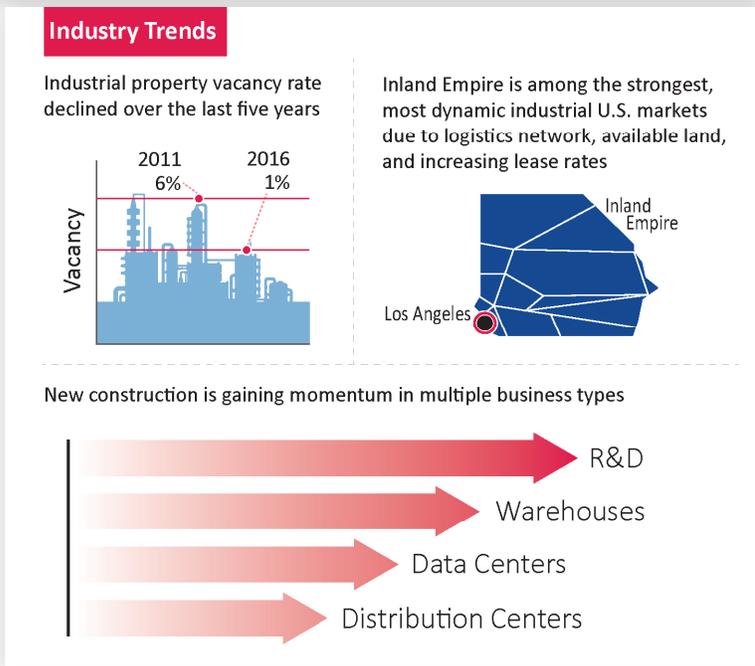
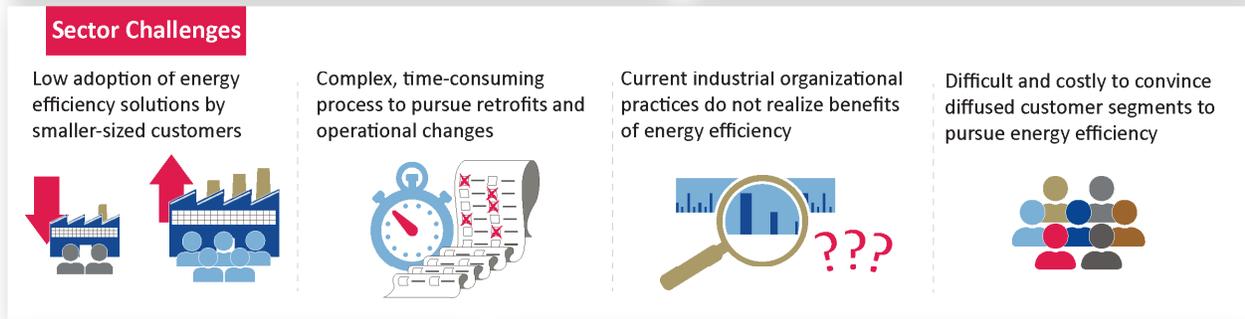
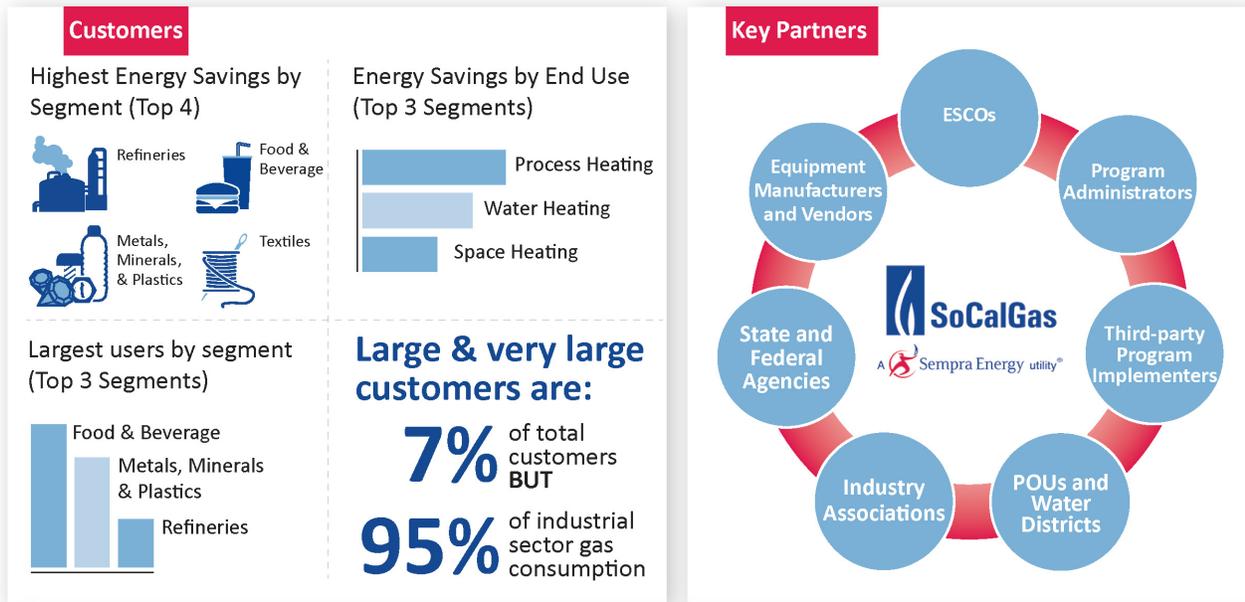
*Note: Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years.

D. Industrial Sector Market Characterization

The industrial sector represents several unique customer segments that vary in size and type of operations. The large industrial sector represents the biggest potential for natural gas energy efficiency among all customer sectors.

Figure 1

Industrial Sector - Market Characterization



Key Characteristics of the Industrial Sector

- Diffused market sector with several unique and varied customer segments;
- Small number of large customers who consume the majority of natural gas in the sector;
- Large number of smaller customers who do not use gas in their industrial processes; and
- Significant amount of untapped energy savings associated with changes in customer operations and practices.

Customer Landscape

Industrial Sector Energy Usage

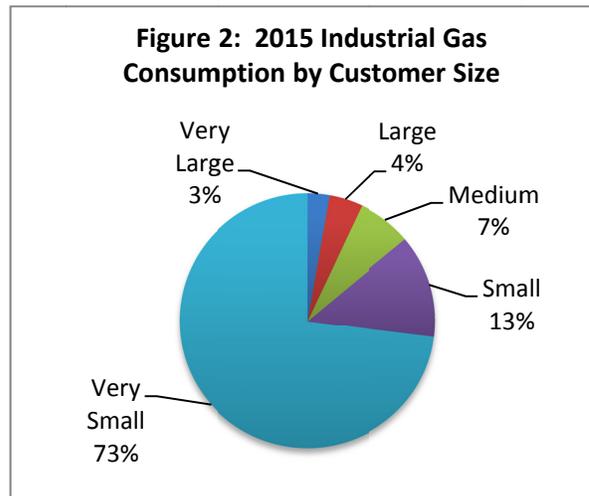
In 2015, SoCalGas industrial customers consumed nearly 1 billion therms of natural gas. Annual natural gas usage is a key segmentation variable of the SoCalGas industrial sector as shown in Table 7. At the highest level, this sector is divided into five primary segments based on average annual gas usage from 2010-2015.

Customer Size (therms/yr)	2015 Number Customers	2015 Usage MM Therms
Very Large (>250k)	489	840.2
Large (50k-250k)	746	87.4
Medium (10k-50k)	1,223	29.1
Small (2k-10k)	2,294	10.7
Very Small (<2k)	12,855	4.4
Total	17,607	972

The Large and Very Large groups include approximately 1,235 industrial facilities that each consumes greater than 50,000 therms annually. These segments account for about 7% of the total number of industrial customers yet accounts for about 95% of industrial sector natural gas consumption. Though individual account consumption varies widely, Very Large industrial facilities each consume on average over 1.7 million therms annually.

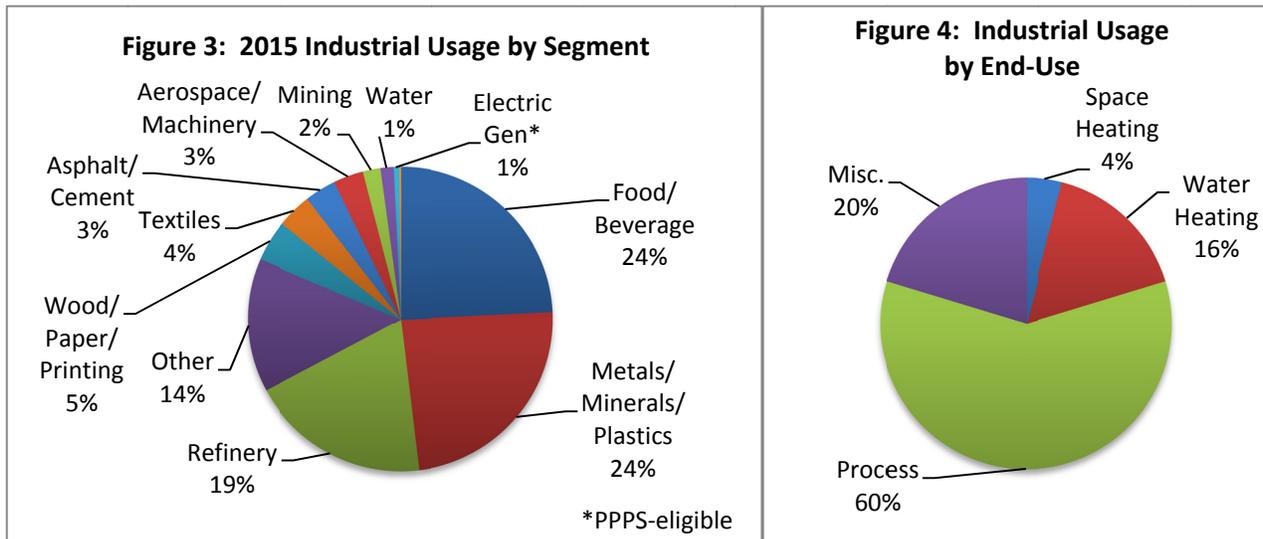
Medium-sized (10,000 – 50,000 therms annually) customers make up approximately 7% of industrial accounts and on average consume approximately 23,800 therms annually. These customers generally use natural gas as part of their process though not as intensively as Large or Very Large customers do. Their total annual consumption is less than 3% of all industrial accounts for 2015.

In contrast, the smaller-sized (<10,000 therms annually) customer includes approximately 15,000 accounts. These smaller customers account for about 86% of the industrial customers, but only about 1.5% of annual gas consumption. On average, very small and small facilities in this segment each consume 1,000 therms annually. The smaller-sized customer can be further disaggregated – the majority of small facilities (73%) consume fewer than 2,000 therms per year and are considered Very Small customers. These Very Small industrial customers are not likely to use natural gas in any significant way in their processes, and thus natural gas usage is a low portion of the facility energy cost. Figure 2 shows the distribution of gas consumption for the industrial sector, by customer size.



Usage by Customer Segment & End-Use

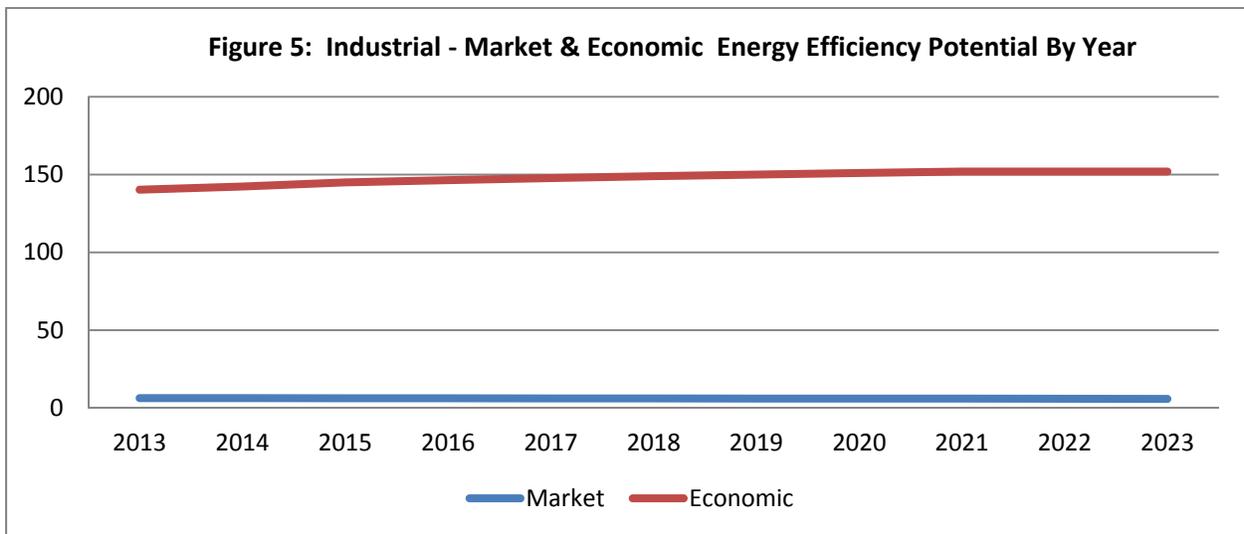
SoCalGas’ industrial customers are segmented into nine distinct North American Industry Classification System (NAICS) segments, as shown in Figure 3. By segment, Food/Beverage and Metals/Minerals/Plastics each consumed approximately 24% of all of the annual natural gas usage in the industrial sector, for a total of 467 million therms. Natural gas used for industrial processes accounts for nearly 60% of gas used in this sector, as shown in Figure 4. As expected, the process end-use consumes the most energy in the industrial sector.¹²⁶



¹²⁶ Itron, Inc. (2006, March). *California Commercial End-Use Survey, CEC-400-2006-005*. Retrieved from <http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF>

Market & Economic Energy Efficiency Potential

The estimated market and economic energy efficiency potential, over the next ten years, is shown in Figure 5.¹²⁷ There exists a significant gap between market and economic energy efficiency potential within the industrial sector. Both economic and market energy efficiency potential trend slightly upward through 2023. Within the industrial sector, certain customer segments will experience an increase in energy efficiency market potential while other segments are expected to decrease in market potential over the next few years. Specifically, market potential is projected to increase in the Metals/Minerals/Plastics segment. In contrast, there is a steady, yet declining market potential projected for the Refinery, Wood/Paper/Printing, and Textile segments. While the Aerospace/Machinery and Food/Beverage segments are projected to remain steady in potential over the next decade.



Historical Sector Performance

Segment

The industrial sector programs delivered approximately 41% of the SoCalGas portfolio savings. Notably, from 2010 to 2015, SoCalGas industrial customers saved 73 million therms of gas, or 8% of total annual industrial gas consumption. Refineries accounted for the largest portion of industrial sector program energy savings with approximately 32 million therms saved from 2010 to 2015, as shown in Figure 6. Other segments that account for large portions of total savings include Food/Beverage and Metals/Minerals/Plastics, each contributing over 2 million therm savings annually.

¹²⁷ Navigant Consulting, Inc. (2015, September 25). *Energy Efficiency Potential and Goals Study for 2015 and Beyond, Stage 1 Final Report*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4033>

Figure 6: 2010-2015 Industrial Energy Savings by Segment

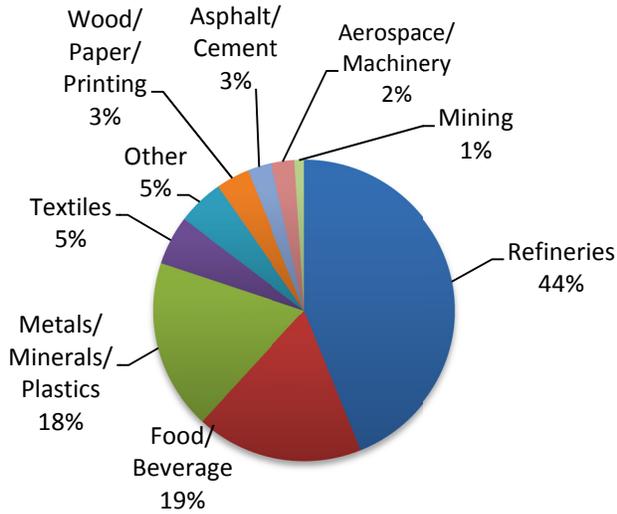
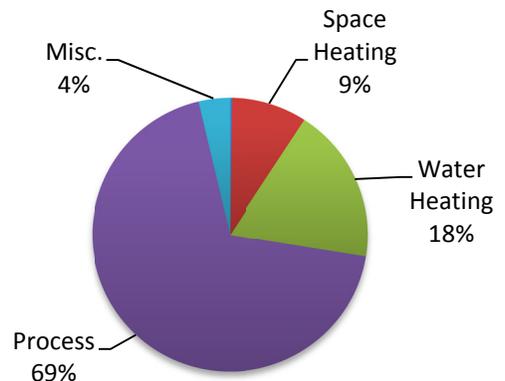


Figure 7: 2010 - 2015 Energy Savings by End-Use

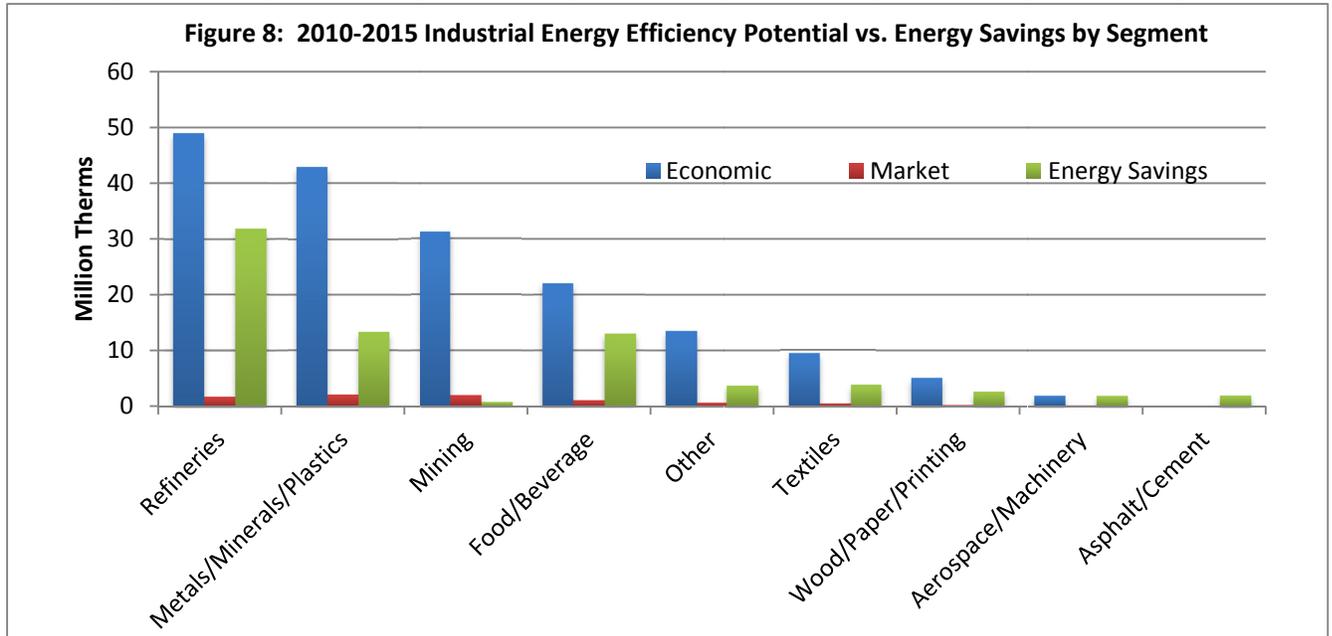


End-Use

Figure 7 depicts annual energy savings of industrial sector by end use. Approximately two-thirds (69%) of the energy savings are associated with process heat, followed by 18% from water heating measures. The majority of industrial energy efficiency savings results were produced by the customized incentives program; most of the energy savings from the deemed incentives program came from water heating measures.

Energy Efficiency Potential & Realized energy efficiency Savings

A comparison of market potential with realized energy savings, by NAICS segment, is shown in Figure 8. The realized energy savings are considerably higher than market potential for the Refineries segment, Metals/Minerals, and Food/Beverage segments indicating there still exists obtainable economic energy efficiency potential in these segments. In contrast, many other segments such as Mining and the Wood/Paper/Printing have a high potential for energy savings, but still have low participation rates.



Energy Efficiency Equipment Sales Share

Due to the diverse and unique segments within the industrial sector, there is no set of common equipment used across the sector. Industrial processes tend to be very distinct among the industrial segments. However, industrial customers do have facilities that have similar energy usage patterns as commercial customers. These industrial facilities typically use gas for space heating and water heating. The industrial sector has a higher adoption of more efficient heating, ventilation, and air conditioning (HVAC) systems but still lags behind the commercial sector. Overall, market adoption levels of energy-efficient equipment vary among segments and equipment.

In order to increase the purchase of energy-efficient equipment, SoCalGas will place a heavy focus on increasing market adoption of energy efficiency technology where market adoption is low among the various customer segments and sizes. Several recent market assessments on various industrial segments provide specific technologies with energy efficiency potential. These measures will be the focus of the industrial program offerings. A combination of comprehensive direct install, on-bill repayment, downstream and midstream energy efficiency equipment incentives will be actively offered to all customers, especially those customers with the greatest potential energy efficiency benefits. Outreach efforts will focus on informing customers of segment-specific energy efficiency solutions along with technical assistance to promote the installation of energy-efficient equipment.

Key Market Actors

In order to increase market adoption of energy-efficient equipment in the industrial sector, it will require working with key market actors that can assist in transforming the market through the various program intervention strategies. The market actors include equipment manufacturers, distributors, and retailers to assist in permanently modifying equipment

stocking habits as well as customer perception and acceptance of energy efficiency equipment. Other market actors include influential industry associations that can inform and influence specific-customer segments within the industrial sector. With significant levels of regulation applied to this industry, partnering with various regulators (e.g., Air Quality Management District or AQMD) to encourage deeper and more comprehensive energy efficiency will be key.

Industry Trends

In recent years, the SoCalGas industrial sector has remained relatively stable, and has strongly recovered since the economic recession of 2008-2009. The vacancy rate of industrial real estate, a key economic indicator, has steadily declined from a high of about 6% in 2011 to 1.3% in 2016¹²⁸, and Los Angeles exhibits the lowest vacancy rates of the ten largest markets across the United States.¹²⁹

Aside from economic cycles and macroeconomic trends, other key industrial market drivers include: equipment efficiency code increases (boilers), emissions standards increase (NOx, GHG), legislative mandates, and transportation and logistics (port congestion, E-commerce), among many others.

Key trends in the industrial market within southern California include:^{130,131}

¹²⁸ Cushman & Wakefield, (2016), *Marketbeat industrial snapshot Q3 2016 greater Los Angeles*, Retrieved from http://www.cushmanwakefield.com/~media/marketbeat/2016/10/Greater_LA_Americas_MarketBeat_Industrial_Q32016.pdf?_ga=1.68247249.1171461221.1483133397

¹²⁹ CBRE Group, Inc. (2014, April 4). Industrial markets in southern California show sustained strength in Q1 2014. *CBRE Media Center*. Retrieved from <http://www.cbre.us/o/losangelesmarket/los-angeles-media-center/Pages/INDUSTRIAL-MARKETS-IN-SOUTHERN-CALIFORNIA.aspx>

¹³⁰ Los Angeles County Economic Development Corporation, Kyser Center for Economic Research (2016, February). *2016-2017 Economic forecast and industry outlook*, p.27. Retrieved from <http://laedc.org/wp-content/uploads/2016/02/LAEDC-2016-2017-February-Forecast.pdf>

¹³¹ Navigant Consulting, Inc. (2015, April 10). *Measure, Application, Segment, Industry (MASI): New Opportunities for Oil and Gas Extraction and Produced Water Management and Recycling*, CALMAC Study ID SCE0377.07. Retrieved from

http://www.calmac.org/publications/MASI_Oil_and_Gas_Final_Report.pdf

Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Food Processing Industry*, CALMAC Study ID SCE0377.06. Retrieved from

http://www.calmac.org/publications/MASI_Food_Processing_Final_Report.pdf;

Navigant Consulting, Inc. (2015, February 18). *Measure, Application, Segment, Industry (MASI): Integrated Design for New Construction*, CALMAC Study ID SCE0377.01. Retrieved from

http://www.calmac.org/publications/MASI_Integrated_Design_for_New_Construction_Buildings_Final_Report.pdf

Navigant Consulting, Inc. (2015, March 13). *Measure, Application, Segment, Industry (MASI): Wastewater Treatment Facilities*, CALMAC Study ID SCE0377.05. Retrieved from

http://www.calmac.org/publications/MASI_Wastewater_Treatment_Plants_Final_Report.pdf

Development. New construction for the industrial sector is gaining momentum, especially in the goods movement as well as the distribution and technology sectors. The outlook for industrial development is much more optimistic, especially for warehouse and distribution facilities, data centers, and research and development (R&D) centers. Need to develop buildings to accommodate product demand, to move closer to customers or shipping centers, or to repurpose existing facilities.

Reduced Capital for Projects. Recent drop in oil prices has increased pressure on oil producers to reduce the cost of production. In addition, cash flow for minor producers will be low and interest in updating equipment will be even lower.

Codes and Standards. The food processing industry continues to be slow to adopt new technologies as the industry is heavily regulated by food safety and sanitation standards. Any energy efficiency upgrades activities cannot jeopardize the facility's compliance with food safety and sanitation standards. In addition, Title 24 captures most energy efficiency opportunities for boiler measures; facility managers have limited opportunities beyond Title 24 requirements.

Changing Landscape. In the textile segment, local manufacturing employment is not likely to significantly increase due to increasing overseas costs, but creative design work, merchandizing, and wholesaling will continue to grow.

Port activity and the growing importance of e-commerce continue to drive improvement in the Inland Empire's industrial real estate market. The Inland Empire is one of the strongest and most dynamic industrial markets in the nation, benefiting from logistics advantages, high demand, growing lease rates, and a substantial amount of available land for future industrial projects. The outlook for the market continues to be positive through 2016. Alone among the southern California five-county region, the Inland Empire's new development and construction is expected to be strong with demand easily absorbing new supply.

Long-term Planning Horizons. In the wastewater treatment segment, new construction and expansions are being planned at existing plants. These projects are planned years in advance and present excellent opportunities to facilitate installation of the most efficient equipment. In addition, emerging new processes are being considered that could improve on current plant energy efficiency.

Legislative Impacts on Strategy

There are several newly adopted legislative bills providing specific guidance for the future of energy efficiency in California. From Senate Bill (SB) 350 to Assembly Bills (AB) 758, 793 and 802, there are numerous directives that are helping to shape the next generation of energy efficiency program offerings. SB 350 sets forth a goal to double the levels of energy efficiency in California by 2030. A summary of the recent legislative along with SoCalGas' proposed program strategies to address these directives is shown in Table 8 below.

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Industrial Sector Customer

Policy Drivers	Guidance	Response
SB 350 – Clean Energy and Pollution Reduction Act of 2015	Achieve a cumulative doubling of savings in electricity and gas retail customers’ final end uses by 2030.	SoCalGas will deliver a customer-friendly suite of energy efficiency program intervention strategies structured to significantly increase energy efficiency levels within the industrial sector.
AB 793 – Energy Management Technology Incentive Offering	Must develop programs that provide incentives to help residential and small/medium business customers acquire energy management technology and educate them about these programs.	Although not applicable to the industrial sector, SoCalGas will offer EMT tactics, where feasible, to industrial customer to enable consumer-friendly, on-going virtual communication that will allow customer to continuously monitor energy consumption within their buildings. This will empower customers to permanently modify their behavior.
AB758 - Existing Buildings Energy Efficiency Action Plan	Strategy 2.2.5 - Develop multiyear, sector specific energy plans to implement energy and water efficiency improvements for property owners.	SoCalGas will implement the Strategic Energy Management (SEM) program to industrial customers. SoCalGas will also offer education and training to industrial customers on identifying and harvesting energy efficiency potential in their industrial operations and buildings.
AB 802 - Benchmarking and Changes to Energy Efficiency Baselines	Benchmarking - By January 1, 2017, for multi-unit buildings, utilities must provide aggregated energy usage data to its owner, its agent or the building operator. Commission will set requirements for public disclosure of information for benchmarking purposes. Baselines - Authorizes utilities to provide incentives to customers for energy efficiency projects based on normalized metered energy consumption as a measure of energy savings.	Through the Intelligent Outreach program strategy, promotion of tactics such as data sharing will provide usage data to the customer to support benchmarking activities. Program offerings such as pay-for-performance will encourage both energy efficiency retrofit and behavioral changes through incentives based on normalized metered energy consumption as of estimate of energy savings.

The Commission has also issued guidance to Program Administrators on how to further formulate the energy efficiency Business Plans. In response, SoCalGas has reshaped existing program strategies and added new ones to meet these specific directives. The recent legislative and regulatory directives along with SoCalGas' proposed program strategies to address these directives are detailed in Appendix A.

E. Goals, Strategies, and Tactics for the Industrial Sector

To realize the desired sector outcomes, several coordinated and integrated program intervention strategies will be deployed throughout various market channels to increase customer energy efficiency adoption levels. This will support the achievement of increases in the adoption of energy-efficient products and behavioral practices. To simplify customer engagement in the delivery of energy efficiency programs, SoCalGas proposes to coordinate program delivery with other local utilities (electric, water), where practicable. This will allow for a single customer engagement and will empower the customer to implement a holistic energy (and water) efficiency plan.

Goal 1: Increase adoption of energy efficiency solutions by smaller-sized industrial customers. Achieve deeper energy efficiency levels in the smaller-sized industrial customer group across all segments.

Sector Strategy: Through Intelligent Outreach, create data analytic methods to efficiently identify facilities with high energy efficiency potential and provide tailored energy assessment that will encourage customers to make immediate behavioral changes and near-term retrofits. Create industry and/or customer benchmarks for individual segments and sub-segments (industry type, customer size) to inform and demonstrate energy efficiency benefits to customer. Assemble best practice forums among like customer groups and partner with industry groups to promote awareness and newer technologies. Implement a targeted outreach to increase awareness among smaller-sized facility owners, customers operating in rural communities and non-English speaking business owners. Collaborate with financial market actors to enhance financing options for small industrial customers.

Goal 2: Provide simple, no hassle, low cost customer transactions that encourage greater customer investment in energy efficiency. Encourage greater participation in energy efficiency programs through bundling of strategies, simplified participation requirements, and one-touch customer outreach.

Sector Strategy: Create simple solutions to attract more customers to energy efficiency. Provide integrated energy solutions and products through a "one-stop shop" approach including simplified pay-for-performance strategies to achieve deeper energy efficiency levels. Deliver simple, low-touch customer solutions that leverage data analytic techniques to target customers with energy efficiency potential in order to increase the efficiency of their facilities

and operations. Simplify program requirements to facilitate ease of program participation while maintaining appropriate program safeguards in collaboration with regulators.

Goal 3: Reshape industrial organizational practices to enable adoption of energy efficiency solutions as part of customer's industrial processes.

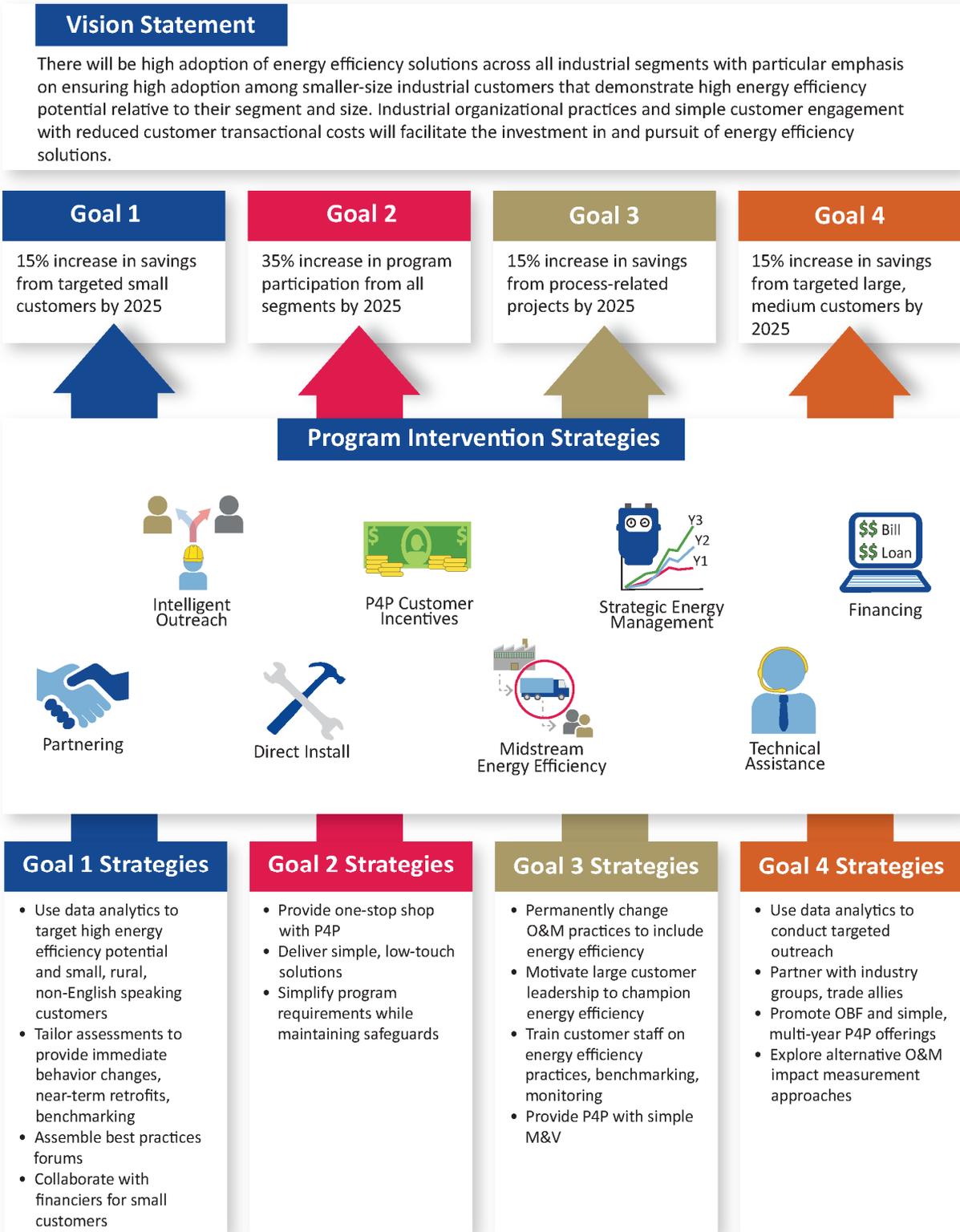
Sector Strategy: Change customer's organizational practices to make energy efficiency a key priority. Permanently modify industrial practices to encourage organizations to naturally consider and adopt energy efficiency solutions. Achieve deeper energy efficiency through permanent changes in operations and maintenance (O&M) practices, behaviors, and equipment upgrades through the strategic energy management program strategy. Encourage industrial customers to engage in comprehensive energy efficiency solutions, through new pay-for-performance strategies coupled with simple measurement and verification (M&V) approaches. Educate industrial customers on energy and operational benefits to encourage customers to optimize and incorporate O&M actions to increase energy efficiency levels. Motivate organizational leadership, in the large industrial group, to champion energy efficiency and incorporate energy efficiency as a key consideration into operational decision-making. Implement Intelligent Outreach tactics to help inform and excite the customer leadership to adopt energy efficiency practices and retrofits. Train customer staff to become in-house experts on energy efficiency in order to foster permanent energy efficiency practices, improved process efficiency, and on-going benchmarking.

Goal 4: Increase energy efficiency adoption levels across all industrial segments.

Sector Strategy: Apply data analytics, conduct efficient customer targeting, and offer simplified programs to increase customer awareness and adoption of energy efficiency practices and retrofits. Increase energy efficiency adoption levels across all industrial segments through segment-specific solutions. Increase program awareness and applicable energy efficiency solutions through partnership arrangements with industry groups and trade allies. Promote on-bill financing and other financing for energy efficiency investments via financial workshops and other outreach activities to help overcome the first cost market barrier. For example, coordinate delivery of dual-fuel program offerings among Program Administrators to allow energy efficiency project loan amounts to meet minimum financing thresholds. Create simple pay-for-performance offerings over multi-year periods. Continue to explore, with the industry, normalized metered energy consumption approaches to determine the overall impact of O&M and behavior measures as an alternate approach to quantifying energy savings.

Figure 9

Industrial Sector Strategies will leverage program intervention strategies to achieve goals and realize the 10-year vision



Program Intervention Strategies

The following is a comprehensive list of program intervention strategies that will be directed at SoCalGas' industrial sector. The strategies are intended to overcome the various market barriers identified in this Business Plan to achieve the desired sector outcomes. These strategies will be deployed in a cohesive manner at various stages during the execution of the Business Plan.

Upon Commission approval of this Business Plan, future Implementation Plans will be developed to describe the tactical approaches to implementing these program intervention strategies.

Program Intervention Strategy: **Partnering**



Partnering can create very effective alliances where there are shared common goals. Mutual collaboration and coordination as well as equitable contribution of resources and commitment are key to such program strategies. Partnering with other entities, through structured arrangements, is intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model.

In the industrial sector, partnering will enable greater customer reach and awareness of segment-specific energy efficiency opportunities while providing simplified solutions for deeper, more comprehensive energy efficiency in customer operations. Industry partnering can be a powerful and efficient way to reach specific customers operating within a specific segment or sub-segment in such a diffused market sector.¹³² Raising customer awareness of how energy efficiency solutions are being applied by others in a specific segment can remove performance uncertainties regarding energy efficiency solutions and motivate customers to permanently modify their organizational practices.¹³³ By partnering with large commercial property owners, challenges such as split-incentives and access to capital can be effectively identified and addressed, especially for smaller-sized industrial customers.¹³⁴ SoCalGas will also collaborate with the industry to identify emerging energy-efficient technologies, demonstrate technology performance, and increase technology adoption levels. This collaboration will also extend to financial market actors to enhance financing options for smaller-sized industrial customers who have limited access to financing. Utility partnering is also a very effective

¹³² Trombley, D. (2014, January 6). *One small step for energy efficiency: Targeting small and medium-sized manufacturers.* Retrieved from <http://aceee.org/research-report/ie1401>

¹³³ Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Food Processing Industry, CALMAC Study ID SCE0377.06.* Retrieved from http://www.calmac.org/publications/MASI_Food_Processing_Final_Report.pdf

¹³⁴ Turiel, I. (2009, November 4). *Comprehensiveness in California's Small Business Retrofit Programs Within Local Government Partnerships, CALMAC Study ID CPU0047.01.* Retrieved from http://www.calmac.org/publications/Local_Government_&_Comprehensiveness_11-4-09ES.pdf

approach to simplify customer energy efficiency program experiences and to further reduce the high first cost market barrier through combined utility incentives. Working with water agencies can also further the water-energy nexus by jointly identifying opportunities for customers to save both energy and water in industrial processes.¹³⁵

Intervention Strategy: Partnering				
Objectives: to increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Split incentive • Organizational practices • Diffused market • Access to capital • Hassle, transactional cost • Lack of information • Performance uncertainties 	Utility Partnering Facilitate the co-delivery of key program intervention strategies among gas and electric investor-owned utilities (IOUs), publicly-owned utilities (POUs), Program Administrators, and water agencies.	New	NR	On-going
	Customer Partnering Partnering with larger property owners to create energy efficiency action plans as part of the customer’s property management plans.	New	NR	On-going
	Industry Partnering Industry associations to promote energy efficiency solutions to select customer-based groups.	New	NR	On-going

Note: R=Resource; NR = Non-resource.

Program Intervention Strategy: **Intelligent Outreach**



Intelligent outreach embodies several tactical solutions to: assist customers with greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operations. Intelligent outreach uses energy consumption data, in concert with other sources, to effectively target and inform customers about energy efficiency opportunities within their own businesses. Through a multi-faceted approach, primarily enabled by SoCalGas’ advanced metering infrastructure (AMI)¹³⁶ customers can use their energy usage data to better optimize their business operations.

¹³⁵ California Sustainability Alliance. (2015, April 13). *Water-energy program collaboration guidebook*. Retrieved from http://sustainca.org/sites/default/files/publications/2014_Water_Energy_Program_Collaboration_Guidebook.pdf

¹³⁶ California Public Utilities Commission. (2010, April 14). D.10-04-027.

SoCalGas has over 17,000 customers, of all sizes, operating within nine unique customer segments across the industrial sector. This diffused customer base creates a barrier to effectively inform customers about their energy efficiency opportunities.¹³⁷ Leveraging AMI consumption data along with other data sources (e.g., census data), data analytics will identify customers with significant energy efficiency potential across this vast customer sector. Data analytics will expand upon the current demographic-based approaches to customer segmentation to include psychographics. This will help the customer to become aware of their daily decision-making patterns regarding energy use. Intelligent Outreach, coupled with automated continuous customer segmentation,¹³⁸ will allow the right program to assist the customer in modifying their behavior. This approach will increase customer adoption of energy efficiency practices in the most cost-efficient manner. This will also enable industry benchmarks for individual segments and sub-segments to inform and demonstrate energy efficiency benefits to customers, thereby helping to permanently modify the customer's organizational practices.

In response to the growing energy management technology (EMT) industry¹³⁹ and legislative direction,¹⁴⁰ EMTs will be used to assist customers in actively managing their energy usage. This will include merging AMI technology with advanced energy efficiency and management technologies to permanently modify customer behavior, which will result in reliable energy efficiency savings for the customer. The industrial sector has many facilities that can benefit from EMTs.¹⁴¹ It is expected the use of EMTs and customer data will reduce the hassle and transactional cost to adopting energy-efficient practices.

Due to the competitive nature of the industrial sector, sharing best practices is very difficult. However, where there exist opportunities to share among customers within a customer segment, sub-segment or groups, best practices forums will be created, typically in collaboration with industry groups, to reduce performance uncertainties and improve customer knowledge regarding energy efficiency practices pertinent to their business operations. A key

¹³⁷ Elliott, R.N., & Kaufman, N. (2009, October 20). Barriers to energy efficiency investments and energy management in the U.S. industrial sector." *American Council for an Energy-Efficient Economy*, p. 1. Retrieved from http://aceee.org/files/pdf/fact-sheet/ACEEE-Barriers_to_industrial_EE_10-20-09.pdf

¹³⁸ California Public Utilities Commission. (2010, April 14). D.10-04-027.

¹³⁹ Zion Market Research. (2016, August). *Energy management system (EMS) market by software (utility, industrial, residential, enterprises energy management) - Global industry perspective, comprehensive analysis, size, share, growth, segment, trends and forecast, 2015 - 2021*.

¹⁴⁰ See Energy Management Technology Incentive, California Assembly Bill 793 (2015). See Cal. Public Utilities Code § 2790 (e).

¹⁴¹ Report Buyer. (2015, October 12). *Industrial energy management systems: Software and services for intelligent efficiency: Market issues, drivers, and barriers, regional trends, and global forecasts*.

Retrieved from <http://www.prnewswire.com/news-releases/industrial-energy-management-systems-software-and-services-for-intelligent-efficiency-market-issues-drivers-and-barriers-regional-trends-and-global-forecasts-300158296.html>

focus will be to educate customers on energy and operational benefits of changing operational and maintenance (O&M) practices to increase energy efficiency levels in business operations.

Most industrial customers are considered smaller and operate throughout SoCalGas’ service territory including in disadvantaged communities.¹⁴² Working with industrial customers, customer account representatives indicate there are a number non-English speaking industrial business owners operating throughout the service territory. A customer outreach tactic directed at smaller industrial customers operating in disadvantaged communities, including a focus on rural and non-English speaking business owners, can reduce the lack of information market barrier by helping customers understand how specific energy-efficient equipment retrofits (e.g., boilers), O&M, and optimization energy efficiency changes can improve their businesses. This outreach will help the customer understand how to better address several market barriers, through this and other program strategies, including high first cost, split-incentives, organizational practices, transactional costs, performance uncertainties and lack of information about energy efficiency opportunities.

Ultimately, the Intelligent Outreach strategy will reduce several market barriers, including lack of information and performance uncertainties, by showing customers how to incorporate energy efficiency solutions, behavioral and retrofit, into their business operations in a very effective and efficient manner.

Intervention Strategy: Intelligent Outreach					
Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operation					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Split incentive • Organizational 	<p>Data Analytics Leverage AMI data to identify facilities with the highest energy efficiency potential for customer. Benchmarking by segment and size will be a key element to this effort.</p>	New	NR	Short-term	

¹⁴² California Energy Commission. (2016, December). *Draft staff report, low-income barriers study, part A: Overcoming barriers to energy efficiency and renewables for low-income customers and small business contracting opportunities in disadvantaged communities, CEC-300-2016-009-SD2*. Retrieved from http://docketpublic.energy.ca.gov/PublicDocuments/16-OIR-02/TN214605_20161201T144029_SB_350_LowIncome_Barriers_Study__Revised_Draft.pdf

Intervention Strategy: Intelligent Outreach

Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operation

Barriers	Tactics	Status	Type	Timing
<p>practices</p> <ul style="list-style-type: none"> • Diffused market • Access to capital • Hassle, transactional cost • Lack of information • Performance uncertainties 	<p>Virtual Energy Audits Virtual energy audits will be able to recommend both behavioral and retrofit opportunities to customer decision-makers and facilities staff. Consumer-friendly, on-going virtual communication, to inform progress on maintaining and/or increasing energy efficiency levels within their facilities will be a permanent feature.</p>	New	R	Short-term
	<p>Facility Energy Audits Offers onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations.</p>	Existing	R	On-going
	<p>Energy Management Technologies EMTs will help customers better manage energy and will allow customers to achieve optimal efficiency with other equipment. Where practicable, the EMT tactic will also partner with electric and water agencies to provide a simple, one-touch efficiency experience.</p>	New	R	Short-term
	<p>Industry Energy Efficiency Best Practices Offer, along with industry groups, a collaborative forum to help inform, excite, and accelerate energy efficiency actions among like customers.</p>	New	NR	On-going
	<p>Data Sharing Provide customer access to their energy usage. This will enable customers to use tools to better manage their energy. Data sharing will comply with Commission requirements and processes to protect customer privacy.</p>	Existing	NR	Short-term
	<p>Small Industrial Outreach Target small-sized customers, including a focus on rural and non-English speaking business owners, to help the customer understand how behavioral changes and retrofits, based on their own unique energy usage profile, can improve their business operations.</p>	New	NR	Short-term

Program Intervention Strategy: **Customer Incentives**



The customer incentive program intervention strategy is a simplified suite of financial incentive offerings directed at customers to reduce the high first cost barrier: a key market barrier for most customers. Recognizing the varied preferences among customers for different financial solutions,¹⁴³ the program strategy offers a menu of tactics. Although incentive-based strategies like pay-for-performance may be suited for larger energy efficiency projects, in many circumstances, a one-payment approach (e.g., deemed and customized incentives) is very effective in motivating the customer to install energy efficiency equipment. Each of the tactics, within the overall customer incentive strategy, are intended to increase participation through simplified customer engagement while encouraging deeper, more comprehensive energy efficiency solutions including permanent behavior modification.

The high first cost associated with most capital expenditures is the largest market barrier for industrial customers, both large and small.¹⁴⁴ To properly inform the customer's decision regarding a capital improvement, all energy savings, equipment and behavioral, expected by a capital improvement needs to be recognized. A pay-for-performance (P4P) approach supports this goal by recognizing all energy savings realized by the customer's capital investment thereby justifying their investment. In sum, a P4P approach provides a steady customer incentive payment, over a multi-year period, based on the actual energy savings resulting from an energy efficiency improvement. Prior performance programs were plagued with disagreement regarding energy savings levels and the timing and amount of customer incentives.¹⁴⁵ A key element to a successful P4P program offering is the simplicity and ease of participation by which periodic, frequent energy savings claims¹⁴⁶ associated interval incentive payments are made. Energy savings resulting from behavioral energy changes can be identified based on measured savings, using normalized meter data, with a baseline of existing conditions. Other strategy tactics, such as customized and deemed incentive offerings, can help overcome the high first cost barrier by offering a simple, one-incentive payment customer experience. In addition, bundling of energy efficiency measures for like customers can reduce the customer's perceived hassle with making energy efficiency improvements.

¹⁴³ United States Environmental Protection Agency. (2010, February). *Customer incentives for energy efficiency through program offerings*. Retrieved from https://www.epa.gov/sites/production/files/2015-08/documents/program_incentives.pdf

¹⁴⁴ Elliott, R.N., & Kaufman, N. (2009, October 20). Barriers to energy efficiency investments and energy management in the U.S. industrial sector." *American Council for an Energy-Efficient Economy*, p. 1. Retrieved from http://aceee.org/files/pdf/fact-sheet/ACEEE-Barriers_to_industrial_EE_10-20-09.pdf

¹⁴⁵ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 93.

¹⁴⁶ The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, p. 26. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

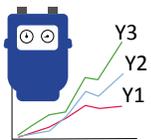
The whole building approach views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting. A whole building approach can help to change operational practices and help overcome the customer’s cost to pursue energy efficiency.

Overall, to encourage greater customer adoption of energy efficiency solutions, program requirements and the customer experience will be simplified to facilitate ease of program participation while maintaining appropriate program safeguards.

Intervention Strategy: Customer Incentives				
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Split incentive • Organizational practices • Diffused market • Hassle, transactional cost 	<p>Pay-for-Performance Will provide incentive payments to the participating customer over a pre-determined period on preset payment intervals based on measured savings, using normalized meter data, with a baseline of existing conditions associated with O&M and behavioral actions and equipment retrofits.</p>	New	NR	On-going
	<p>Customized Incentives Offers financial incentives for customized retrofit energy efficiency projects. The program offering features incentives based on calculated energy savings for measures installed as recommended by comprehensive technical and design assistance for customized retrofits and new construction. It offers a calculation method that can consider system and resource interactions, to support an integrated, whole system, and multi-resource management strategies.</p>	Existing	NR, R	On-going
	<p>Deemed Incentives Offers financial incentives based on predetermined energy savings. It also features rebates per unit measure for installed energy-saving projects and provides the IOU, equipment vendors, and customers a simple transaction and encourages greater market adoption of emerging energy efficiency technologies and applications.</p>	Existing	NR, R	On-going

Intervention Strategy: Customer Incentives				
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification				
Barriers	Tactics	Status	Type	Timing
	<p>Bundled Measures Provides an integrated approach by bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage), primarily for smaller-sized customers. The bundled strategy will integrate education, financing, and technical assistance in support of the installation of energy efficiency measures.</p>	New	NR	Short-term
	<p>Whole Building A process that views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting. This strategy is also directed at the new construction segment by promoting integrated design through owner incentives, design team incentives, and design assistance to participants who design spaces that are energy-efficient.</p>	Existing	NR	Short-term

Program Intervention Strategy: **Strategic Energy Management**



SEM is a program intervention strategy focused on achieving deeper and permanent energy efficiency levels for larger operations through improved customer operational and maintenance practices and energy efficiency equipment installations. SEM provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the shop floor to corporate management. Continuous monitoring of energy usage confirms the energy savings realized by the SEM program strategy.

The industrial sector relies on unique business processes. Typically, these industrial processes represent a large portion of the energy used in the facility.¹⁴⁷ A one-size-fits-all offering of

¹⁴⁷ Cropp, J., & Phoutrides, S. (2015). Regional assessment to characterize industrial end-use energy consumption. *2015 ACEEE Summer Study on Energy Efficiency in Industry*. Retrieved from <http://aceee.org/files/proceedings/2015/data/papers/5-199.pdf>

energy efficiency measures is an effective approach in other customer sectors, however, such approaches tend not to apply to the industrial sector¹⁴⁸ as much of the energy efficiency potential is embedded in the customer’s industrial processes. A key market barrier to realizing this energy efficiency potential is the customer’s organizational practices, which tend to focus on production and quality.¹⁴⁹ To effectively capture this energy efficiency potential, the SEM program strategy will focus on permanently modifying the customer’s decision-making process so energy efficiency is factored into the customer’s capital and process improvement decisions.¹⁵⁰ To overcome the customer’s performance uncertainties, continuous monitoring of energy usage will be a key tactic to this program strategy. Previous SEM approaches have been troubled with infrequent availability of energy consumption data.¹⁵¹ With AMI, data collection may significantly improve SEM’s effectiveness thereby expanding the strategy to more industrial customers. To encourage a greater level of retrofits and behavioral changes, a pay-for-performance tactic will be offered to customers thereby helping to reduce the high first cost barrier.

Intervention Strategy: Strategic Energy Management				
Objectives: to increase energy efficiency in the business operations				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle, transactional cost 	Pay-for-Performance Multi-year pay-for-performance incentive based on realized energy savings that will balance the customer need for greater operational efficiency and ensure ratepayer benefit.	New	NR	Near-term
	Modified Savings Analysis A “bottom-up” approach of enumerating measures to demonstrate the impact of SEM on the customer operations.	New	NR	Near-term

¹⁴⁸ Haeri, H., Ochsner, H., & Stewart, J. (2012, October). Efficiency beyond the low fruit. *Public Utilities Fortnightly Magazine*. Retrieved from <https://www.fortnightly.com/fortnightly/2012/10/efficiency-beyond-low-fruit>

¹⁴⁹ Harrington, B. K. & Burnes, I. (2016). The longer road to deep energy savings in commercial and industrial facilities. *2016 ACEEE Summer Study on Energy Efficiency in Buildings*. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/4_322.pdf

¹⁵⁰ Kolwey, N. & Chittum, A. (2011, March). *Industrial energy efficiency programs and supporting policies: A white paper*. Retrieved from <http://www.swenergy.org/data/sites/1/media/documents/publications/documents/WGA%20White%20Paper%20on%20Industrial%20EE%20-%20March%202011.pdf>

¹⁵¹ The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, pp. 34-35. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

Intervention Strategy: Strategic Energy Management				
Objectives: to increase energy efficiency in the business operations				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Lack of information • Performance uncertainties 	Use of AMI data When estimating energy savings with regression, the probability of detecting savings increases with higher data frequency. Savings are more likely to be detected with more frequent data collection using AMI data.	New	NR	Near-term
	Cross Promotion SEM’s multi-year engagement allows an opportunity to promote other energy efficiency offerings as well as clean renewable opportunities, including renewable natural gas.	New	NR	Near-term
	Meter Large Projects When the customer implements both capital and O&M measures during the same period, the program may employ metering of the capital project(s) to identify capital energy efficiency savings separately from O&M energy efficiency savings.	New	NR	Near-term

Program Intervention Strategy: **Direct Install**



The direct install (DI) program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for smaller-sized customers. A comprehensive DI tactic will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits. Comprehensive DI will rely, in part, on ratepayer funds and, in part, on customer co-fund contributions and/or customer financing through on-bill financing or other financing vehicles.

The majority of customers in the industrial sector are smaller-sized.¹⁵² Many of these smaller industrial customers do not use natural gas as part of their industrial processes.¹⁵³ As a result, these smaller industrial customer’s energy consumption patterns resemble that of a small commercial or residential customer, and are less likely to consider investing in natural gas efficiency. High first cost, performance uncertainties, split incentives, hassle factor, and lack of awareness are market barriers that can be reduced by a direct install strategy.

¹⁵² SoCalGas consumption data in Market Characterization section of chapter

¹⁵³ SoCalGas consumption data in Market Characterization section of chapter

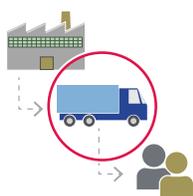
The DI program intervention strategy offers both a standard and comprehensive DI approach, primarily targeted at smaller-sized industrial customers to deliver natural gas and electric energy efficiency solutions, in a simple approach, to achieve near-term measurable energy efficiency benefits.

The standard DI offering will provide a limited list of low/no cost energy efficiency measures. DI will include natural gas energy efficiency measures along with other similar electric and water efficiency measures, where practicable. It will use the Intelligent Outreach strategy to identify small industrial facilities with the greatest energy efficiency opportunities.

The comprehensive DI tactic encourages deeper energy savings by offering more comprehensive energy efficiency measures that are typically used by the targeted customer segment. Comprehensive DI will provide qualified contractors that will engage directly with the customers to install measures. A co-pay option will be offered to the customer to offset the initial cost of energy-efficient equipment. Customers can leverage on-bill financing or other financing offerings (e.g., on-bill repayment) to fund their co-pay portion.

Intervention Strategy: Direct Install				
Objectives: to achieve near-term measurable results primarily for smaller-sized customers				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Split incentive • Lack of information • Performance uncertainties 	<p>Standard Direct Install</p> <p>Targets smaller-sized customers through the intelligent outreach strategy, which will identify facilities with the greatest energy efficiency opportunity. The standard DI offering will provide a limited list of low/no cost energy efficiency measures.</p>	New	NR	Near-term
	<p>Comprehensive Direct Install</p> <p>Encourages deeper energy savings by offering more comprehensive energy efficiency measures. Comprehensive DI will offer qualified contractors that will engage directly with the customers to install measures. A co-pay option will be offered to the customer along with tailored on-bill repayment strategy to offset the initial cost of the energy efficiency equipment.</p>	New	NR	Near-term

Program Intervention Strategy: **Midstream Energy Efficiency**



The Midstream Energy Efficiency program intervention strategy provides deemed incentives to distributors that will be used to reduce the retail cost of natural gas energy efficiency equipment, promote stocking of energy efficient equipment and inform contractors at the distributor level.

Incentives directed at midstream market actors can greatly simplify the end-use customer transaction while having lasting long-term change of key market actors in the promotion of energy efficiency technologies to their end-use customer. This approach can reduce the high purchasing cost of advanced energy efficiency equipment along with hassle cost associated with identifying the appropriate energy efficiency technologies. However, as incentives are moved away from the end-use customers, the stability of such energy savings can be concerning due to difficulty in tracking product to the end-use customer to confirm program eligibility. Distributor training coupled with active product monitoring can greatly reduce these concerns. Distributor training also can have greater impact in transforming market adoption of energy efficient equipment.¹⁵⁴

Intervention Strategy: Midstream Energy Efficiency				
Objectives: to achieve near-term measurable results and long-term market adoption of energy efficiency technologies through incentives directed at mid-stream and upstream market actors				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Lack of information • Performance uncertainties 	Midstream Incentives Provides incentives to mid-stream and upstream market actors to drive down the wholesale price of energy efficient technologies and to improve the stocking habits of energy efficient equipment.	Existing	NR	Near-term
	Distributor Training Provides distributor-assisted training to contractors to support promotion of energy efficiency equipment to contractors and, in turn, customers.	New	NR	Near-term

Program Intervention Strategy: Technical Assistance



Technical assistance is an information strategy focused on educating and training key facility personnel on energy efficiency practices and providing supplemental technical assistance in energy efficiency project development and implementation.

In the industrial sector, a lack of in-house technical expertise or the resources to hire outside staff for the development and operation of end-use efficiency projects can hinder

¹⁵⁴ Bickle, S., Burns, E., Rivett, B., VIta, D., Nelson, M., Parson, J., & Merson, H. (2016). Swimming to midstream: New residential HVAC program models and tools. *2016 ACEEE Summer Study on Energy Efficiency in Buildings*, pp.7-5 – 7-7. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/7_888.pdf

deployment.¹⁵⁵ Without this expertise, there is an overall lack of awareness regarding energy efficiency opportunities and/or concern that the energy efficiency investment will result in benefits (including non-energy benefits)¹⁵⁶ to the customer (i.e., performance uncertainty). There is also a perceived hassle factor, especially with smaller industrial customers, to adopting energy efficiency solutions. Technical assistance can help modify the customer decision-making practices to help recognize the benefits to the customer to help with making capital improvement decisions.¹⁵⁷ By training customer’s staff to become in-house experts on energy efficiency will help foster permanent energy efficiency practices, improved process efficiency, and on-going benchmarking.

Intervention Strategy: Technical Assistance				
Objectives: to assist customer with identification and implementation of energy efficiency in their businesses				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Organizational practices • Lack of information • Performance uncertainties 	Technical Training Educates and trains key facility personnel on energy efficiency practices to promote long-lasting behavioral changes.	Existing	NR	Near-term
	Technical Support Provides supplemental assistance to the customer in energy efficiency project development and implementation	Existing		

Program Intervention Strategy: Industrial Financing



The industrial financing program intervention strategy relies on various financing vehicles including on/off bill repayment solutions to encourage customers to adopt deeper, more comprehensive energy efficiency solutions. On-Bill Financing (OBF) and the statewide CHEEF finance pilots will be leveraged as an essential part of this strategy.

¹⁵⁵ United States Department of Energy. (2015, June). *Barriers to industrial energy efficiency*. Retrieved from https://www.energy.gov/sites/prod/files/2015/06/f23/EXEC-2014-005846_6%20Report_signed_0.pdf

¹⁵⁶ Global Superior Energy Performance Partnership, Energy Management Working Group. (2013, November 1). *Knowledge and skills needed to implement energy management systems in industry and commercial buildings*. p. 4. Retrieved from http://www.ourenergypolicy.org/wp-content/uploads/2014/01/GSEP_knowledge_skills_EnMS_implementation.pdf

¹⁵⁷ *Id.*

The industrial sector is faced with the high cost of capital improvements. There is significant internal competition within the customer’s organization for limited capital budgets. In the industrial sector, these capital expenditures typically demand very short payback periods (one to three years).¹⁵⁸ Energy efficiency financing solutions are a pathway to address the high cost barrier and to permanently modify organizational decision-making practices regarding energy efficiency-related improvements. The new financing pilots developed as part of the CHEEF program will utilize innovative features to attract the development of energy efficiency financial products to the market. Financing solutions are most effective when offered jointly with a customer incentive¹⁵⁹ thereby making it an ideal program strategy to overcome the first high cost barrier to energy efficiency. On-bill financing offerings yield positive customer feedback for its simple, low customer interaction approach.¹⁶⁰ The low hassle factor is especially attractive to the smaller-sized customer, with limited staff resources. Smaller-sized customers can further leverage financing solutions in combination with a comprehensive direct install program strategy to further reduce the high cost and hassle factor market barriers.

Intervention Strategy: Financing				
Objectives: to assist customer with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle factor 	On-Bill Financing Offers interest-free, utility ratepayer financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects which are repaid over time via the customer’s utility bill	Existing	NR, R	Near-term
	Credit Enhancement Provides interest subsidies for financial institutions as an incentive for offering low interest loans	Existing	NR, R	Near-term
	On-Bill Repayment Privately financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects, which are repaid over time via the customer’s utility bill.	New	NR, R	Near-term

¹⁵⁸ United States Department of Energy. (2015, June). *Barriers to industrial energy efficiency*. Retrieved from https://www.energy.gov/sites/prod/files/2015/06/f23/EXEC-2014-005846_6%20Report_signed_0.pdf

¹⁵⁹ The Cadmus Group. (2014, April 22). *California Joint Utilities Financing Research: Existing Programs Reviews, CALMAC Study ID PGE0338.01*, p. 4. Retrieved from http://www.calmac.org/publications/Existing_Programs_Review_FINAL.pdf

¹⁶⁰ *Id.* at 6.

F. Performance Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the business plan proposes key sector metrics. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the program administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels. The sector-specific metrics are presented in Table 9 below. Over time, metrics and targets may be adjusted and improved to more accurately reflect sector progress.

Table 9 - Industrial Sector Metric Table

10-year Vision

California industry will be vibrant, profitable and double its level of energy efficiency by 2030 through a suite of energy efficiency programs intended to: facilitate, sustain, and transform the long-term delivery and adoption of energy efficient products and services; cultivate, promote and sustain lasting energy-efficient operations and practices; and offer a range of simplified solutions that address the customer’s energy efficiency needs.

Problem Statement	Desired Sector Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Low adoption of energy efficiency solutions by smaller-sized industrial group.	1. Increase adoption of energy efficiency solutions by smaller-sized industrial group.	Partnering	Amount of energy efficiency savings achieved by smaller (<50k therms) industrial customers.	2015 Participation Levels.	Program tracking data	Increase energy efficiency savings from targeted customer group by 5% over 2015 levels by Year 3.	Increase energy efficiency savings from targeted customer group by 15% over 2015 levels by Year 7.	Increase energy efficiency savings from targeted customer group by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Small Industrial Outreach						
		Strategic Energy Management						
		Customer Incentives						
		Direct Install						
		Technical Assistance						
		Midstream Energy Efficiency						
Financing								
Complex program requirements and transactional costs reduce the customer’s pursuit for	2. Provide greater number of simple, no hassle, low cost program transactions that encourage more	Partnering	Number of industrial customer participating in energy efficiency programs.	2015 Participation Levels.	Program tracking data	Increase in program participants by 15% over 2015 levels by Year 3.	Increase in program participants by 35% over 2015 levels by Year 7.	Increase in program participants by 50% over 2015 levels by Year 10.
		Intelligent Outreach						
		Small Industrial Outreach						
		Strategic Energy Management						
		Customer Incentives						

Table 9 - Industrial Sector Metric Table

10-year Vision

California industry will be vibrant, profitable and double its level of energy efficiency by 2030 through a suite of energy efficiency programs intended to: facilitate, sustain, and transform the long-term delivery and adoption of energy efficient products and services; cultivate, promote and sustain lasting energy-efficient operations and practices; and offer a range of simplified solutions that address the customer’s energy efficiency needs.

Problem Statement	Desired Sector Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
energy efficiency solutions.	customers to adopt energy efficiency solutions.	Direct Install Midstream Energy Efficiency Financing						
Industrial organizational practices reduce investment in energy efficiency.	3. Permanently modify industrial practices to have organizations naturally adopt energy efficiency solutions.	Partnering Intelligent Outreach Small Industrial Outreach Strategic Energy Management Customer Incentives Direct Install Technical Assistance Midstream Energy Efficiency	Amount of energy efficiency savings achieved from process-related projects.	2015 Participation Levels.	Program tracking data	Increase energy efficiency savings from process-related projects by 5% over 2015 levels by Year 3.	Increase energy efficiency savings from process-related projects by 15% over 2015 levels by Year 7.	Increase energy efficiency savings from process-related projects by 25% over 2015 levels by Year 10.
Diffused industrial market makes it difficult and	4. Increase energy efficiency adoption levels	Partnering Intelligent Outreach Small Industrial Outreach	Amount of energy efficiency savings achieved by medium	2015 Participation Levels.	Program tracking data	Increase energy efficiency savings from	Increase energy efficiency savings from	Increase energy efficiency savings from targeted

Table 9 - Industrial Sector Metric Table

10-year Vision

California industry will be vibrant, profitable and double its level of energy efficiency by 2030 through a suite of energy efficiency programs intended to: facilitate, sustain, and transform the long-term delivery and adoption of energy efficient products and services; cultivate, promote and sustain lasting energy-efficient operations and practices; and offer a range of simplified solutions that address the customer’s energy efficiency needs.

Problem Statement	Desired Sector Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
costly to move diverse customer segments to invest in deeper levels of energy efficiency.	across all industrial segments.	Strategic Energy Management	(>50k therms) and large industrial customers.			targeted customer group by 5% over 2015 levels by Year 3.	targeted customer group by 15% over 2015 levels by Year 7.	customer group by 25% over 2015 levels by Year 10.
		Customer Incentives						
		Direct Install						
		Technical Assistance						
		Midstream Energy Efficiency						
		Financing						

G. Key Partners

The success of the industrial sector business plan will rely on a positive, collaborative relationship with a number of market actors, program administrators, regulators, and government entities. Table 10 below contains a list of key partners that will help SoCalGas successfully achieve the ambitious vision for the industrial sector.

Table 10 - Key Partners	
Key Partners	Support Activity
Program Administrators	<ul style="list-style-type: none"> • Deliver dual-fuel programs to reach more customers; • Leverage all available best practices and promote statewide consistency, where appropriate; • Simplify program engagement; • Capture all energy efficiency benefits including operational energy savings; and • Conduct market research that will identify and better understand unique barriers to energy efficiency investments.
Publicly-owned Utilities (POUs) and Water Districts	<ul style="list-style-type: none"> • Coordinate with POUs and water agencies to effectively and efficiently deliver energy and water efficiency programs; • Engage in partnership and co-delivery arrangements with POUs and water agencies when there is a shared customer base (gas, electric) to simplify the customer engagement and achieve higher levels of energy efficiency; and • Actively coordinate with POUs and water agencies throughout California and other regions to share best practices in program administration, design, and delivery.
State and federal agencies	<ul style="list-style-type: none"> • SoCalGas will work with state federal agencies (e.g., DFA, DWR, USDA) to promote greater levels of energy efficiency adoption throughout the various customer segments.
California Public Utilities Commission and Key Stakeholders	<ul style="list-style-type: none"> • SoCalGas will work with the Commission and other key stakeholder to investigate ways to simplify program requirements and to identify policies that will recognize all energy efficiency benefits associated with energy efficiency ratepayer-programs.
Third-party Program Implementers	<ul style="list-style-type: none"> • Solicit new and innovative programs from third-party program implementers to draw upon creative program solutions that can be quickly and effectively targeted to these customers. Continued collaboration with program implementers throughout the program’s lifecycle will be an integral part of the program’s success.
Local and State Governments	<ul style="list-style-type: none"> • SoCalGas will leverage its existing partnerships with local and state government to assist in the development and implementation of program strategies directed at smaller industrial customer group.

Table 10 - Key Partners	
Key Partners	Support Activity
Industrial Trade Organizations	<ul style="list-style-type: none"> Industrial trade organizations can provide an effective path to industrial sector collaboration, particularly by serving as a trusted source of information about business concerns facing specific industrial segments. Trade organizations have the ability to survey their membership to find common concerns and potential solutions. Understanding these concerns can help program administrators construct value propositions and tailor their program offerings to best serve these customers. Trade organizations have an established communications channels with the industry that can facilitate education of industrial customers about energy efficiency programs through a variety of forums, such as social and print media, ad hoc round tables, monthly meetings, and regional or national quarterly or annual meetings. SoCalGas will collaborate with trade allies to increase program promotion and customer awareness of the benefits of energy efficiency investments.
Industry Technical Community	<ul style="list-style-type: none"> Specialized technical assistance with expertise in specific industrial processes can be highly effective in identifying energy savings opportunities at industrial facilities. The expertise can be provided by resources that include utility in-house experts, independent technical consultants, and equipment vendors.
Equipment Vendor and Manufacturers	<ul style="list-style-type: none"> SoCalGas will actively work with equipment vendors and manufacturers to promote greater adoption of energy efficiency equipment among the various customer segments.
California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) for financing	<ul style="list-style-type: none"> Financing will be a key program intervention strategy to overcome the high first cost of energy efficiency in the sector. SoCalGas will continue its long-term collaboration with CAEATFA to design and promote innovative financing strategies that will encourage greater customer investment in energy efficiency.

H. Cross-cutting Sector Coordination

Local Marketing and Statewide Marketing, Education & Outreach Integration

The sector programs will rely on a combination of locally targeted promotion of specific energy efficiency programs tailored to the various segments throughout the sector. There will be a focus on historically underserved customers with higher energy efficiency potential to encourage greater program participation.

As the statewide Marketing, Education, and Outreach (ME&O) program’s near-term goal is focused on the mass market customer (i.e., residential and small business owners), the

industrial program will rely on the Energy Upgrade California efforts to inform small business owners on the importance of energy efficiency and their opportunities to act. The Small Industrial Outreach will provide customer-specific information and services to help the customer modify their energy consumption behavior and to install energy efficiency retrofits. The industrial sector program will also rely on targeted outreach efforts to inform larger industrial customers on the importance of energy efficiency, their opportunities to act, and the benefits of their actions. SoCalGas will also actively participate in both the development of the five-year ME&O Strategic Roadmap and Annual Joint Consumer Action Plans to coordinate program offerings with the statewide marketing efforts and to support the short and long-term goals of the ME&O program.

WE&T Integration

WE&T will provide classes, seminars, consultations, and demonstrations to support industrial customers (and their staffs).

Industrial education and training offerings will focus on large-scale manufacturing, processing and refining plant workers to encourage equipment, process, and whole system related energy efficiency projects. The intended audience for these events will include facility managers, energy managers, small facilities owners, and process engineers who are designing, building, analyzing, and maintaining food processing, manufacturing, and petroleum facilities.

WE&T will also collaborate with industrial programs and the large Commercial and Industrial (C&I) team to coordinate outreach to expand existing partnerships with water agencies, industrial conference organizers, industrial and manufacturers associations.

Emerging Technologies

The ETP's work on exploring opportunities for large-scale energy-saving measures is among the most important ways in which it supports the industrial sector. Additionally, the ETP provides important data on non-energy issues regarding industrial equipment, such as market readiness and economics. In addition, ETP collaborates with other utility stakeholders to explore innovative solutions such as meter-based verification, fault detection and diagnostics, targeted continuous energy improvements (CEI), and non-process technologies. In addition to bringing energy savings, these advancements can enable DR and IDSM strategies and help utilities meet legislative mandates, such as AB 802, AB 793, and SB 350.

Compared with other sectors, individual energy efficiency interventions in the industrial sector tend more frequently to be custom and offer greater savings, though they are more expensive to deliver and administer. These large, custom interventions provide an opportunity for the ETP to offer support through evaluating and advancing process measures, as well as supporting opportunities for deeper savings through CEI. CEI can achieve savings beyond simple equipment upgrades by utilizing ETP-vetted solutions like energy benchmarking software that can help with implementation of AB 802, as well as advanced monitoring and analytical systems that quickly pinpoint malfunctioning equipment.

Beyond CEI, the statewide ETP identified supporting the evolution of energy efficiency portfolios to be more solution-driven rather than purely technology-driven as a major long-term goal. To achieve this, the ETP will investigate advanced meter-based verification approaches, which directly measure energy savings of an equipment upgrade, rather than traditional methods, which typically could only offer an estimate based on field or laboratory testing. Thus, a meter-based approach offers utilities and industrial customers a more accurate picture of energy savings and can help identify problems in the installation process or if unexpected performance issues arise. Critical to this evolution is AB 802, which requires IOUs to count all savings that show up at the meter as decreased use, including savings achieved by process changes and maintenance.¹⁶¹

Moreover, when it comes to more traditional measures, the statewide ETP recognizes that equipment maintenance, downtime resulting from new equipment installation, and initial costs continue to be major drivers in industrial energy efficiency decisions. As a result, the ETP will continue to study both equipment performance and economics as part of the market assessment and field evaluation process. The ETP has a track record of successful interventions that helped bring energy efficiency solutions to this sector. Moving forward, SB 350 - which calls for a doubling of previous energy efficiency goals - will spur additional innovation and savings opportunities in these areas.

Codes & Standards

The Statewide Codes and Standards (C&S) Program saves energy on behalf of ratepayers by influencing standards and code-setting bodies, such as the California Energy Commission (CEC) and the Department of Energy (DOE), to strengthen energy efficiency regulations by improving compliance with existing C&S, assisting local governments to develop ordinances (reach codes) that exceed statewide minimum requirements. The C&S effort will also draw upon industrial customers, where applicable, into the code development in the early stages to advocate for codes and compliance-related matters.

Financing

Please refer to the Finance portion of the Cross-cutting chapter for more information on the CHEEF pilots as authorized in D.13-09-044. The industrial sector will have access to the nonresidential pilots, which will have on-bill, off-bill, credit enhancement, and non-credit enhancement features.

Integrated DSM

The integrated Demand-side Management (IDSM) encourages the integration of a full range of DSM options such energy efficiency, advanced metering, low income energy efficiency, distributed generation, alternate fuel vehicles. In short, IDSM is fundamental to achieving California's strategic energy goals, as presented in the CLTEESP. IDSM efforts will continue to

¹⁶¹ Cal. Public Utilities Code § 381.2(b) (2016)

identify and promulgate best practices, address implementation, and program policy issues across customer DSM programs. IDSM will specifically look for integration opportunities, identify integration barriers, and work with both program administrator and program implementer staffs to promote the advancement of integration, using lessons learned, and best practices to establish a continuous improvement process. Although, not a program, IDSM will help other DSM programs to integrate and compliment with each other facilitate a simple, effective DSM engagement with the customer.

Demand Response

The industrial sector business plan proposes to leverage emerging energy management technologies to assist customers in actively managing their energy remotely. This will include merging AMI technology with advanced energy efficiency and energy management technologies to permanently modify customer behavior, which will result in reliable energy efficiency savings and serve to support utility demand response activities. Where practicable in these efforts, SoCalGas will also partner with electric and water agencies with AMI technologies to provide a simple, one-touch efficiency and demand response experience.

Alternative Fuel Vehicles

In California, SB 350, codified in Public Utilities Code § 740.12(a)(1), states the following goal: “Advanced clean vehicles and fuels are needed to reduce petroleum use, to meet air quality standards, to improve public health, and to achieve greenhouse gas emissions reduction goals.”¹⁶² The industrial sector business plan proposes to increase awareness of natural gas vehicle options to serve the industrial sector transportation needs to significantly reduce NOx and GHG emissions. Consistent with SB 350’s goals to address barriers to access for low-income customers to zero-emission and near-zero-emission transportation options,¹⁶³ outreach efforts directed at industrial customers within disadvantaged communities will also emphasize the benefits and opportunities for natural gas vehicles supporting the industrial sector.

Statewide Implementation

SoCalGas will collaborate and coordinate with other program administrators on the effective implementation of any statewide program offerings. Programs designed to engage directly with specific market actors at the midstream and upstream market channels will be implemented on a statewide basis. Other downstream programs, beyond what is presented in the Business Plan, may also be considered candidates for statewide implementation.

Local Implementation

Local and regional solutions are necessary for the achievement of the industrial sector vision, goals, and objectives. Many of the current programs offered are done so in coordination with publicly-owned utilities (POUs). Such partnerships with POUs will continue at a local level. For

¹⁶² Cal. Public Utilities Code § 740.12(a)(1) (2015).

¹⁶³ See Clean Energy and Pollution Reduction Act of 2015, California Senate Bill 350. (2015). See Cal. Public Utilities Code § 25327(d).

example, SoCalGas has a strong partnership with the Los Angeles Department of Water and Power (LADWP), the largest municipality in the nation, to jointly design and deliver energy efficiency programs to a shared customer base. Such activities will continue to be implemented by the POU and/or implemented by SoCalGas-selected and managed third-party program implementers. SoCalGas will also work with other POUs to identify good program candidates to join statewide implementation efforts, where feasible.

IOU Program Implementation and Support

SoCalGas proposes to continue implementation of certain downstream programs (i.e., programs delivered directly to the customer) where it is reasonable and practicable to do so. SoCalGas will also continue to actively support the delivery of third-party programs. For example, customer services, such as incentive payments and inspections, will be provided by SoCalGas to support third-party program implementers and to safeguard ratepayer funds. For program efficiency, the customers will also be directed to the SoCalGas portal to maintain a simple, easy program participation experience for the customer. In addition, at times, it is more efficient and productive to leverage the natural relationship between SoCalGas and its customers. As the trusted energy advisor, SoCalGas has an ongoing relationship with its customers on all energy matters including energy efficiency. SoCalGas proposes to continue to promote energy efficiency programs to the customers and customer groups in order to improve the likelihood that customers will adopt energy efficiency.

I. Evaluation, Measurement & Verification (EM&V) Considerations

The industrial sector contains a wide variety of industrial customers with very unique and divergent ways they use energy. There has been limited research on each of the different segments and sub-segments within the industrial sector especially a deeper examination of the small and medium-sized customers who are classified under the industrial sector.

The industrial customer can benefit greatly from permanent changes in their energy usage. For instance, there are several maintenance and operational changes that can have a great impact in the amount of energy consumed by an industrial-based process. Estimating the impact of behavioral measures will be paramount to the near and long-term success in achieving the overall goal of the industrial sector.

Strategic Energy Management is an endeavor in which industrial customers will enroll in a multi-year program with the goal of moving from foundational (O&M, retrocommissioning) to advanced (capital projects) skills to realize long-term savings. This type of program has been highly successful at Energy Trust of Oregon, Bonneville Power Administration, and BC Hydro. The California IOUs are developing an implementation plan as well as drafting a California Industrial M&V Guide to meet the rigorous requirement to quantify savings. California plans to implement SEM once the program plan and M&V plan is vetted and approved. The goal for SEM is look beyond rebates or incentives of individual measures but instead, using a combination of workshop, activities, and facility-wide energy performance tracking to achieve persistent savings.

An Industry Standard Practice study (ISP) was completed in 2015. This is important as it informs what baselines to use to calculate energy savings. ISP is something that is always changing as technology evolves and therefore will need periodic updates.

During the 2016-2017 EM&V Roadmap update discussions, the IOUs also prioritized studies on pilot programs, HOPPs, identifying untapped potential, and conducting research on measuring net savings for custom projects.

The following are recommendations to improve the body of knowledge regarding the industrial sector.

Market Research and Process Evaluation:

- Conduct a market study to identify the unique segments within the industrial sector and to examine their unique characteristics and trends within their specific segment or sub-segment.
- Interview medium/large industrial customers to identify where program participation process can be simplified.
- Target small to large industrial customers to identify industrial customers' values relating to financing capital expenditures and energy efficiency. This research will seek to better understand barriers such as production delays for efficiency improvement and will explore customers' value proposition(s) for energy efficiency.

Load Impact:

- Use normalized metered energy consumption data to determine the overall impact of O&M and behavior measures as an enhanced approach to quantify energy savings. For this approach, energy savings are calculated as the difference between the normalized metered energy consumption for baseline and post-intervention time periods.

AGRICULTURAL CHAPTER

Agricultural Sector Snapshot

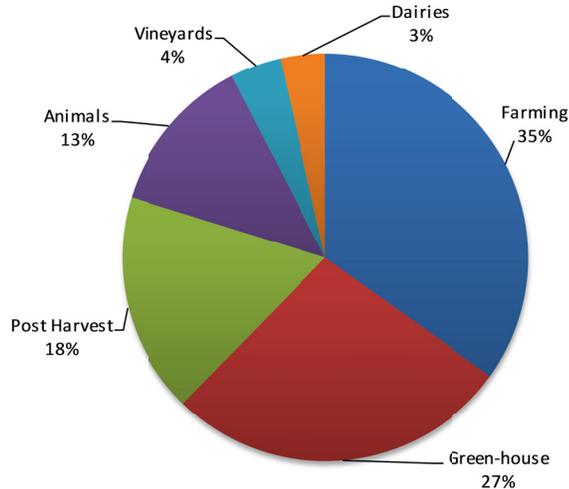
Agricultural Customers by the Numbers		2015 Totals	
Customer Count (Number of Customers)			
Animals		314	
Dairies		108	
Farming		825	
Greenhouse		159	
Post Harvest		474	
Vineyards		89	
Total of Segment		1,969	
Program Participation (% of total)			
Agricultural: Total # of Projects		21	
Agricultural Percentage		1.07%	
Animals		0.0%	
Dairies		0.0%	
Farming		0.4%	
Greenhouse		9.4%	
Post Harvest		0.6%	
Vineyards		0.0%	

	2010-2015		2015
	Average	Trends	Totals
Animals	8,124,672		8,835,318
Dairies	2,087,451		2,471,314
Farming	19,715,602		24,454,026
Greenhouse	17,383,639		19,138,291
Post Harvest	16,504,121		12,295,377
Vineyards	2,439,691		2,828,091
Sector Total	66,255,176		70,022,417

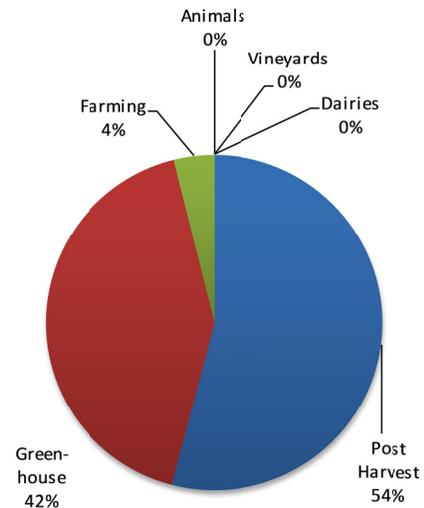
Energy Savings in Therms			
	Average	Trends	Totals
Animals	25,518		-
Dairies	360		-
Farming	224,433		36,827
Greenhouse	406,302		397,098
Post Harvest	135,315		511,015
Vineyards	14,962		-
Sector Total	806,890		944,940
Energy Savings as % of EE Portfolio	2.7%		3.7%

Notes:
 Program Participation is based upon non-consolidated figures.
 Sparklines represent 2010-2015 data. Green and Red dots identify low and high points respectively.
 Annual consumption and Customer Counts do not include electric generation (Non-PPPs) usage which accounted for 7,368,441 therms in 2015 - approximately 9.5% of all the natural gas used by agricultural sector customers.

2015 Agricultural Sector Natural Gas Consumption by Segment



2015 Agricultural Sector Energy Savings by Segment



A. Agricultural Sector Chapter Summary

SoCalGas' agricultural sector represents about 2% of the natural gas consumed by all customers. California agriculture is a \$54 billion industry that generates at least \$100 billion in related economic activity.¹⁶⁴ California's agriculture sector is diverse and robust, with each segment interlinked with the others in a network of common culture and commerce. Unlike the single crop monocultures of wheat and corn in the Midwest, the farmers and ranchers of California grow a multitude of crops – from alfalfa to zucchini – that provide the greatest agricultural bounty of any state in the country. Although energy is an important aspect of their business, the primary focus of the agricultural customers is on the health and yield of their crops.

Agricultural Sector Vision

Energy efficiency will support the long-term economic and environmental success of California agriculture.

SoCalGas services agricultural customers ranging from very small family farms to large commercial outfits, and include greenhouses, wineries, dairy farms, field crops, and more. The SoCalGas service territory encompasses the Lower San Joaquin Valley, Central Coast, and Southern California growing regions. Within this territory, SoCalGas has identified meaningful opportunities to change agricultural customer energy practices and behaviors to promote greater energy efficiency in agricultural segment-specific systems and processes. To realize the agricultural sector vision, SoCalGas has developed the following goals:

- Goal 1:** Substantial increase in deeper, more comprehensive natural gas energy efficiency in the small customer groups.
- Goal 2:** Encourage investment in natural gas energy efficiency to lower operational costs and improve competitiveness.
- Goal 3:** Increase in natural gas energy efficiency among all agricultural customer segments.

B. Approach to Achieve Agricultural Sector Goals

The agricultural sector business plan includes a combination of proven and newer program strategies coupled with new approaches to efficiently identify customers with the greatest energy efficiency opportunities using data analytics advancements enabled by SoCalGas' Advanced Meter Infrastructure (AMI). To encourage greater adoption of energy efficiency among all agricultural customer segments, SoCalGas will offer a simple, low-cost suite of

¹⁶⁴ California Department of Food and Agriculture. (2016). *California Department of Food and Agriculture: 97 Years protecting and promoting agriculture in the golden state*. Retrieved from <https://www.cdfa.ca.gov/CDFA-History.html>

strategies that are tailored to the unique customer characteristics of the agricultural sector. A targeted focus will also be applied to agricultural customers who operate in disadvantaged communities throughout the service area, which includes most rural communities.

The agricultural sector has a unique set of barriers that inhibit the customer attaining these goals and realizing greater levels of energy efficiency. Typically, multiple barriers co-exist in the same market as summarized in the identified challenges. SoCalGas has distilled these barriers into the following three sector challenges:

Challenge 1: A considerable number of small agricultural customers lack technical and financial resources.

Energy efficiency not a priority for small farms. While agricultural customers consider water and energy efficiency to an extent, the primary concern is the health and yield of their crops. Agricultural customers may select equipment based on the needs of the crop they are growing and thus will forgo systems that are more efficient because of the crop's needs.¹⁶⁵ For example, a rice grower requires high amounts of water and thus will continue to use flood irrigation practices as low-flow systems may hurt the crop or decrease the farmer's yield. Specific to wineries, the current drought in California has made it difficult to make it cost-beneficial to allocate capital for energy efficiency projects.¹⁶⁶ Water and irrigation projects are higher priorities. This issue affects all agricultural customers to some extent, but may be especially challenging for small farms given their already-constrained resources. Small farms are also particularly affected by the burdens of regulatory compliance.¹⁶⁷

Rising costs and competition. Rising costs and competition threaten small farm success. Rising production costs and increased competition from larger farms and from imported crops threaten small farm viability. Production costs including equipment costs, inputs, and regulatory compliance, can be higher for small operations that do not have the advantage of the economies of scale. Additionally, imported crops are threatening many California commodities and can especially undermine smaller farms that cannot hedge low margins with the profits from vertically integrated operations.

¹⁶⁵ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*, pp. xv-xvi. Retrieved from

http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

¹⁶⁶ Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Agriculture, CALMAC Study ID SCE0377.03*. Retrieved from

http://www.calmac.org/publications/MASI_Agriculture_Final_Report.pdf

¹⁶⁷ National Sustainable Agriculture Coalition. (2016). *Costs to farmers and consumers – Produce rule*. Retrieved from <http://sustainableagriculture.net/fsma/learn-about-the-issues/costs-to-farmers-and-consumers-produce-rule/>

Low natural gas costs deter large investments in energy efficiency. Smaller-sized customers tend not to pursue energy efficiency due to the limited gas bill savings.

Financing is a challenge. Small agricultural customers have very little natural gas energy efficiency potential. The small size of the investment may not meet or exceed current financing thresholds.¹⁶⁸

Challenge 2: The agriculture sector has competing priorities (i.e., production and product quality) which overshadow energy efficient investment opportunities.

Drought and dwindling water supply are a large concern. The dwindling water supply has caused food production, based on harvested acreage, to decline. In 2014, harvested acreage was 6.9 million acres, the lowest level in the past 15 years.¹⁶⁹ When faced with declining production, agricultural customers may be less inclined to prioritize energy efficiency over other investments that have the potential to boost production. Specific to wineries, the current multi-year drought in California made it increasingly difficult to make business cases to obtain capital allocation for energy reduction projects, with higher prioritization placed on water and irrigation projects.¹⁷⁰

Capital investments strain even large farms. Although large farms tend to have more capital to invest in efficiency opportunities than small farms do, the volume of equipment that large farms must replace can place cost constraints on their efficiency efforts, as well.¹⁷¹ This makes energy efficiency difficult to prioritize.

Seasonality. Farmers must consider production seasons. Seasonality is a characteristic that affects savings for agricultural customers. For some agricultural customers, such as the fruits and vegetable canning industry, savings can only occur during the facility's operating season. Furthermore, agricultural customers may be extremely time-constrained during the planting or harvesting seasons to plan and implement energy efficiency solutions.

Competing priorities. Production and quality are the highest priority for agricultural customers.¹⁷² While they consider water and energy efficiency to an extent, their concern is

¹⁶⁸ On-bill financing requires a \$5,000 minimum loan amount due to California lending laws.

¹⁶⁹ Cooley, H., Donnelly, K., Phurisamban, R., & Subramanian, M. (2015). Impacts of California's ongoing drought: Agriculture. *Pacific Institute*. Retrieved from <http://pacinst.org/publication/impacts-of-californias-ongoing-drought-agriculture/>

¹⁷⁰ Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Agriculture, CALMAC Study ID SCE0377.03*. Retrieved from http://www.calmac.org/publications/MASI_Agriculture_Final_Report.pdf

¹⁷¹ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*, pp. xv-xvi. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

¹⁷² *Id.* at 151.

the health and yield of their crops. Agricultural customers will select equipment based on the needs of the crop that they are growing and may not prioritize the efficiency of the equipment when considering purchases.¹⁷³ This may mean that agricultural customers will forgo systems that are more efficient because the crop requires more water to grow.

Movement towards mechanization. Because of decreased labor supply and increased labor costs, farms may need to improve labor efficiency by increasing mechanization.¹⁷⁴ Research into mechanized equipment and increased communication with agricultural customers provides the opportunity to influence equipment choice and promote alternate fuel vehicles, such as natural gas tractors, if a customer transitions to more automated processes.

Challenge 3: A diverse agricultural sector base makes it difficult to offer standard programs that fit the needs of all customers within and among segments.

Agricultural customer energy use varies greatly. The agricultural sector customers are very diverse in their business operations and how they use natural gas.¹⁷⁵ The customer diversity creates challenges to positioning gas energy efficiency in the market as customer perceptions and energy usage vary greatly.

Integrated farms. Some agricultural facilities integrate agricultural, commercial, and residential activities. For example, the integrated nature of agricultural, commercial, and residential activities within fruit, tree nut, and vine crop operations lends itself to a program design that can offer measures for all three types of energy profiles.¹⁷⁶ Therefore, energy efficiency programs may need to address a wide variety of end uses and consumption patterns from a single source.

No holistic approach to efficiency. While individual energy-efficient equipment may help to manage costs, many growing systems for agricultural customers are complex and may not benefit from limited optimization of individual elements. By offering agricultural energy audits and designing a systems approach to agricultural incentives, program offerings have an opportunity to overcome both the barriers of first cost while promoting a holistic approach to energy savings.¹⁷⁷

Limited sharing of energy efficiency information. Unlike other nonresidential sectors, the customers within various agricultural segments have a natural connection to each other and most agricultural segments have very well established industry associations.¹⁷⁸ However, there

¹⁷³ *Id.*

¹⁷⁴ *Id. at 33.*

¹⁷⁵ *Id. at 191, 201.*

¹⁷⁶ *Id. at 9.*

¹⁷⁷ *Id.*

¹⁷⁸ *Id. at 16.*

is still limited information regarding energy efficiency opportunities shared through many of these industry stakeholders. Greater levels of engagement, such as partnering, with key industry stakeholder groups can be very influential upon the customer’s energy-efficient behaviors and decision-making.¹⁷⁹

Limited cost-effective energy efficiency technologies inhibit customer action. There are few cost-effective energy efficiency measures available to agricultural customers.¹⁸⁰ Greater focus on the technology needs of various customer segments is needed.

Lack of comprehensive industry-specific information. Despite individual reports that various groups have conducted over the years, the agricultural industry still lacks a comprehensive database of individual producers in the market, and their respective on-farm equipment components. The lack of a comprehensive database makes it difficult to establish industry baselines, to identify market trends, and to maintain communication with agricultural customers.¹⁸¹

Desired Outcome

The sector business plan identifies key milestones in the advancement towards a permanent market effect¹⁸² through a set of desired sector outcomes. In many cases, the desired outcome is expected well beyond the near- and mid-term planning horizon, and ties to the 10-year vision for the sector. The Business Plan identifies the corresponding program intervention strategies that will be deployed to reduce the market barriers that will result in the desired sector outcome, shown in Table 1 below.

Table 1 - Desired Outcome	
10-year Vision: Energy efficiency will support the long-term economic and environmental success of California agriculture.	
Challenges	Desired Outcome
A considerable number of small agricultural customers lack technical and financial resources.	Substantial increase in deeper, comprehensive natural gas energy efficiency savings from smaller-sized customers.
The agricultural sector has competing priorities, which may overshadow energy efficiency.	Increase investment in natural gas energy efficiency to lower operational costs and improve competitiveness.

¹⁷⁹ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01, pp. 16 and 99.* Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

¹⁸⁰ *Id.* at 55.

¹⁸¹ *Id.* at 191.

¹⁸² Navigant Consulting, Inc. (2015, September 25). *Energy Efficiency Potential and Goals Study for 2015 and Beyond.* Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4033>

Table 1 - Desired Outcome	
10-year Vision: Energy efficiency will support the long-term economic and environmental success of California agriculture.	
Challenges	Desired Outcome
A diverse agricultural sector base makes it difficult to offer programs that fit the needs of all customers.	Substantial increase in natural gas energy efficiency savings among all agricultural segments.

The following metric targets allow SoCalGas to continuously track the agricultural sector progress towards achieving these goals:

- Goal 1: Metric Target** – Increase natural gas savings from smaller-sized customers by 15% over 2015 levels by 2025.
- Goal 2: Metric Target** – Increase participation in energy efficiency programs by 15% over 2015 levels by 2025.
- Goal 3: Metric Target** – Increase natural gas savings from agricultural sector by 15% over 2015 levels by 2025.

Agricultural Sector Budget

To facilitate the achievement of the agricultural sector goals, SoCalGas will rely on a coordinated combination of existing and new program intervention strategies. Table 2 contains the agricultural sector budget for the 2018-2025 timeframe.

Table 2 – Sector Budget (\$000s)										
Sector	2016*	2017*	2018	2019	2020	2021	2022	2023	2024	2025
Industrial	\$5,296	\$3,618	\$3,618	\$4,471	\$4,539	\$4,608	\$4,679	\$4,751	\$4,825	\$4,901

*2016 and 2017 are shown for historical purposes.

Table 3 contains the net therm savings forecast for the 2018-2025 timeframe, based on the 2015 Potential and Goals Study and the AB 802 Technical Analysis.

Table 3 – Annual and Cumulative Net Savings (MM Therms)										
Savings	2016*	2017*	2018	2019	2020	2021	2022	2023	2024	2025
Annual	1.07	0.98	0.98	1.46	1.47	1.48	1.49	1.50	1.51	1.52
Cumulative	-	-	0.98	2.43	3.90	5.38	6.86	8.09	9.20	10.31

*2016 and 2017 are shown for historical purposes. The number reflects net energy savings from compliance filings.

Table 4 presents annual and lifecycle gross emissions avoided forecast for 2018-2020 for agricultural sector programs.

Gross Emissions Avoided	CO ₂ (tons)	NOx (lbs)	PM-10 (lbs)
Annual	43,633	68,600	43
Lifecycle	700,874	1,102,133	216

Table 5 shows the near-term cost-effectiveness for the agricultural sector.

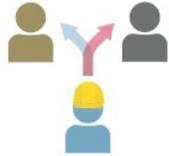
Sector	TRC	PAC
Industrial	1.97	3.30

C. Overview of New Program Strategies and Tactics

In addition to proven program strategies, SoCalGas will incorporate new program strategies and corresponding program tactics to arrive at a complete energy efficiency solution set for the agricultural customer. The proven and new program strategies are further detailed in the Program Intervention Strategies section. These offerings will be introduced to the customers over time and may be withdrawn and retooled to adapt to dynamic market changes and modifications to regulatory program policies. The new program approaches and the proposed implementation timeframe are summarized in Table 6 below.

Program Intervention Strategy	Descriptions	Tactics	Timing
Partnering 	Limited-partnership arrangements, deployed on an as needed basis that are intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model based on equitably sharing of customer incentives and administrative costs among partners.	<ul style="list-style-type: none"> • Utility partnering • Industry partnering 	Near, Mid-term

Table 6 - New Program Strategies

Program Intervention Strategy	Descriptions	Tactics	Timing
Intelligent Outreach 	To assist customers in identifying the greatest energy efficiency opportunities, improve cost efficiency in program delivery, segment-specific benchmarking and provide deeper, comprehensive energy savings solutions.	<ul style="list-style-type: none"> • Data Analytics • Virtual Energy Audits • Energy Mgmt. Technologies • Industry Best Practice Sharing • Small Agricultural Outreach 	Near, Mid-term
Customer Incentives 	Facilitates customer choice by offering a simplified suite of financial incentives strategies to customers to reduce the high first cost barrier, the key market barrier for most customers.	<ul style="list-style-type: none"> • Pay-for-Performance • Bundled Measures 	Near-term
Strategic Energy Management 	Provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the production line to corporate management.	<ul style="list-style-type: none"> • Pay-for-Performance • Modified Savings Analysis • Use of AMI Data • Cross-Promotion • Meter Large Projects 	Near-term
Direct Install 	The direct install program strategy, including a comprehensive component, that delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for multi-family properties.	<ul style="list-style-type: none"> • Standard Direct Install • Comprehensive Direct Install 	Near-term
Midstream Energy Efficiency 	Provides deemed incentives to manufactures and distributors to reduce the retail cost of natural gas energy efficiency equipment, promote stocking of energy efficient equipment and inform customers at the distributor level.	<ul style="list-style-type: none"> • Midstream Incentives • Distributor Training 	Near-term
Financing 	The Agricultural Financing program strategy relies on various financing vehicles including on/off bill repayment solutions to encourage customers to adopt deeper, more comprehensive energy efficiency solutions.	<ul style="list-style-type: none"> • On-bill Repayment 	Near-term

*Note: Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years.

D. Agricultural Sector Market Characterization

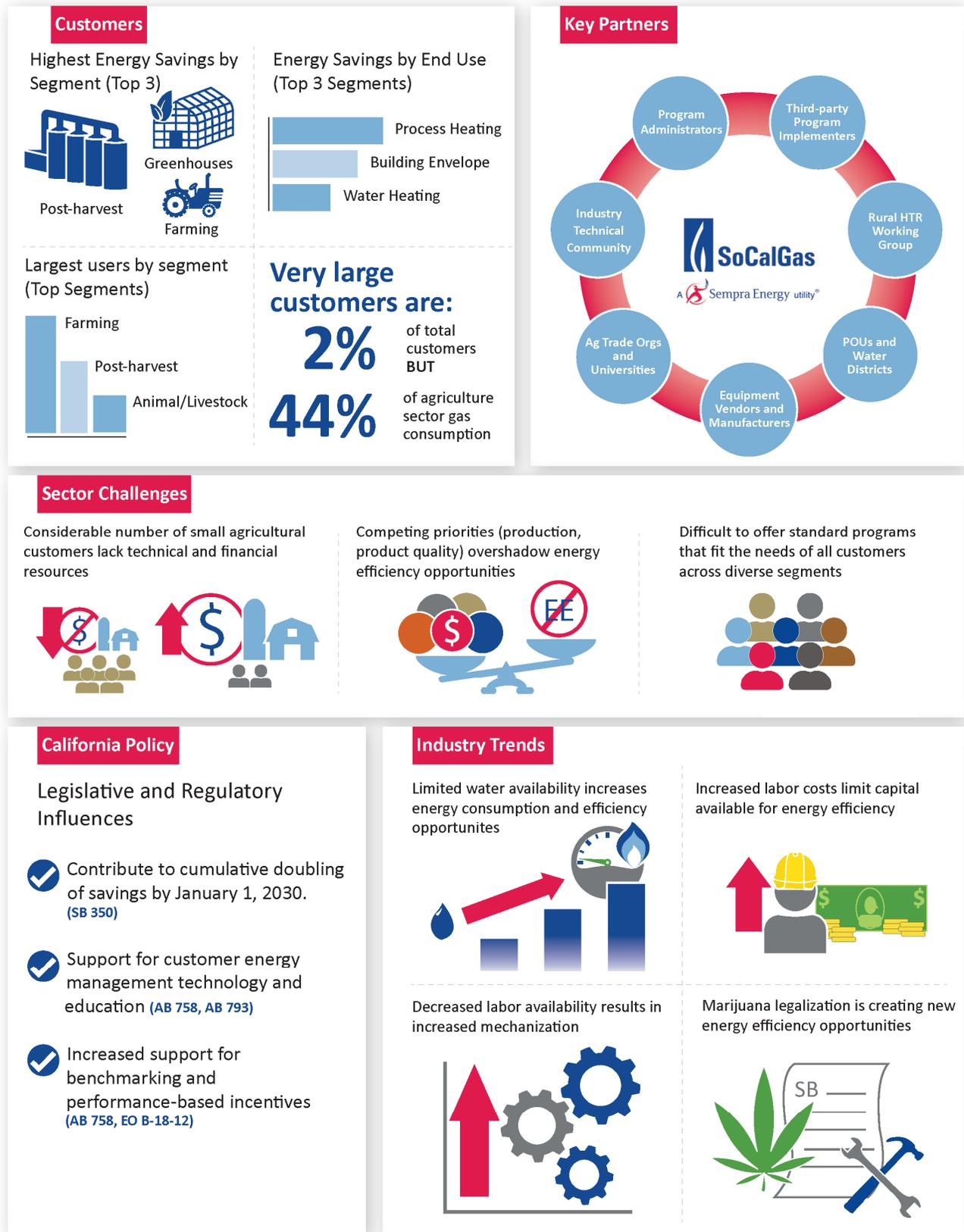
The agricultural sector represents several unique customer segments that vary in size and type of operations. Emerging market trends in this sector represent the biggest potential for natural gas energy efficiency in the coming years.

The key characteristics of the agricultural sector include:

- California's agricultural sector is a \$54 billion industry that generates at least \$100 billion in related economic activity;
- Diverse and robust customer segments with each segment interlinked with the others in a network of common culture and commerce;
- Primary focus of the agricultural customers is on the health and yield of their crops;
- Small number of large customers who consume the vast majority of natural gas;
- Very large geographical area, typically in rural communities with limited access to energy efficiency products and services; and
- Low natural gas usage in many agricultural customer segments.

This section provides an overview of the agricultural market in the SoCalGas service territory with respect to farm size, segment type, annual energy use, energy savings, and remaining energy efficiency potential.

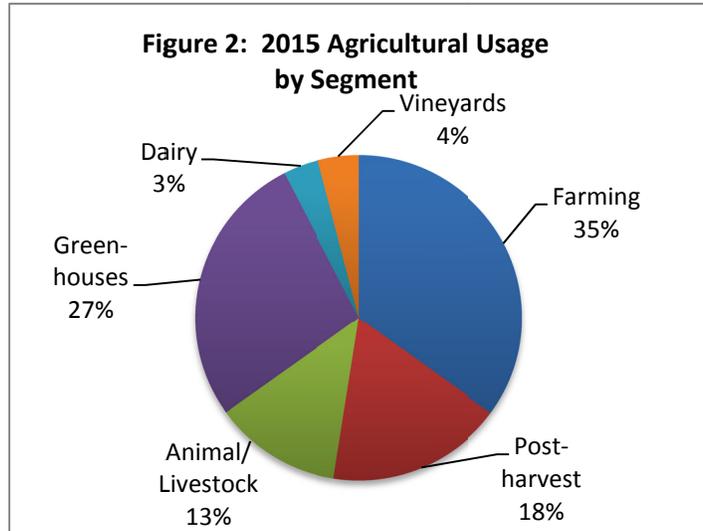
Figure 1
Agricultural Sector - Market Characterization



Agricultural Sector Segmentation by NAICS

Six North American Industry Classification System (NAICS) segments define the SoCalGas agricultural sector: Farming, Post-Harvest, Animal/Livestock, Greenhouses, Dairy, and Vineyards. Some agricultural customers may conduct on-site post-harvest processing, but any off-site food processing facilities are classified as an industrial account.

SoCalGas categorizes customers within the agriculture sector by consumption, as revenue data for all agricultural customers are not available to the utility. Natural gas consumption is an imperfect indicator of farm size because larger agricultural outfits may not necessarily consume a proportionately large amount of natural gas. However, the large number of small agricultural customers by consumption mirrors the large number of small agricultural customers by revenue.



SoCalGas agricultural customers are identified by NAICS codes that correspond to operations with crop or animal production, i.e., “farms.” Natural gas usage in 2015 by NAICS code (segment) is shown in Figure 2; farming accounts for the highest portion of gas usage in the SoCalGas agricultural sector. This segment is loosely defined by the NAICS code as crop production which does not fall into the more specific segments of greenhouse or vineyards.

Agricultural Account Segmentation by Number of Customers

While some agricultural operations in the SoCalGas service territory are large, commercial-scale operations, many SoCalGas agricultural customers represent small farms. The United States Department of Agriculture uses a variety of classifications to distinguish among types and sizes of farms. One of the determining characteristics is revenue. Small and intermediate-sized farms are typically considered family and/or residential farms with annual revenues below \$250,000, whereas farms above this revenue threshold are considered commercial farms. According to an article from the University of California Agriculture Journal, more than 90% of California’s food and fiber is grown on roughly 19,000 nonresidential farms with revenues above \$100,000.¹⁸³ The rest is grown by approximately 62,000 small or residential farms. While the smaller farms may be overshadowed by the larger ones, their volume greatly impacts the rural economies in the state as they produce more than \$1 billion in annual sales, pay about 38% of agriculture’s property taxes, and own roughly one-third of the State’s farm machinery. These factors make small farms an important segment in California’s agriculture sector.

¹⁸³ Stumbos, J. (1993, March 1). Small farmers: Who are they and why do they matter? *California Agriculture* 47(2): 6-7. Retrieved from <http://calag.ucanr.edu/Archive/?article=ca.v047n02p6>

Table 7 shows the distribution of customers and their usage by customer size. These small and very small customers who use less than 10,000 therms annually accounted for approximately 61% of SoCalGas’ agricultural customers but their combined consumption was only 3.4% total agricultural gas usage in 2015.

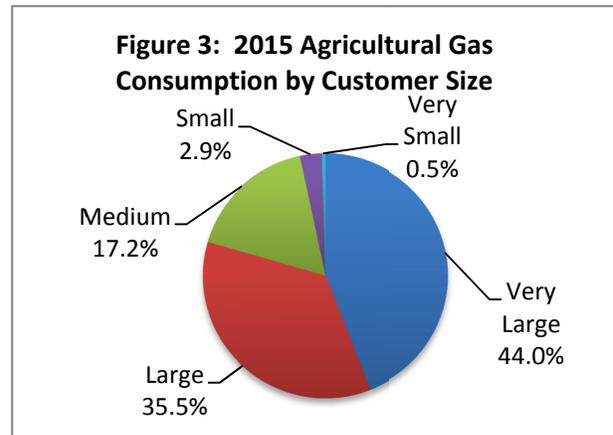
Table 7 - Energy Consumption by Customer Size (does not include electric generation and cogeneration)		
Customer Size (therms/year)	2015 Number of Customers	2015 Usage MM Therms
Very Large (>250k)	40	30.8
Large (50k-250k)	240	24.8
Medium (10k-50k)	485	12.0
Small (2k-10k)	377	2.0
Very Small (<2k)	827	0.4
Total	1,969	70.0

Agricultural Sector Energy Usage

In 2015, SoCalGas agriculture customers consumed approximately 70 million therms, as shown in Table 7. The total agricultural sector usage represents approximately 2% of the total SoCalGas usage and less than 4% of the total nonresidential customer load.

Usage by Customer Size

Figure 3 shows that 44% of natural gas consumed by SoCalGas’ agricultural customers is used by a few large accounts that make up approximately 2% of all agricultural customers (see Table 4). As noted earlier, the small and very small-sized agricultural customers used only 3.4% of the natural gas consumed in 2015 but accounted for roughly 61% the customers in this sector.

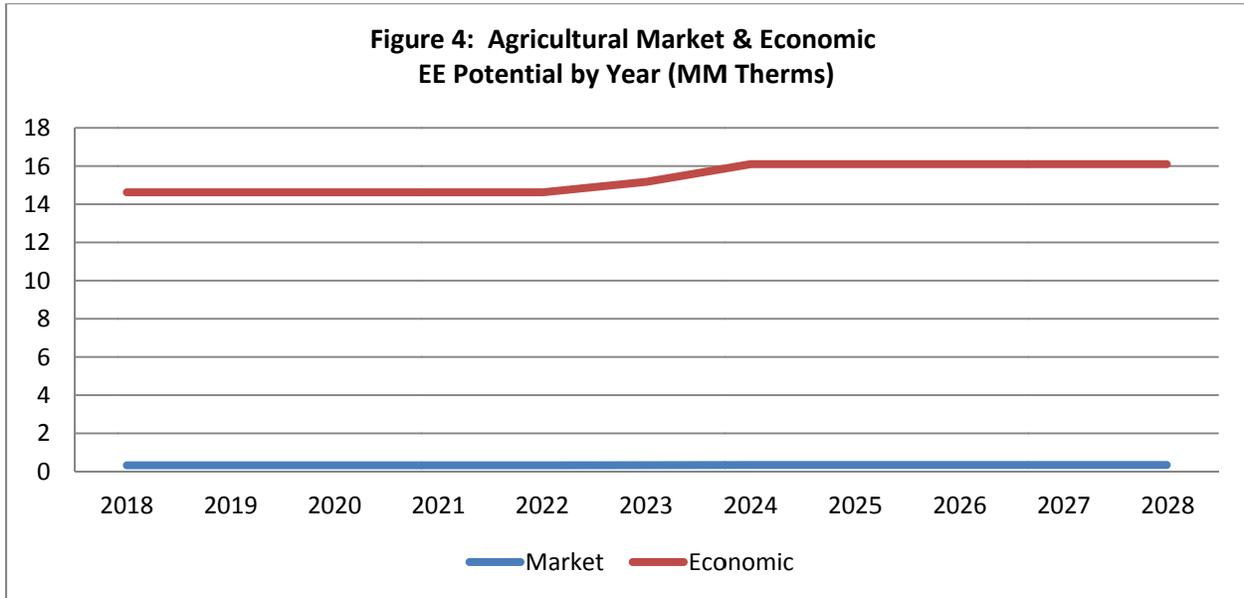


Market & Economic Energy Efficiency Potential

The estimated market and economic energy efficiency potential, by year, is shown in Figure 4.¹⁸⁴ The SoCalGas agricultural sector gap analysis indicates that agricultural energy efficiency

¹⁸⁴ Navigant Consulting, Inc. (2015, September 25). *Energy Efficiency Potential and Goals Study for 2015 and Beyond, Stage 1 Final Report*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4033>

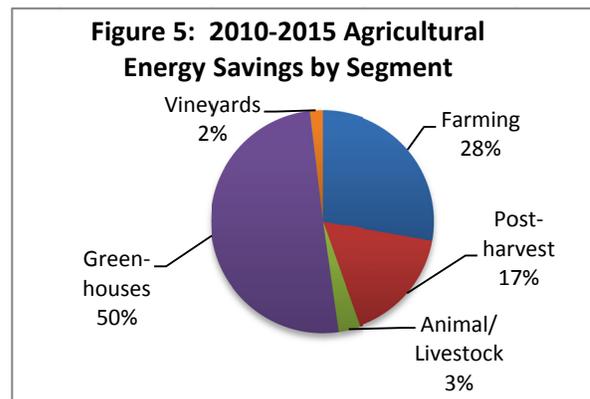
market potential lies between 0.7 and 0.8 million therms annually from 2018 and 2028. Some specific areas identified as potential applications for energy efficiency program interventions include system-level solutions, such as system optimization services and water pumping as well as conveyance and drip irrigation. In addition to the measure and applications where there may be market potential, specific market sub-segments may be targets for energy efficiency programs in the coming years.



Historical Sector Performance

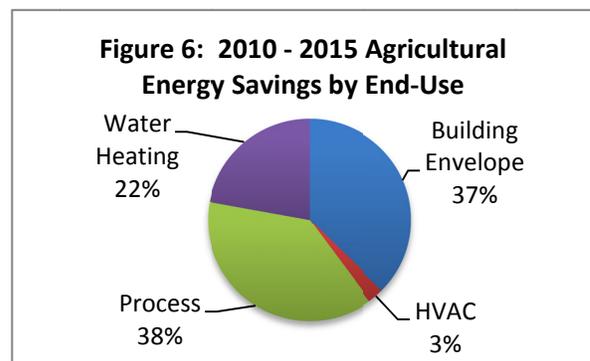
Segment

In 2015, the agricultural sector accounted for almost 4% of the total energy savings. From 2010 to 2015, SoCalGas’ agricultural sector saved approximately 4.8 million therms of gas, approximately 2.7% of the total portfolio savings for that time period. As shown in Figure 5, the greenhouse segment accounted for the largest portion of agricultural sector program energy efficiency savings representing about 50% of total agricultural sector gas savings. The farming and post-harvest segments also accounted for considerable energy savings during the same time period.



End-Use

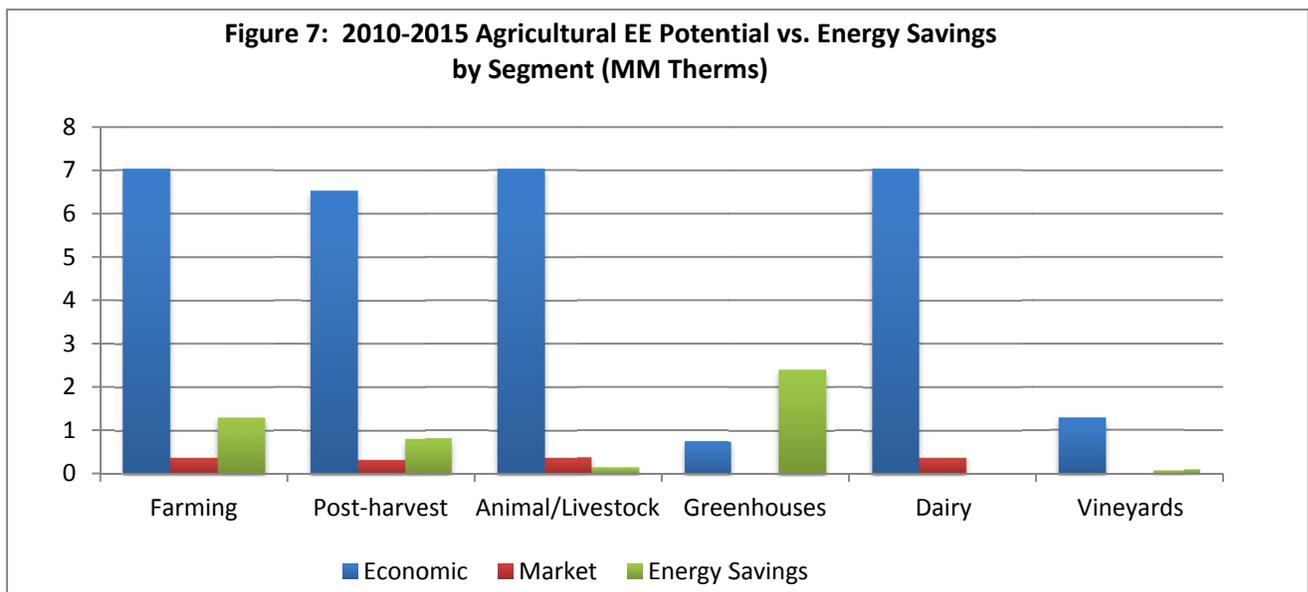
Figure 6 depicts the total energy savings from the agricultural sector by end use. The process



heating measures represented the largest energy savings by end use, followed closely by building envelope measures. The majority of energy savings was attributed to the Agricultural Calculated Incentives program.

Energy Efficiency Potential & Realized Energy Savings

A comparison of market potential with realized energy savings, by NAICS segment, is shown in Figure 7. The realized energy savings are greater than the market potential for the farming, greenhouse, and post-harvest segments while the realized energy savings are lower than the market potential in the animal/livestock segment. In contrast, dairy and vineyard segments show potential for energy savings, but still have low participation rates.



Energy Efficiency Equipment Sales Share

Due to the diverse segments within the agricultural sector, there is no common equipment used across the sector. However, similar equipment is common within each of the segments within the agricultural sector. Market adoption levels of energy efficiency equipment vary among segments and equipment. In the greenhouse segment, the primary energy efficiency equipment, heat curtains and infrared film, have achieved significant (38%)¹⁸⁵ market adoption levels. In contrast, the post-harvest segment uses the same energy efficiency equipment but market adoption levels are still very low (<1%).¹⁸⁶ To increase the purchase of energy efficiency

¹⁸⁵SoCalGas Data

¹⁸⁶Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*, p. 191. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

equipment to realize the permanent market effect, SoCalGas will place a heavy focus on increasing market adoption of energy efficiency equipment where market adoption is low.

Key Market Actors

There are key market actors that can assist increasing market adoption of energy efficiency equipment by transforming the market through the various program and policy intervention strategies. The market actors include equipment vendors and manufacturers to assist in permanently modifying equipment stocking habits as well as customer perception and acceptance of energy efficiency equipment. Other market actors include influential industry associations and universities that can inform and influence specific-customer segments within the agricultural sector. With significant levels of regulation applied to this industry, partnering with various regulators to encourage deeper and more comprehensive energy efficiency will be needed.

Industry Trends

Key trends in the agricultural market within SoCalGas' service territory include:¹⁸⁷

Water. The agricultural sector faces significant water issues. Water availability is a very large concern for growers because of persistent drought conditions in California. Because of the limited water availability, there has been an increase in water pumping. As various segments use different water management approaches, energy management solutions can play an integral role in efficient use of energy and water.

Labor. The sector is experiencing a decreased labor supply and, as a result, an increase in labor costs. The increased labor costs severely limit the agricultural customer's ability to invest in more energy efficient equipment and processes.

Mechanization. Increases in labor costs and a reduced labor pool are moving the industry to more mechanized solutions. These trends will cause an increase in energy consumption and greenhouse gas (GHG) emissions.¹⁸⁸ As various segments shift to automation and to different water management approaches, energy management solutions can play an integral role in reducing energy, water, and GHG impacts. In addition, various alternate fuel vehicle options, including natural gas tractors and heavy-duty trucks, may be well suited to meet the mechanization movement to help further mitigate and/or avoid GHG impacts.

Imported Crops. Imported crops are threatening many California commodities and can especially undermine smaller farms that cannot hedge low margins with the profits from vertically integrated operations. Working with smaller farmers to capture energy efficiency solutions will help their competitive positions. Increasing competition from international

¹⁸⁷ *Id.*

¹⁸⁸ Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Agriculture, CALMAC Study ID SCE0377.03*, pp. 44-45. Retrieved from http://www.calmac.org/publications/MASI_Agriculture_Final_Report.pdf

markets has created uncertainty in the market, and has caused some farms to be increasingly cost-conscious and risk averse. This is a current concern in California's greenhouse and nursery segment as it is increasingly facing competition from other markets, particularly from South American growers.

Increased Energy Consumption. Although the agricultural sector represents about 5% of the natural gas load annually, there are current trends in various agricultural segments where increases in natural gas consumption are likely to occur. Among the varied agricultural segments, the industry continues to adapt in response to changes in crops, market demand, competition, technologies, production costs, and regulations. This means that energy efficiency programs must also be quick to adapt and adjust offerings and services to suit the needs of this market. Another trend in that could lead to increased energy consumption is the movement of crops that farmers previously grew outdoors into the greenhouse segment. This is mostly driven by pests that increasingly harm crops such as tomatoes. The 2012 USDA Agriculture Census data supported this trend for tomatoes, having shown a 12% decrease in acres of tomatoes grown in the open from 2007-2012, with a 41% increase in square footage of tomatoes grown in greenhouses during the same period.¹⁸⁹

Urban¹⁹⁰ and Peri-Urban¹⁹¹ Farming. Several sub-segments and technologies may present opportunities to introduce energy efficiency solutions within the agriculture market. New trends in farming, such as farm-to-table and urban or peri-urban farming place a high priority on local and sustainable produce, as well as community connections. For example, the greenhouse and nursery segments are an important and expanding component in California's agricultural market, and are the largest natural gas consumers within the agricultural sector. These trends create opportunities for significant water efficiency, GHG mitigation due to reduced transportation costs, and an increase in crop production and quality. Conversely, these trends will increase the energy intensity within these segments. Timely and effective energy efficiency program intervention strategies can significantly reduce the increases in energy consumed while creating an opportunity for farms to market themselves as "green" and sustainable as well as contributing to the well-being of the community.

Legalization. Another potential new sub-segment in California may be created by the passage of California's Proposition 64 which approved of a regulated, legal marijuana system for adult recreational use at the State level. California's current medical marijuana legalization already

¹⁸⁹ Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Agriculture, CALMAC Study ID SCE0377.03*, pp. 44-45. Retrieved from http://www.calmac.org/publications/MASI_Agriculture_Final_Report.pdf

¹⁹⁰ Refers to small areas (e.g. vacant plots, gardens, verges, balconies, containers) within the city for growing crops and raising small livestock or milk cows for own-consumption or sale in neighborhood markets.

¹⁹¹ Refers to farm units close to town which operate intensive semi- or fully commercial farms to grow vegetables and other horticulture, raise poultry and other livestock, and produce milk and eggs.

represents about 50% of the legal cannabis market in the United States.¹⁹² An examination of the fledgling marijuana industry will help identify energy efficiency opportunities. For example, growing may move quickly from indoor greenhouses to large crop production, avoiding the need for efficient greenhouse solutions. Partnering with industry associations (e.g., National Cannabis Industry Association) may help incorporate energy and water efficiency throughout the different agricultural processes (e.g., growing, harvesting, processing, etc.). However, continued conflict between state and federal laws regarding the legalization of marijuana may prohibit ratepayer-funded energy efficiency assistance for an industry not recognized at the federal level.

Legislative Impacts on Strategy

There are a number of newly adopted legislative bills providing specific guidance for the future of energy efficiency in California. From Senate Bill (SB) 350 to Assembly Bills (AB) 793 and 802, there are numerous directives that are helping to shape the next generation of energy efficiency program offerings. SB 350 sets forth a goal to double the levels of energy efficiency in California by 2030. A summary of the recent legislation along with SoCalGas’ proposed program strategies to address these directives is shown below.

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Agricultural Sector Customer		
Policy Drivers	Guidance	Response
SB 350 – Clean Energy and Pollution Reduction Act of 2015	Achieve a cumulative doubling of savings in electricity and gas retail customer’s final end uses by 2030.	SoCalGas will deliver a customer-friendly suite of energy efficiency program intervention strategies structured to significantly increase energy efficiency levels within the agricultural sector.
AB 793 – Energy Management Technology Incentive Offering	Must develop programs that provide incentives to help residential and small/medium business customers acquire energy management technology and educate them about these programs.	SoCalGas will offer EMT tactics to agricultural customers to enable consumer-friendly, on-going virtual communication that will allow customer to continuously monitor energy consumption within their buildings. This will empower customers to permanently modify their behavior.

¹⁹² National Cannabis Industry Association. (2015, November 17). *Top 5 states to watch in 2016*. Retrieved from <http://3h3hg1lvfpa2qxgq62uw69x.wpengine.netdna-cdn.com/wp-content/uploads/2016/03/Top5StatestoWatchin2016.pdf>

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Agricultural Sector Customer		
Policy Drivers	Guidance	Response
AB 758 - Existing Buildings Energy Efficiency Action Plan	<p>Strategy 4.1.2 - Develop and compile information on building life-cycle and/or building occupant tenure cost reductions for energy and water efficiency measures.</p> <p>Strategy 3.4.2 – Identify building/business types well-suited for ZNE retrofits but where current ZNE guidance is scarce.</p>	<p>As part of the Intelligent Outreach and Homeowner Resale program strategies, SoCalGas will promote customer understanding of energy efficiency benefits associated with retrofits and permanent behavior changes. SoCalGas will also partner with water agencies to support such endeavors. SoCalGas will partner with various public sector agencies to promote a pathway to ZNE by improving the efficiency of gas end-use technologies.</p>
AB 802 - Benchmarking and Changes to Energy Efficiency Baselines	<p>Benchmarking - By January 1, 2017, for multi-unit buildings, utilities must provide aggregated energy usage data to its owner, its agent or the building operator. Commission will set requirements for public disclosure of information for benchmarking purposes.</p> <p>Baselines - Authorizes utilities to provide incentives to customers for energy efficiency projects based on normalized metered energy consumption as a measure of energy savings.</p>	<p>Through the Intelligent Outreach program strategy, promotion of tactics such as data sharing will provide usage data to the customer to support benchmarking activities. Program offerings such as pay-for-performance will encourage both energy efficiency retrofit and behavioral changes through incentives based on NMEC as of estimate of energy savings, where feasible.</p>

The Commission has also issued guidance to program administrators on how to further formulate the energy efficiency business plans. In response, SoCalGas has reshaped existing program strategies and added new ones to meet these specific directives. The recent legislative and regulatory directives along with SoCalGas’ proposed program strategies to address these directives are detailed in Appendix A.

E. Goals, Strategies and Tactics for the Agricultural Sector

The following goals are supported by sector-level strategies that will be delivered through a full suite of program intervention strategies. Specific program tactics will be deployed within program intervention strategies. The following are a set of goals and the corresponding sector strategies.

Goal 1: Substantial increase in deeper, more comprehensive natural gas energy efficiency in the small customer groups.

Sector Strategy: To capture additional energy savings among smaller-sized agricultural customers, SoCalGas will efficiently identify customer facilities with high energy efficiency potential to achieve substantial increase in deeper, comprehensive natural gas energy efficiency. In recognition that smaller-sized customers consume energy like other customer types, SoCalGas will promote a full range of measures, as part of an integrated program (residential, commercial, and agricultural) rather than focus solely on agricultural processes. Also, there are key industry stakeholders that have significant influence with this sector and with this customer group; SoCalGas will partner with University of California's Cooperative Extension Service, industry associations and equipment vendors to promote energy efficiency equipment, process and programs to various segments (e.g., fruit and nut trees). Through the financing program intervention strategy, SoCalGas will collaborate with financial market actors to enhance financing options for small agricultural customers and to promote existing financing vehicles available.

Goal 2: Encourage investment in natural gas energy efficiency to lower operational costs and improve competitiveness.

Sector Strategy: As customers shift to mechanized process solutions to improve and expand production, SoCalGas will provide information on energy efficient equipment to growers and vendors.¹⁹³ For example, SoCalGas will help educate farmers regarding life-cycle costing of energy efficiency equipment purchases. Also, SoCalGas will take this opportunity to make customers aware of other demand-side management programs that can provide them options for alternate fuel vehicles to help mitigate future GHG emissions. SoCalGas will also work with customers on segment-specific solutions. For instance, the expanding greenhouse segment that provides growers with improved quality and production also affords them significant water efficiency solutions.¹⁹⁴ In this segment, SoCalGas and implementers will demonstrate and promote efficient equipment as well as energy management systems through partnership strategies with water districts. To help customers to consider energy efficiency into their operational decision-making, SoCalGas will develop segment-specific energy metrics (and corresponding benchmarks) as part of growers' overall sustainability efforts in collaboration with industry associations.

¹⁹³ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*, p.9. Retrieved from

http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

¹⁹⁴ *Id.*

Goal 3: Increase in natural gas energy efficiency among all agricultural customer segments.

Sector Strategy: SoCalGas will create simplified program engagement to support significant increases in the efficiency natural gas use by all customer segments through improved customer platforms (e.g., web portals, apps) and simplified program requirements to facilitate ease of program participation. Also, SoCalGas will educate agricultural customers on energy and operational benefits and encourage customers to install energy efficiency equipment and adopt operations and maintenance (O&M) actions to increase measurable energy efficiency. Enabled by data analytics, SoCalGas will create industry benchmarks for individual segments (industry type, customer size) to inform and demonstrate energy efficiency benefits to specific customer segments. Also, analytics will be applied to efficiently identify facilities with higher energy efficiency potential and provide tailored energy assessment to lead customer to make permanent behavioral changes and to promote energy-efficient equipment purchases. Also, through partnering, SoCalGas will collaborate with industry to identify emerging natural gas technologies and to increase adoption levels of those energy efficiency technologies.

Program Intervention Strategies

To realize the desired sector outcomes (i.e., sector goals), several coordinated and integrated program intervention strategies will be deployed throughout the various market channels to increase customer energy efficiency adoption levels. This will support the achievement of increases in the adoption of energy efficiency products and behavioral practices. It is planned that these program intervention strategies will be offered in tandem to the customer to enable freedom of choice based on the individual customer's preferences. To support an adaptive program portfolio, incentives levels will vary throughout a program's lifecycle in response to customer reaction or inaction (e.g., higher equipment costs, lower perceived energy efficiency-related benefits). Due to the limited natural gas usage among customers within this sector and the need to simplify customer engagement in the delivery of demand-side management (DSM) programs, SoCalGas proposes to coordinate program delivery with other local utilities (electric, water), where practicable. This will allow for a single, streamlined customer engagement and will empower the customer to implement a holistic energy (and water) efficiency plan.

In certain instances, an agricultural customer may behave in manner like those in other sectors at different times throughout the year.¹⁹⁵ For example, an agricultural customer may also act as a residential and commercial customer in a shared facility depending on the varied growing seasons. In those instances, strategies from various sectors will be offered to these multi-dimensional customers in a coordinated approach.

¹⁹⁵ *Id.*

Figure 8

Agricultural Sector Strategies will leverage program intervention strategies to achieve goals and realize the 10-year vision

Vision Statement

Energy efficiency will support the long-term economic and environmental success of California agriculture.

Goal 1

15% increase in deeper energy efficiency savings from small customers by 2025

Goal 2

15% increase in participation in energy efficiency programs by 2025

Goal 3

25% increase in energy efficiency savings from agriculture sector by 2025

Program Intervention Strategies



Partnering



Intelligent Outreach



Technical Assistance



Customer Incentives



Strategic Energy Management



Direct Install



Midstream Energy Efficiency



Financing

Goal 1 Strategies

- Use data analytics to target outreach to small customers
- Offer full range of measures to small customers
- Partner with Cooperative Extension, industry associations, vendors on outreach
- Collaborate with agriculture financiers

Goal 2 Strategies

- Educate customers on equipment lifecycle costs and energy efficiency equipment benefits
- Raise customer awareness of other DSM programs
- Offer segment-specific solutions for water and energy savings
- Develop segment-specific benchmarking and metrics

Goal 3 Strategies

- Create simple, easy program engagement through updated platforms
- Educate customer on sector-specific, measurable O&M energy efficiency options and benefits
- Tailor segment-specific assessments to make permanent energy efficiency behavior changes and identify energy efficiency equipment
- Collaborate with industry to increase adoption of emerging energy efficiency technologies

The following is a comprehensive list of program intervention strategies that will be directed at SoCalGas' agricultural customer sector.

Program Intervention Strategy: **Partnering**



Partnering can create very effective alliances where there are common goals. Mutual collaboration and coordination as well as equitable contribution of resources and commitment are key to such program strategies. Partnering with other entities, through structured arrangements, is intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model.

Utility partnering will be accomplished through the co-delivery of key program intervention strategies among gas and electric investor-owned utilities (IOUs), publicly-owned utilities, other program administrators, and water agencies. Partnering will also be deployed, on an as-needed-basis, among industry associations to promote energy efficiency solutions to a represented customer group as well as sharing of energy efficiency best practices to address both lack of awareness and performance uncertainty regarding energy efficiency solutions. Industry partnering will effectively reach a diverse customer sector most efficiently. Agricultural trade organizations, equipment vendors and universities (e.g., University of California's Cooperative Extension Service) can provide an effective path to agricultural sector collaboration, particularly by serving as a trusted source of information about business concerns facing specific agricultural segments.¹⁹⁶ Trade organizations can survey their membership to find common concerns and potential solutions. Understanding these concerns can help program administrators construct value propositions and tailor their program offerings to best serve these customers. Trade organizations have an established communications channels with the industry that can facilitate education of customers about energy efficiency programs through a variety of forums, such as social and print media, ad hoc round tables, monthly meetings, and regional or national quarterly or annual meetings.¹⁹⁷ SoCalGas will collaborate with trade allies to increase program promotion and customer awareness of the benefits of energy efficiency investments thereby permanently modifying customer practices in favor of energy efficiency solutions. Collaboration with industry can help identify emerging natural gas technologies, including renewable natural gas opportunities and alternative fuel vehicles (e.g. natural gas tractors), and to promote increased adoption levels of those energy efficiency technologies.

¹⁹⁶ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*, p. 120. Retrieved from

http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

¹⁹⁷ *Id.* at 9.

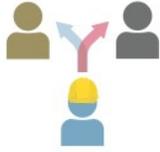
Intervention Strategy: Partnering

Objectives: to increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement

Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> Organizational practices Diffused market 	<p>Utility Partnering Facilitate the co-delivery of key program intervention strategies among gas and electric IOUs, publicly-owned utilities, program administrators, and water agencies.</p>	New	NR	On-going
<ul style="list-style-type: none"> Lack of information Performance uncertainties 	<p>Industry Partnering Industry associations to promote energy efficiency solutions to a represented customer group.</p>	New	NR	Near-term

Note: R=Resource; NR = Non-resource. Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years.

Program Intervention Strategy: Intelligent Outreach



Intelligent outreach embodies several tactical solutions to: assist customers with greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operations. Intelligent outreach uses energy consumption data, in concert with other sources, to effectively target and inform customers about energy efficiency opportunities within their own facilities. Through a multi-faceted approach, primarily enabled by SoCalGas’ advanced metering infrastructure (AMI),¹⁹⁸ customers can use their energy usage data to better optimize their business operations.

The Intelligent Outreach program intervention strategy consists of several integrated program tactics efficiently and simply delivered to the customer. Data analytics will use AMI infrastructure to target agricultural customers with the highest energy efficiency potential thereby overcoming the diffused market barrier. This will assist in encouraging customers to incorporate energy efficiency into their operations thereby permanently modifying their decision-making practices regarding energy management. Benchmarking by segment and size will be a key element to this strategy. SoCalGas will support the development of segment-specific energy metrics (and corresponding benchmarks) as part of growers’ overall sustainability efforts, in collaboration with industry associations, to promote energy efficiency. A virtual engagement will provide energy assessments by way of virtual audits that recommend permanent behavioral actions to agricultural customers. Simple, low and/or no touch customer communications to provide energy assessment, on a repeated basis, will be leveraged to

¹⁹⁸ California Public Utilities Commission. (2010, April 14). D.10-04-027.

permanently change the customer's behavior. Energy usage alerts will be deployed to assist customers in managing their energy. Data sharing will also enable customers to access their energy usage. This will enable customers to use their tools to better manage their energy. The strategy will also implement other tactics to leverage AMI data and to confirm actual delivery of expected energy savings from energy efficiency retrofits and behavioral actions, where feasible.

The facility energy audits offering will provide onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations. This will increase customer awareness of energy efficiency opportunities thereby reducing a key market barrier to energy efficiency.

Intelligent Outreach will also promote emerging energy management technologies to assist customers in actively managing their energy remotely. This will include merging AMI technology with advanced energy management technologies (e.g., smart thermostats)¹⁹⁹ to permanently modify customer behavior, resulting in reliable energy efficiency savings. These technologies will also focus on appliances that can assist the customer to manage their energy, including proper maintenance of appliances (e.g., HVAC self-diagnostic technology) to achieve optimal efficiency. Where practicable, the strategy will also partner with electric and water agencies with AMI technologies to provide a simple, one-touch efficiency experience helping to reduce the hassle factor that customers face.

With several unique customer segments within the agricultural sector, there is opportunity to share energy efficiency best practices among like customers. This sharing among customers can occur through trusted industry groups in collaboration with SoCalGas. For instance, the Dairy Institute of California association has significant influence over California dairy farmers.²⁰⁰ These best practices forums will help to reduce performance uncertainties and to improve customer knowledge regarding energy efficiency practices pertinent to their agricultural-specific operations.

The small agricultural outreach offering will target small-sized customers by applying data analytics, including a focus on rural and non-English speaking business owners, to help the customer understand how specific energy efficiency equipment retrofits and O&M, based on their own unique energy usage profile, can improve their agricultural operations. The agricultural customers either use natural gas as part of their agricultural process (larger

¹⁹⁹ Southern California Gas (SoCalGas) Company. (2016, August 11). *Advice Letter 5003-A Supplement - Southern California Gas Company Assembly Bill 793 Implementation Plan*. Retrieved from <https://www.socalgas.com/regulatory/tariffs/tm2/pdf/5003-A.pdf>

²⁰⁰ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

consumer) or not (smaller consumer). The small agricultural outreach tactic, in concert with the data analytics tactic, will group these customers accordingly and approach them differently. The larger consuming agricultural customers will be approached with similar program strategies along with a more comprehensive direct install offering. The lower energy-consuming agricultural customers typically use natural gas in a way similar to a small commercial and/or residential customer (e.g., water and space heating). As such, the appropriate commercial and/or residential program strategies will be directed at these lower energy-consuming customers.

Intervention Strategy: Intelligent Outreach				
Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operation				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Lack of information • Performance uncertainties • Customer practices • Diffused market 	Data Analytics Leverage AMI data to identify facilities with the highest energy efficiency potential for customer. Benchmarking by segment and size will be a key element to this effort.	New	NR	Short-term
	Virtual Energy Audits Virtual energy audits will be able to recommend both behavioral and retrofit opportunities to customer decision-makers and facilities staff.	New	R	Short-term
	Data Sharing Provide customer access to their energy usage. This will enable customers to use tools to better manage their energy.	Existing	NR	Short-term
	Facility Energy Audits Offers onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations.	Existing	R	On-going
	Energy Management Technologies (EMT) EMTs will help customers better manage energy and will allow customers to achieve optimal efficiency with other equipment.	New	R	Short-term
	Industry energy efficiency Best Practices Offer, along with industry groups, a collaborative forum to help inform, excite, and accelerate energy efficiency actions among like customers.	New	NR	On-going
	Small Agricultural Outreach Target small-sized customers by applying data analytics, including a focus on rural and non-English speaking business owners, to help the customer understand how specific energy efficiency equipment retrofits and O&M, based on their own unique energy usage profile, can improve their agricultural operations.	New	NR	Short-term

Program Intervention Strategy: **Technical Assistance**



Technical assistance is an information strategy focused on educating and training key facility personnel on energy efficiency practices and providing supplemental assistance in energy efficiency project development and implementation.

In the agricultural sector, a lack of in-house technical expertise or the resources to hire outside staff for the development and operation of end-use efficiency projects can create missed opportunities.²⁰¹ For instance, SoCalGas can provide energy efficiency education/outreach to growers and vendors as they begin to expand production and add equipment.²⁰² Without this expertise, there is an overall lack of awareness that the energy efficiency investment will result in benefits to the customer, including non-energy benefits.²⁰³ Technical assistance can help modify customer decision-making practices to help recognize these benefits to help with making capital improvement decisions.²⁰⁴ For instance, technical assistance will educate growers regarding life-cycle costing and energy-efficient equipment purchases in response to sector movement towards mechanization of agricultural processes. Also, information will be provided to customers on options for alternate fuel vehicles, including natural gas tractors, to help mitigate future GHG emissions. Training customers to grow in-house expertise on energy efficiency will help foster permanent energy efficiency practices, improved process efficiency, and on-going benchmark monitoring.

Intervention Strategy: Technical Assistance				
Objectives: to assist customer with identification and implementation of energy efficiency in their businesses				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices 	<p>Technical Training Educates and trains key facility personnel on energy efficiency practices to promote long-lasting behavioral changes.</p>	Existing	NR	Near-term

²⁰¹ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

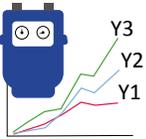
²⁰² *Id.*

²⁰³ Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Agriculture, CALMAC Study ID SCE0377.03*, p. 46. Retrieved from http://www.calmac.org/publications/MASI_Agriculture_Final_Report.pdf

²⁰⁴ *Id.* at 52.

Intervention Strategy: Technical Assistance				
Objectives: to assist customer with identification and implementation of energy efficiency in their businesses				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> Lack of information Performance uncertainties 	<p>Technical Support Provides supplemental technical assistance to customers in energy efficiency project development and implementation.</p>	Existing	NR	Near-term

Program Intervention Strategy: Strategic Energy Management



SEM is a program intervention strategy focused on achieving deeper and permanent energy efficiency levels for larger operations through improved customer operational and maintenance practices and energy efficiency equipment installations. SEM provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the production line to corporate management. Continuous monitoring of energy usage confirms the energy savings realized by the SEM program strategy.

Larger agricultural customers with on-site processes can benefit from permanent operational process-related changes to improve energy efficiency levels.²⁰⁵ A key market barrier to realizing this energy efficiency potential is the customer’s organizational practices which, in the agricultural sector, tend to focus on crop yield and quality.²⁰⁶ To effectively capture this energy efficiency potential, the SEM program strategy will focus on permanently modifying the customer’s decision-making process so energy efficiency is factored into the customer’s capital and process improvement decisions.²⁰⁷ To overcome the customer’s performance uncertainties, continuous monitoring of energy usage will be a key tactic to this program strategy. Previous SEM approaches have been troubled with the infrequent availability of

²⁰⁵ National Association of Conservation Districts. (2007, May). *Energy conservations opportunities in agriculture*, p. 2. Retrieved from http://www.nacdnet.org/wp-content/uploads/2016/06/energy_conservation_opportunities_agriculture.pdf

²⁰⁶ Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*, p. 139. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

²⁰⁷ Levine, A. (2012). Energy efficiency in agriculture: A review of the role of the federal government and state and private entities. *An Alliance to Save Energy White Paper*. Retrieved from <https://www.ase.org/sites/ase.org/files/eeinagriculture.pdf>

energy consumption data.²⁰⁸ With AMI, data collection may significantly improve SEM’s effectiveness thereby expanding the strategy to more customers. To encourage a greater level of retrofits and behavioral changes, a pay-for-performance tactic will be offered to customers thereby helping to reduce the high first cost barrier.

Intervention Strategy: Strategic Energy Management				
Objectives: to increase energy efficiency in business operations				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle, transactional cost • Lack of information • Performance uncertainties 	Pay-for-Performance Multi-year pay-for-performance incentives based on realized energy savings that will balance the customer need for greater operational efficiency and ensure ratepayer benefit.	New	NR	Near-term
	Modified Savings Analysis A “bottom-up” approach of enumerating measures to demonstrate the impact of SEM on the customer operations.	New	NR	Near-term
	Use of AMI data When estimating energy savings with regression, the probability of detecting savings increases with higher data frequency. Savings are more likely to be detected with more frequent data collection using AMI data.	New	NR	Near-term
	Cross Promotion SEM’s multi-year engagement allows an opportunity to promote other energy efficiency offerings as well as clean renewable opportunities, including renewable natural gas.	New	NR	Near-term
	Meter Large Projects When the customer implements both capital and O&M measures during the same period, the program may employ metering of the capital project(s) to identify capital energy efficiency savings separately from O&M energy efficiency savings.	New	NR	Near-term

Program Intervention Strategy: Customer Incentives



The customer incentive program intervention strategy is a simplified suite of financial incentive offerings directed at customers to reduce the high first cost

²⁰⁸ The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, pp. 34-35. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

barrier: a key market barrier for most customers.²⁰⁹ Recognizing the varied preferences among customers for different financial solutions, the program strategy offers a menu of tactics. Although incentive-based strategies like pay-for-performance may be suited for larger energy efficiency projects, in many circumstances, a one-payment approach (e.g., deemed and customized incentives) is very effective in motivating the customer to install energy efficiency equipment. Each of the tactics, within the overall customer incentive strategy, are intended to increase participation through simplified customer engagement while encouraging deeper, more comprehensive energy efficiency solutions including permanent energy behavior modification.

The Customer Incentive program intervention strategy offers a variety of financial incentives to the agricultural sector to assist in overcoming the high first cost and split incentive market barriers. A new approach to the agricultural market, pay-for-performance, will target more comprehensive energy efficiency projects by offering a performance-based whole building approach. Where there are significant energy efficiency savings opportunities, customers will be encouraged to participate using a pay-for-performance (P4P) tactic and to leverage the energy service provider community. The P4P tactic will provide for incentive payments to the participating customer over a pre-determined period, on preset payment intervals based on installation activities, measured savings, and using normalized meter data, with a baseline of existing conditions.

The comprehensive incentive tactic will offer a simplified, one-payment incentive approach to encourage customers to pursue deeper energy savings as part of their agri-business. Comprehensive incentives offer financial incentives for customized retrofit energy efficiency projects, including new construction. The program offering features incentives based on calculated energy savings for measures installed as recommended by comprehensive technical and design assistance for customized retrofits and new construction. It offers a calculation method that can consider system and resource interactions, to support an integrated, whole system, and multi-resource management strategies. The deemed incentive tactic offers financial incentives based on predetermined energy savings. It also features rebates per unit measure for installed energy-saving projects and provides the IOU, equipment vendors, and customers a simple transaction and encourages greater market adoption of emerging energy efficiency technologies and applications.

Bundled measures will also simplify the customer's program experience by providing an integrated approach of bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage). The bundled

²⁰⁹ Fuller, M. (2008, August). *Enabling investments in energy efficiency, a study of programs that eliminate first cost barriers for the residential sector*, p.44. Retrieved from https://www.veic.org/documents/default-source/resources/reports/energy_efficiency_financing_report-merrian_fuller_2008.pdf

measure offering will provide a simple, easy customer transaction that will integrate education, financing, and technical assistance in support of energy efficiency installations helping to reduce the transactional cost of such retrofits.

The strategy will also include a whole building approach. Whole building is a process that views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting. This tactic is also directed at the new construction segment by promoting integrated design through owner incentives, design team incentives, and design assistance to participants who design spaces that are energy efficient. This will help overcome several market barriers especially the customer’s high first cost and organizational practices towards energy efficiency.

Intervention Strategy: Customer Incentives				
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Diffused market • Hassle, transactional cost 	Pay-for-Performance Will provide for incentive payments to the participating customer over a pre-determined period on preset payment intervals based on measured savings, using normalized meter data, with a baseline of existing conditions associated with O&M and behavioral actions and equipment retrofits.	New	R	Near-term
	Comprehensive Incentives Offers financial incentives for customized retrofit energy efficiency projects, including new construction.	Existing	R	On-going
	Deemed Incentives Offers financial incentives based on predetermined energy savings.	Existing	R	On-going
	Bundled Measures Provides an integrated approach by bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage), primarily for smaller-sized customers.	New	R	Short-term
	Whole Building A process that views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting.	Existing	R	On-going

Program Intervention Strategy: **Direct Install**



The direct install (DI) program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for smaller-sized customers. A comprehensive DI tactic will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits. Comprehensive DI will rely, in part, on ratepayer funds and, in part, on customer co-fund contributions and/or customer financing.

The DI program intervention strategy offers both a standard and comprehensive DI approach, primarily targeted at smaller-sized agricultural customers to deliver natural gas and electric energy efficiency solutions, in a simple approach, to achieve near-term measurable energy efficiency benefits.

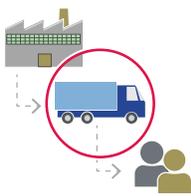
The standard DI offering will provide limited list of low/no cost energy efficiency measures. DI will include natural gas energy efficiency measures along with other similar electric and water efficiency measures, where practicable. It will use the Intelligent Outreach strategy to identify agricultural facilities with the greatest energy efficiency opportunities.

The comprehensive DI tactic encourages deeper energy savings by offering more comprehensive energy efficiency measures that are typically used by the targeted customer segment. Comprehensive DI will provide qualified contractors that will engage directly with the customers to install measures. A co-pay option will be offered to the customer to offset the initial cost of energy-efficient equipment. Customers can leverage on-bill financing or other financing offerings (e.g., on-bill repayment) to fund their co-pay portion.

Intervention Strategy: Direct Install					
Objectives: to achieve near-term measurable results primarily for smaller-sized customers					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Split incentive • Lack of information • Performance 	<p>Standard Direct Install</p> <p>Targets smaller-sized customers through the Intelligent Outreach strategy which will identify properties with the greatest energy efficiency opportunities. The standard DI offering will provide a limited list of low/no cost energy efficiency measures.</p>	New	NR	Near-term	

Intervention Strategy: Direct Install				
Objectives: to achieve near-term measurable results primarily for smaller-sized customers				
Barriers	Tactics	Status	Type	Timing
uncertainties	<p>Comprehensive Direct Install</p> <p>Encourages deeper energy savings by offering more comprehensive energy efficiency measures. Comprehensive DI will offer qualified contractors that will engage directly with the customers to install measures. A co-pay option will be offered to the customer along with on-bill financing to offset the initial cost of energy-efficient equipment.</p>	New	NR	Near-term

Program Intervention Strategy: **Midstream Energy Efficiency**



The Midstream Energy Efficiency program intervention strategy provides deemed incentives to distributors to reduce the retail cost of natural gas energy efficiency equipment, promote stocking of energy-efficient equipment, and inform contractors at the distributor level.

Incentives directed at midstream market actors can greatly simplify the end-use customer transaction while having lasting behavior change of key market actors in the promotion of energy efficiency technologies to their end-use customer.²¹⁰ This approach can reduce the high cost of advanced energy-efficient equipment purchases along with the hassle associated with identifying the appropriate energy efficiency technologies. However, as incentives are moved away from the end-use customers, the stability of such energy savings can be concerning due to difficulty in tracking products to the end-use customer. Distributor training coupled with active product monitoring can greatly reduce these concerns. Distributor training also can have greater impact in transforming market adoption of energy-efficient equipment.²¹¹ Also, in the retail channel, retailers have expressed their disinterest in participating in point-of-sale tactics promoting energy-efficient equipment due to the rising retailer cost to support such transactions. In such cases, alternate, more cost-efficient deemed incentives directed at the end-use customer will be offered.

²¹⁰ Backen, D., Burmester, C., and Sheehan, M. (2016). Moving to the middle – How to navigate the ins and outs of C&I midstream programs in *Strategies*. Retrieved from <http://www.aesp.org/page/MidstreamPrograms/Selected-articles-from-Strategies.htm>

²¹¹ Bickle, S., Burns, E., Rivett, B., VIta, D., Nelson, M., Parson, J., & Merson, H. (2016). Swimming to midstream: New residential HVAC program models and tools. *2016 ACEEE Summer Study on Energy Efficiency in Buildings*, pp.7-5 – 7-7. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/7_888.pdf

This Midstream Energy Efficiency strategy will be coupled, where practicable, with a comprehensive, co-pay direct install strategy that can efficiently deliver on-demand installation by trained and qualified contractors. The strategy will also work with retailers to improve their stocking habits and with distributor and/or manufacturing-funded rebates/discounts, where possible.

Intervention Strategy: Midstream Energy Efficiency				
Objectives: to achieve near-term measurable results and long-term market adoption of energy efficiency technologies through incentives directed at midstream market actors				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Lack of information • Performance uncertainties 	<p>Midstream Incentives Provides incentives to midstream market actors to drive down the wholesale price of energy-efficient technologies and to improve the stocking habits of energy-efficient equipment.</p>	New	NR	Near-term
	<p>Distributor Training Provides distributor-assisted training to contractors to support promotion of energy efficiency equipment to contractors and, in turn, customers.</p>	New	NR	Near-term

Program Intervention Strategy: **Financing**



The Agricultural Financing program strategy relies on various financing vehicles including on/off bill repayment solutions to encourage customers to adopt deeper, more comprehensive energy efficiency solutions. On-Bill Financing (OBF) and the statewide California Hub for Energy Efficiency Finance (CHEEF) pilots will be leveraged as an essential part of this strategy.

The agricultural customer is challenged with a limit amount of capital to pursue operational improvements.²¹² Energy efficiency financing solutions are a pathway to address the high cost barrier and to permanently modify organizational decision-making practices regarding energy efficiency-related improvements. New finance pilots developed as part of the CHEEF program will utilize innovative features to attract the development of energy efficiency financial products to the market. Financing solutions are most effective when offered jointly with a

²¹² Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

customer incentive²¹³ thereby making it an ideal program strategy to overcome the high first cost barrier to energy efficiency. On-bill financing offerings yield positive customer feedback for its simple, low-touch customer interaction approach.²¹⁴ The low hassle factor of financing is especially attractive to the smaller-sized customer, with limited staff resources. Smaller-sized customers can further leverage financing solutions in combination with a comprehensive direct install program strategy to further reduce the high cost and hassle factor market barriers. Also, the strategy will collaborate with financial market actors to enhance financing options for small agricultural customers and to promote alternate financing vehicles available to the agricultural sector.

Intervention Strategy: Financing				
Objectives: to assist customer with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle factor 	On-Bill Financing Offers interest-free, utility ratepayer-financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects which are repaid over time via the customer’s utility bill.	Existing	NR, R	Near-term
	Credit Enhancement Provides interest subsidies for financial institutions as an incentive for offering low-interest loans.	New	NR, R	Near-term
	On-Bill Repayment Privately financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects which are repaid over time via the customer’s utility bill.	New	NR, R	Near-term

F. Performance Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the Business Plan proposes key sector metrics. To properly monitor progress, the metrics will rely on data currently collected, tracked and verified as part of the Program Administrator’s data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels. The sector-specific metrics are presented below. Over time, metrics and targets may be adjusted and improved to more accurately reflect sector progress.

²¹³ The Cadmus Group. (2014, April 22). *California Joint Utilities Financing Research: Existing Programs Reviews*, CALMAC Study ID PGE0338.01, p. 4. Retrieved from http://www.calmac.org/publications/Existing_Programs_Review_FINAL.pdf

²¹⁴ *Id.* at 6.

Table 9 - Agricultural Sector Metric Table -

10-Year Vision

Energy efficiency will support the long-term economic and environmental success of California agriculture.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets(8-10+ years)
A considerable number of small agricultural customers lack technical and financial resources.	1. Substantial increase in deeper, comprehensive natural gas energy efficiency savings from smaller-sized customers.	Partnering	Increase energy efficiency savings in smaller-sized (<50k therms) customer group.	2015 Savings Levels.	Program tracking data.	Increase energy efficiency savings from smaller-sized customers by 5% over 2015 levels by Year 3.	Increase energy efficiency savings from smaller-sized customers by 15% over 2015 levels by Year 7.	Increase energy efficiency savings from smaller-sized customers by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Technical Assistance						
		Customer Incentives						
		Direct Install						
		Midstream Energy Efficiency						
Financing								
The agricultural sector has competing priorities, which may overshadow energy efficiency.	2. Increase investment in natural gas energy efficiency to lower operational costs and improve competitiveness.	Partnering	Increase participation in energy efficiency programs.	2015 Participation Levels.	Program tracking data.	Increase participation in energy efficiency programs by 5% over 2015 levels by Year 3.	Increase participation in energy efficiency programs by 15% over 2015 levels by Year 7.	Increase participation in energy efficiency programs by 25% over 2015 levels by Year 10.
		Intelligent Outreach						
		Technical Assistance						
		Strategic Energy Management						
		Customer Incentives						
		Direct Install						
Midstream Energy Efficiency								
Financing								
A diverse agricultural sector base makes it difficult to offer	3. Substantial increase in natural gas energy efficiency savings among all agricultural	Partnering	Achieve greater levels of energy efficiency savings from all agricultural	2015 Savings Levels.	Program tracking data.	Increase energy efficiency savings from agricultural sector by 5% over 2015 levels	Increase energy efficiency savings from agricultural sector by 15%	Increase energy efficiency savings from agricultural sector by 25% over 2015
		Intelligent Outreach						
		Technical Assistance						
		Strategic Energy Management						
		Customer Incentives						

Table 9 - Agricultural Sector Metric Table -

10-Year Vision

Energy efficiency will support the long-term economic and environmental success of California agriculture.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets(8-10+ years)
programs that fit the needs of all customers.	segments.	Direct Install	segments including smaller-sized customers.			by Year 3.	over 2015 levels by Year 7.	levels by Year 10.
		Midstream Energy Efficiency						
		Financing						

G. Key Partners

The success of the agricultural sector Business Plan will rely on positive, collaborative relationships with several market actors, Program Administrators, regulators and other government entities. Table 10 presents a list of key partners that will help SoCalGas successfully achieve the ambitious vision for the agricultural sector.

Table 10 - Key Partners	
Key Partners	Support Activity
Program Administrators	<ul style="list-style-type: none"> • Deliver dual-fuel programs to reach more customers; • Leverage all available best practices and promote statewide consistency, where appropriate; • Simplify program engagement; • Capture all energy efficiency benefits including operational energy savings; and • Conduct market research that will identify and better understand unique barriers to energy efficiency investments.
Publicly-owned Utilities (POUs) and Water Districts	<ul style="list-style-type: none"> • Actively coordinate with POUs and water agencies to deliver energy and water efficiency programs; • Engage in partnership and co-delivery arrangements with POUs and water agencies when there is a shared customer base (gas, electric) to simplify customer engagement and achieve higher levels of energy efficiency; and • Coordinate with POUs and water agencies throughout California and other regions to share best practices in program administration, design and delivery.
State and federal agencies	<ul style="list-style-type: none"> • SoCalGas will work with state and federal agencies (e.g., DFA, DWR, USDA) to promote greater levels of energy efficiency adoption throughout the various agricultural segments.
California Public Utilities Commission and Key Stakeholders	<ul style="list-style-type: none"> • SoCalGas will work with the Commission and other key stakeholder to investigate ways to simplify program requirements and to identify policies that will recognize all energy efficiency benefits associated with agricultural sector energy efficiency programs.
Third-party Program Implementers	<ul style="list-style-type: none"> • Solicit new and innovative programs from third-party program implementers to address the agricultural sector to draw upon creative program solutions that can be quickly and effectively targeted to these customers; and • Continued collaboration with program implementers throughout the program’s lifecycle will be an integral part of the program’s success.
Rural Hard to Reach Working Group	<ul style="list-style-type: none"> • SoCalGas will leverage its existing relationship with the Rural Hard-to-Reach Working Group to assist in efforts with industry associations that support segment-specific customers (e.g., dairy farms, mushroom growers, etc.).

Table 10 - Key Partners	
Key Partners	Support Activity
Agricultural Trade Organizations and Universities	<ul style="list-style-type: none"> • Agricultural trade organizations and universities can provide an effective path to agricultural sector collaboration, particularly by serving as a trusted a source of information about business concerns facing specific agricultural segments; • Trade organizations can survey their membership to find common concerns and potential solutions. Understanding these concerns can help Program Administrators construct value propositions and tailor their program offerings to best serve these customers; • Trade organizations have established communications channels with the industry that can facilitate education of customers about energy efficiency programs through a variety of forums, such as social and print media, ad hoc round tables, monthly meetings, and regional or national quarterly or annual meetings; and • SoCalGas will collaborate with trade allies to increase program promotion and customer awareness of the benefits of energy efficiency investments.
Industry Technical Community	<ul style="list-style-type: none"> • Specialized technical assistance with expertise in specific agricultural segments can be highly effective in identifying energy savings opportunities at agricultural facilities; and • The expertise can be provided by resources that include utility in-house experts, independent technical consultants, and equipment vendors.
Equipment Vendor and Manufacturers	<ul style="list-style-type: none"> • SoCalGas will actively work with equipment vendors and manufacturers to promote greater adoption of energy efficiency equipment among the various agricultural segments.
California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) for financing	<ul style="list-style-type: none"> • Financing will be a key program intervention strategy to overcome the high first cost of energy efficiency in the agricultural sector; and • SoCalGas will continue its long-term collaboration with CAEATFA to design and promote innovative financing strategies that will encourage greater customer investment in energy efficiency.

H. Cross-cutting Sector Coordination

Local Marketing and Statewide Marketing, Education & Outreach Integration

The sector programs will rely on a combination of locally targeted promotion of specific energy efficiency programs tailored to the various segments throughout the sector. There will be a focus on historically underserved customers with higher energy efficiency potential, through data analytics, to encourage greater program participation.

Since the statewide Marketing, Education, and Outreach (ME&O) program's short-term goal is focused on the mass market customer (i.e., residential and small business owners), the agricultural sector programs will focus its outreach to agricultural customers on the importance of energy efficiency, their opportunities to act and the benefits of their actions. Small customer outreach will provide customer-specific information and services to help the customer modify their energy consumption behavior and to install energy efficiency retrofits. SoCalGas will actively participate in both the development of the five-year ME&O Strategic Roadmap and Annual Joint Consumer Action Plans to coordinate program offerings with the statewide marketing efforts and to support the short and long-term goals of the ME&O program.

Workforce Education & Training Integration

Workforce Education & Training (WE&T) will provide classes, seminars, consultations, and demonstrations to support agricultural sector customers (and their staffs). WE&T will guide access to training programs pertinent to engineers, facilities and maintenance staff, plant managers, and business owners who are designing, building, and maintaining facilities such as dairies, breweries, distilleries, wineries, and greenhouses serving the agricultural sector. WE&T will also collaborate with existing partnerships such as universities and community colleges, regional water districts, and relevant trade associations to assist the agricultural sector. WE&T will explore alternative ways to extend training opportunities to rural customers, or those customers with access limitations to traditional training locations.

Emerging Technologies

California's agricultural sector is unique among utility customer segments in that it is suffering disproportionately from the effects of a multi-year drought. If there is any upside to this ongoing crisis, it is that energy savings and water savings can often both be realized in a single efficiency measure. This can make upgrades or improvements easier to justify than in sectors where the largest energy-saving opportunities and the largest water-saving opportunities may come from completely different measures. However, energy-saving opportunities in this sector go beyond purely water-related measures, and include integrated whole-farm solutions, improvements in the facilities where produce is stored, and emerging indoor agriculture opportunities.

A problem the agricultural sector in California faces is a dwindling number of energy efficiency measures. To address this shortfall, the statewide Gas and Electric Emerging Technologies Programs (ETP) have adopted a long-term vision of addressing the lack of technology supply that can hinder energy efficiency portfolio success. To realize this vision, the Gas and Electric ETPs have outlined two medium-term solutions: working upstream with product developers to integrate energy-saving attributes in the product design phase and motivating technology developers to build integrated (i.e., whole-farm) solutions. The programs have identified methods of reaching product developers to accelerate these solutions, including collaborating with the Public Interest Energy Research (PIER) and Electric Program Investment Charge (EPIC) programs, as well as hosting quarterly Emerging Technologies Coordinating Council (ETCC) sector meetings and open forums that serve as platform for technology companies and utilities to collaborate, including in the agriculture space.

Elsewhere in the agriculture industry, indoor agriculture is a small but growing industry subsector. Because this subsector is new and very different from traditional agriculture, it is fertile ground for innovative new technologies—particularly in HVAC and lighting. The Gas and Electric ETPs will conduct technology evaluations and market interventions that can increase energy efficiency and demand response opportunities within this emerging subsector.

Codes & Standards

The Statewide Codes and Standards (C&S) Program advances technologies into code through advocacy work with standards and code-setting bodies, such as the California Energy Commission (CEC) and the Department of Energy (DOE), to strengthen energy efficiency regulations by improving compliance with existing C&S and assisting local governments to develop ordinances (reach codes) that exceed statewide minimum requirements. The C&S effort will also draw upon agricultural customers, where applicable, into code development in the early stages to advocate for codes and compliance-related matters.

Financing

Please refer to the Finance portion of the Cross-Cutting Chapter for more information on the CHEEF pilots. The agricultural sector will have access to the nonresidential pilots which will have on-bill, off-bill, credit enhancement, and non-credit enhancement features.

Other DSM Programs

To assist customers in managing their energy, the program strategies presented in this Business Plan will be coordinated and integrated with other customer demand-side opportunities, where feasible.

Integrated DSM

Integrated Demand-Side Management (IDSM) encourages the integration of a full range of DSM options such as energy efficiency, advanced metering, low income energy efficiency, distributed generation, and alternative fuel vehicles. In short, IDSM is fundamental to achieving California's strategic energy goals. IDSM efforts will continue to identify and promulgate best practices, address implementation and program policy issues across customer DSM programs. IDSM will specifically look for integration opportunities, identify integration barriers, and work with both Program Administrators and program implementers to promote the advancement of integration, using lessons learned and best practices to establish a continuous improvement process. Although, not a program, IDSM will help other DSM programs to integrate with and complement each other to facilitate a simple, effective DSM engagement with the customer.

Demand Response

The agricultural sector Business Plan proposes to leverage emerging energy management technologies to assist customers in actively managing their energy remotely. This will include merging AMI technology with advanced energy efficiency and energy management technologies to permanently modify customer behavior, which will result in reliable energy efficiency savings and serve to support utility demand response activities. Where practicable,

these efforts will also partner with electric and water agencies with AMI technologies to provide a simple, one-touch efficiency and demand response experience.

Alternative Fuel Vehicles

In California, SB 350, codified in Public Utilities Code § 740.12(a)(1), states the following goal: “Advanced clean vehicles and fuels are needed to reduce petroleum use, to meet air quality standards, to improve public health, and to achieve greenhouse gas emissions reduction goals.”²¹⁵ The agricultural sector Business Plan proposes to increase awareness of natural gas vehicles to serve the agricultural sector transportation needs to significantly reduce nitrous oxides (NOx) and GHG emissions. Consistent with SB 350’s goals to address barriers to access for low-income customers to zero-emission and near-zero-emission transportation options,²¹⁶ outreach efforts directed at agricultural customers within disadvantaged communities to emphasize the benefits and opportunities for natural gas vehicles supporting the agricultural sector.

In addition to natural gas vehicles to promote GHG emission reduction, the agricultural sector affords unique opportunities in the dairy segment. Anticipated developments in the dairy biomethane and organic waste diversion industries could also provide unique opportunities to engage with the agricultural sector to affect positive energy and environmental changes. Various end-uses, such as water pumping, could be upgraded from diesel to be fueled with cleaner-burning, more efficient natural gas. Engaging with developers to ensure that new organic waste diversion facilities are designed using state-of-the-art energy-efficient technologies and practices can help to improve the handling of agricultural waste and could reduce transportation fuels consumed in managing this waste stream and help to improve air and water quality for the region.

Energy Savings Assistance (Multi-family)

Various customer segments within the agricultural sector rely heavily upon seasonal labor to harvest crops. Where multi-family housing exists to support the labor pool, the agricultural sector will coordinate with both the SoCalGas Energy Savings Assistance program and residential energy efficiency sector programs to improve the efficiency of such multi-family units through deep, comprehensive energy efficiency retrofits.

Statewide Implementation

SoCalGas will collaborate and coordinate with other program administrators on the effective implementation of any statewide program offerings. Programs designed to engage directly with specific market actors at the midstream and upstream market channels will be implemented on a statewide basis. Other downstream programs, beyond what is presented in the Business Plan, may also be considered candidates for statewide implementation.

²¹⁵ Cal Public Utilities Code § 740.12(a)(1) (2015).

²¹⁶ See Clean Energy and Pollution Reduction Act of 2015, California Senate Bill 350. (2015). See Cal. Public Utilities Code § 25327(d).

Local Implementation

Local and regional solutions are necessary for the achievement of the agricultural sector vision, goals and objectives. Many of the current programs offered are done so in coordination with publicly-owned utilities (POUs). Such partnerships with POUs will continue at a local level. For example, SoCalGas has a strong partnership with the Los Angeles Department of Water and Power (LADWP), the largest municipality in the nation, to jointly design and deliver energy efficiency programs to a shared customer base. Such activities will continue to be implemented by the POU and/or implemented by SoCalGas-selected and managed third-party program implementers. SoCalGas will also work with other POUs to identify good program candidates to join statewide implementation efforts, where feasible.

IOU Program Implementation and Support

SoCalGas proposes to continue implementation of certain downstream programs (i.e., programs delivered directly to the customer) where it is reasonable and practicable to do so. SoCalGas will also continue to actively support the delivery of third-party programs. For example, customer services, such as incentive payments and inspections, will be provided by SoCalGas to support third-party program implementers and to safeguard ratepayer funds. For program efficiency, the customers will also be directed to the SoCalGas portal to maintain a simple, easy program participation experience for the customer. In addition, at times, it is more efficient and productive to leverage the natural relationship between SoCalGas and its customers. As the trusted energy advisor, SoCalGas has an ongoing relationship with its customers on all energy matters including energy efficiency. SoCalGas proposes to continue to promote energy efficiency programs to the customers and customer groups in order to improve the likelihood that customers will adopt energy efficiency.

I. Evaluation, Measurement & Verification (EM&V) Considerations

The agricultural sector contains a wide variety of segments with very unique and divergent ways they use energy. There is a need for a deeper level of research on each of the different segments and sub-segments within the agricultural sector.

The agricultural customer can benefit greatly from permanent changes in their energy usage. Whether changes are permanently adopted can be heavily influenced by the customer expectation/perception of cost savings and improved crop yield and/or quality. Identifying and/or creating segment-specific industry benchmarks are key to helping the customer understand and adopt operational process improvements to better manage their energy. Studies examining industry-specific benchmarking will be paramount in convincing the customer to adopt energy efficiency.

The following are recommendations to improve the body of knowledge regarding the agricultural sector.

Market Research and Process Evaluation:

- Conduct a market study to identify the unique segments within the agricultural sector and to examine their unique characteristics and trends within their specific segment or sub-segment.
- Interview agricultural customers to identify where program participation process can be simplified.
- Identify a set of common industry benchmarks, within segments and sub-segments that will drive the customer to adopt energy efficiency as part of their business operations.
- Consider doing an update to the Measure, Application, Segment, Industry (MASI) study with larger sample size, recruit more subject-matter experts (SMEs), and provide an in-depth look into niche markets such as greenhouse flowers/fruits, nurseries (for landscaping), and post-crop processing.

Load Impact:

- Use normalized metered energy consumption (NMEC) data to determine the overall impact of O&M and behavior measures as an enhanced approach to quantify energy savings. For this approach, energy savings are calculated as the difference between the NMEC for baseline and post-intervention time periods.
- Consistent with AB 793 (§717(3)) requirements, evaluate gas energy savings claims achieved pursuant to the incentives for energy management technologies, directed at the multi-dimensional customer, to determine if the program strategies shall continue or be modified.

PUBLIC CHAPTER

Public Sector Snapshot

Public Sector Customers by the Numbers		2015 Totals	
Customer Count (Number of Accounts)			
Local		5,428	
State		461	
Federal		165	
Education		7,212	
Total of Sector		13,266	
Program Participation (% of total)			
Public Total		214	
Public Percentage		1.6%	
Local		1.0%	
State		0.0%	
Federal		2.4%	
Education		2.2%	

2015 Public Sector Consumption by Segment	
Education	45%
Local	35%
State	12%
Federal	8%

Annual Consumption in Therms	2010-2015		2015
	Average	Trends	Totals
Local	50,705,035		46,967,748
State	18,617,712		16,088,246
Federal	10,960,005		10,405,149
Education	66,738,605		60,618,115
Sector Total	147,021,357		134,079,258

Energy Savings in Therms	2010-2015		2015
	Average	Trends	Totals
Local	284,759		186,121
State	141,050		-
Federal	64,869		362,091
Education	978,155		958,240
Sector Total	1,468,832		1,506,452
Energy Savings as % of EE Portfolio	5.0%		6.0%

2015 Public Sector Energy Savings by Segment	
Education	64%
Federal	24%
Local	12%
State	0%

Notes:

Annual consumption and customer count does not include electric generation (Non-PPPS) usage which accounted for 0.72 billion therms in 2015 - approximately 84% of all natural gas used by the public sector

Program Participation is based upon non-consolidated figures (e.g. each rebate application is counted individually).

Sparklines represent 2010-2015 data. Green and Red dots identify low and high points respectively.

Customer counts based upon unique meter numbers.

A. Public Sector Chapter Summary

SoCalGas' public sector represents nearly 16% of the natural gas consumed by all commercial customers²¹⁷ and approximately 3% of SoCalGas' total energy efficiency-eligible customer load. However, a significant percentage (84%) of additional public sector consumption is due to electric generation, including cogeneration, and is ineligible for energy efficiency programs.²¹⁸

The Program Administrators reached consensus that public sector customers are essentially "tax-based" government organizations. The public sector is further defined by four segments: local government, state government, federal government, and education. These segments contain many customer groups that can be further disaggregated by agency, department, or district affiliation. The key function for the public sector is to provide services which benefit society including public safety, public education, and maintaining public infrastructure.

Public Sector Vision

California's public sector will incorporate energy efficiency into their policies and practices to capture all energy efficiency opportunities throughout their facilities, thereby enabling a pathway to zero net energy.

As taxpayer-funded entities, public sector customers are often subject to executive, legislative, and other mandates. Public sector customers are generally characterized as: not profit-motivated; have fixed utility budgets; require a public process on key decisions, including funding and project approval; implement on a fiscal year rather than a calendar year; and follow unique purchasing guidelines. These characteristics are unlike most commercial businesses.

Public sector customers are generally governed by a centralized decision-making authority that is uniquely positioned to transform their respective organization's decision-making process. These structures are well positioned to achieve deeper energy efficiency and adoption of other demand-side management solutions (including clean renewables) to help reduce operational costs and environmental impacts in support of federal, state, and local mandates. To realize the vision for the public sector, SoCalGas has developed the following goals:

- Goal 1:** Achieve comprehensive, deep energy efficiency levels among all public facilities to support the achievement of zero net energy buildings.
- Goal 2:** Incorporate energy efficiency into policies and practices to permanently modify the public customer's organizational decision-making process regarding energy efficiency solutions.
- Goal 3:** Increase energy efficiency adoption levels among public sector customers in rural and disadvantaged communities.

²¹⁷ Public sector customers have been traditionally covered in "commercial" market data.

²¹⁸ SoCalGas Customer consumption data, 2015.

The public sector has a unique set of market barriers that inhibit customers from achieving these goals. These barriers will be addressed by a complimentary, integrated set of program intervention strategies that will actively engage the public customer to achieve both stranded market and economic energy efficiency potential. SoCalGas distills these market barriers and program intervention strategies into a set of problem statements and sector-level strategies that relate to each goal.

B. Approach to Achieve Public Sector Goals

Previously, public sector customers have been served by energy efficiency programs as part of the broader commercial customer sector. However, unlike the “private” sector commercial customer, Program Administrators have observed that public sector customers have unique characteristics that lend themselves to sector-specific program intervention strategies. Accordingly, the public sector Business Plan includes a suite of energy efficiency strategies structured to best address the market barriers to higher energy efficiency levels facing public sector customers in particular. Recognizing the various public mandates to achieve significant increases in energy efficiency and enable a pathway to zero net energy buildings, the Business Plan provides strategies designed to aggressively encourage customers to pursue deeper, more comprehensive energy efficiency. A collaborative, urgent effort between the public customer and the energy efficiency program portfolio is needed to fulfill these mandates in a timely fashion. In response, SoCalGas has developed new and reformed program strategies designed to assist and persuade the public sector customer to take immediate action.

Sector Challenges

The public sector faces key barriers to reaching higher levels of energy efficiency. SoCalGas has identified key challenges and observations along with proposed sector-level strategies to overcome these barriers within the public sector. A major challenge to quantifying the impacts of these observations is a general lack of sector-specific data. Historically, public sector customers have been included in commercial sector analyses (e.g., market potential studies). Consequently, market research has not always recognized the unique characteristics of the public sector. Additional data are needed to better analyze this sector, but due to well-understood public mandates and requirements, there is little debate that where empirical data is lacking, the anecdotal evidence is clear.

SoCalGas addresses the barriers in this sector with a complimentary, integrated set of program intervention strategies that will actively engage the public customer to capture stranded market energy efficiency potential and drive the sector to achieving more of the economic energy efficiency potential. SoCalGas has distilled these barriers into the following sector challenges:

Challenge 1: Limited funding and competing priorities make it difficult for public sector customers to invest in energy efficiency and represent themselves as leaders in energy efficiency.

Limited funding; large funding need. Capital investments are needed to modernize existing building infrastructures. Executive Order B-18-12 requires the State to pursue all financing options available. Public funding has been unable to keep up with the projected capital investments and maintenance and repair needs. For example, the California State University system has a deferred maintenance budget of more than \$2 billion for academic buildings, with additional \$700 million for critical infrastructure repairs.²¹⁹ The deferred maintenance backlog is a recognized challenge. While there is still significant energy savings potential in this sector,²²⁰ budgets and resources are woefully short.²²¹

Financing is a challenge. It can be challenging for public customers to take on debt. Debt restrictions can vary by customer and agency, which usually results in limited options.²²²

Competing funding priorities. Energy efficiency competes with many other funding priorities in the public sector.²²³ Safety and services to the public are the priorities for these government organizations.²²⁴

Lack of technical resources. Insufficient, untrained resources to develop, implement, and maintain energy efficiency projects.²²⁵ One of the most important considerations for serving the public sector is the budget crisis that has afflicted public customers in recent years.²²⁶ In response, public customers have reduced building maintenance budgets, reduced their staffs,²²⁷ consolidated workers into fewer facilities, and moved out of older buildings that cost more to operate.²²⁸ Although some public customers in the education segment are currently

²¹⁹ California State University, Office of the Chancellor. *2016-2017 Capital outlay program, capital improvement plan: 2016-2017 through 2020-2021*, pp. 12, 219. Retrieved from [http://calstate.edu/cpdc/Facilities_Planning/documents/2016-17 through2020-21CIP.pdf](http://calstate.edu/cpdc/Facilities_Planning/documents/2016-17%20through2020-21CIP.pdf)

²²⁰ Navigant Consulting Inc. (2016, March 31). *AB802 Technical Analysis Potential Savings Analysis*, p. 30. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189>

²²¹ Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 51. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

²²² *Id.* at 51.

²²³ *Id.* at 54.

²²⁴ *Id.*

²²⁵ *Id.* at 85.

²²⁶ *Id.* at 54.

²²⁷ *Id.* at 58.

²²⁸ Jungers, B. (2013, February 19). *Government administration buildings: United States; Sector snapshot*. Retrieved from <https://www.esource.com/members/BAM-S-14/Sector-Snapshot/Government-Administration>.

leveraging California Clean Energy Jobs Act (Proposition 39) dollars to fund facility staff, this source of funding is not permanent and will likely result in further reductions when Proposition (Prop) 39 funds sunset.²²⁹

Prop 39 funding requirements too difficult. Prop 39 requirements create lost opportunity to capture deep energy efficiency retrofits. Prop 39 only supports a small fraction of facility needs; as funding requirements have made low-hanging fruit measures more attractive, costlier, deep energy-saving measures have been more difficult to pursue.

Project complexity inhibits energy efficiency. Energy efficiency projects are too complex²³⁰ and time consuming, requiring a significant customer investment in time and effort to perform energy efficiency retrofits.²³¹ Due to the mission and priorities of public sector customers, they often lack the resources to divert to managing energy efficiency projects.

Changes in Leadership and Policy. Elected official turnover can present a shift in political (and energy efficiency) priorities.

Challenge 2: Public sector-specific requirements (e.g. public contract code, sustainability goals, and centralized energy billing practices) are unique barriers (as compared to commercial customers) to pursuing and supporting efficiency efforts.

Organizational procurement practices. Public customers often limit their participation in energy efficiency programs because of existing procurement policies.²³² Mid- and upstream measures present unique challenges to purchasing practices for these customers.²³³ Kindergarten-12th grade (K-12) schools typically procure and inventory equipment in parts (not complete pieces of equipment). Public sector customers are typically hesitant to replace whole pieces of equipment because of the stranded parts inventory that would be created. Other

²²⁹ California Office of the Legislative Analyst. (2012, July 18). Proposition 39, Tax Treatment for Multistate Business. Clean Energy and Energy Efficiency Funding. Initiative Statute. Retrieved from http://www.lao.ca.gov/ballot/2012/39_11_2012.aspx

²³⁰ Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 69. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

²³¹ *Id.* at 53.

²³² California Department of General Services. *Office of Legal Services state contracting manual, Volume 1, Chapter 5, Section 5.05*. Retrieved from https://www.documents.dgs.ca.gov/ols/SCM%202015/Chapter_5_-_Competitive_Bidding_Methods.pdf

²³³ California Department of General Services. *Office of Legal Services state contracting manual, Volume 1, Chapter 2, Section 2.04.5*. Retrieved from https://www.documents.dgs.ca.gov/ols/SCM%202014/Chapter_2_-_The_Basic_Contracting_Process.pdf

procurement-related matters include low-bid requirements and restrictions on accessing private financing.²³⁴

Organizational split-incentive. Budgets are zero-based and planned as a “general fund.”²³⁵ Incentives (and bill savings) derived by energy efficiency projects typically go back to a general fund and not the department that implemented the energy efficiency project, thereby not realizing the benefit for the specific customer (i.e., department).²³⁶

Older building stock. Many public sector buildings are of older vintage.²³⁷ It is costly to upgrade and often not feasible; existing energy efficiency programs have limited impacts on whole building upgrades.

Policy barriers. Further challenges exist for public sector customers where Program Administrators are required to apply commercial program rules and policies to this sector. For example, currently Industry Standard Practice (ISP) is applied in the same fashion in which it is applied to commercial sector. If ISP is a concern, then public sector-specific ISPs should be developed that reflect the nature of this sector and its customers. Additionally, other policy barriers impact public sector including Effective Useful Life (EUL), Baseline, and Net-to-Gross ratio assumptions. These items will need to be addressed and adjusted in the development of public sector strategies.

Challenge 3: Public customers serving disadvantaged communities²³⁸ are particularly impacted as demonstrated by low energy efficiency adoption levels (relative to the rest of the sector).

²³⁴ California Department of General Services. *Office of Legal Services state contracting manual, Volume 1, Chapter 5, Section 5.06*. Retrieved from

https://www.documents.dgs.ca.gov/ols/SCM%202015/Chapter_5_-_Competitive_Bidding_Methods.pdf

²³⁵ Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 52. Retrieved from

http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

²³⁶ *Id.* at 51.

²³⁷ California Community Colleges, Office of the Chancellor. (2015, October). *2016-2017 Five-year capital outlay plan*, p. 18. Retrieved from

<http://californiacommunitycolleges.cccco.edu/Portals/0/Reports/2016-17-Five-Year-Capital-Outlay-Plan.pdf>); University of California, Office of the President. (2015, November 19). *Capital asset strategies and finance, capital financial plan 2015-25*, p. 4. Retrieved from

<http://regents.universityofcalifornia.edu/regmeet/nov15/gb1attach.pdf>

²³⁸ Cal. Health & Safety Code § 39711 (2014) provides, “The California Environmental Protection Agency shall identify disadvantage communities for investment opportunities related to this chapter. These communities shall be identified based on geographic, socioeconomic, public health, and environmental hazard criteria, and may include, but are not limited to, either of the following: (a) Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation. (b) Areas with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment.”

Public sector customers serving disadvantaged communities lack capacity. Local governments and K-12 schools in disadvantaged communities, including those in rural areas, have even less resources to pursue energy efficiency solutions. In addition, there is concern that these customers often under-participate in programs due to distance from urban areas where most energy efficiency service providers operate.²³⁹ Small rural local governments often do not have the capacity to take on additional activities that are beyond critical activities that ensure minimum required services are sustained.²⁴⁰

Higher cost. Energy efficiency infrastructure upgrades are more costly to customers in rural communities because the lack of local vendors and energy efficiency service providers.

Desired Outcome

The sector Business Plan identifies key milestones in the advancement towards a permanent market effect through a set of desired sector outcomes. In many cases, the desired outcome is expected well beyond the near- and mid-term planning horizon, and ties to the 10-year vision for the sector. The Business Plan identifies the corresponding program intervention strategies (Table 1 below) that will be deployed to reduce the market barriers, which will result in the desired sector outcome.

Table 1 - Desired Outcomes	
10-year Vision: California’s public sector will incorporate energy efficiency into their policies and practices to capture all energy efficiency opportunities throughout their facilities, thereby enabling a pathway to zero net energy.	
Challenges	Desired Outcome
Many public sector customers have limited resources.	Increase adoption of energy efficiency solutions by customers that have significant energy efficiency potential to support ZNE-ready buildings.
Public sector-specific mandates (e.g. public contract code, sustainability goals, and centralized energy billing practices) create competing priorities.	Permanently modify organizational practices to have customers automatically consider and adopt energy efficiency solutions by incorporating energy efficiency into the organization’s energy mandates, policies, and practices.

²³⁹ Turiel, I. (2009, November 4). *Comprehensiveness in California’s Small Retrofit Programs within Local Government Partnerships*, CALMAC Study ID CPU0047.01, pp. 15-16. Retrieved from http://www.calmac.org/publications/Local_Government_&_Comprehensiveness_11-4-09ES.pdf

²⁴⁰ California Energy Efficiency Coordinating Committee. (2016, March 4). *Rural hard to reach public sector business plan recommendations*. Retrieved from <http://www.caeec.org/pub-stage-1-input>

Table 1 - Desired Outcomes

10-year Vision: California’s public sector will incorporate energy efficiency into their policies and practices to capture all energy efficiency opportunities throughout their facilities, thereby enabling a pathway to zero net energy.

Challenges	Desired Outcome
Public customers serving rural and disadvantaged communities are particularly impacted, demonstrated by low energy efficiency adoption levels.	Increase energy efficiency levels among public sector customers serving rural and disadvantaged communities.

The following metrics and the associated targets allow SoCalGas to continuously track and monitor the public sector progress towards achieving these goals:

Goal 1: Metric Target - Increase number of public sector customers participating in energy efficiency programs by 35% over 2015 levels by 2025.

Goal 2: Metric Target- Increase number of policies that promote energy efficiency by 20% over 2015 levels by 2025.

Goal 3: Metric Target - Increase energy savings from public customers in rural and disadvantaged communities by 15% over 2015 levels by 2025.

Public Sector Budget, Cost-Effectiveness, and Savings

To facilitate the achievement of the public sector goals, SoCalGas will rely on a coordinated combination of existing and new program intervention strategies. Table 2 contains the public sector budget for the 2018-2025 timeframe.

Table 2 – Sector Budget (\$000s)

Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Public	\$6,675	\$8,377	\$8,377	\$8,706	\$8,988	\$9,273	\$9,561	\$9,854	\$10,150	\$10,450

**2016 and 2017 are shown for historical purposes.

Table 3 contains the net therm savings forecast for the 2018-2025 timeframe, based on the 2015 Potential and Goals Study and the AB 802 Technical Analysis.

Table 3 – Annual and Cumulative Net Savings (MM Therms)

Savings	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Annual	-*	-*	1.41	1.52	1.61	1.69	1.77	1.85	1.93	2.02
Cumulative	-*	-*	1.41	2.94	4.54	6.23	8.00	9.80	11.67	13.61

* Public sector was included in the commercial sector in 2016 and 2017.

**2016 and 2017 are shown for historical purposes. The number reflects net energy savings from compliance filings.

Table 4 presents annual and lifecycle gross emissions avoided forecast for 2018-2020 for public sector programs.

Gross Emissions Avoided	CO ₂ (tons)	NOx (lbs)	PM-10 (lbs)
Annual	38,411	60,402	(1)
Lifecycle	509,825	801,729	(63)

Table 5 shows the near-term cost-effectiveness for the public sector.

Sector	TRC	PAC
Public	1.00	1.30

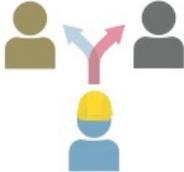
C. Overview of New Program Strategies and Tactics

SoCalGas has served public sector customers for many years through its commercial energy efficiency programs, local government partnerships with cities and counties, State agencies through institutional partnerships, and higher education customers. Additionally, SoCalGas has supported K-12 customers through assigned account executives as well as third-party program offerings. Further details on local government partnerships are provided in Section H, Local Government Partnerships Statewide Consistency. In addition to continuing to utilize proven program strategies, SoCalGas will incorporate new program strategies and corresponding program tactics to arrive at a complete energy efficiency solution set for the public sector. The proven and new program strategies are further detailed in the Program Intervention Strategies section. The new program approaches and the proposed implementation timeframe are summarized below in Table 6.

Program Intervention Strategy	Descriptions	New Tactics	Timing
 Partnering ²⁴¹	Limited-partnership arrangements, deployed on an as needed basis that are intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model based on	<ul style="list-style-type: none"> • Industry partnering 	Near-term

²⁴¹ “Partnering” as a Program Intervention strategy does not refer to SoCalGas’ current Local Government Partnerships (LGP) or Institutional Partnerships (IP) efforts.

Table 6 - New Program Strategies

Program Intervention Strategy	Descriptions	New Tactics	Timing
	equitably sharing of customer incentives and administrative costs among partners.		
<p>Intelligent Outreach</p> 	To assist customers in identifying the greatest energy efficiency opportunities, improve cost efficiency in program delivery, segment-specific benchmarking and provide deeper, comprehensive energy savings solutions.	<ul style="list-style-type: none"> • Data Analytics • Virtual Energy Audits • Energy Management Technologies • Disadvantaged Community/Small Customer Outreach with emphasis on rural and other disadvantaged communities 	Near, Mid-term
<p>Strategic Energy Management (SEM)</p> 	Provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the production line to corporate management.	<ul style="list-style-type: none"> • Pay-for-performance • Modified Savings Analysis • Use of AMI Data • Cross-Promotion • Meter Large Projects 	Near-term
<p>Financial Incentives</p> 	Facilitates customer choice by offering a simplified suite of financial incentives strategies to customers to reduce the high first cost barrier, the key market barrier for most customers.	<ul style="list-style-type: none"> • Pay-for-performance • Bundled measures 	Near-term
<p>Direct Install</p> 	Targeted primarily at very-small/small-sized customers that will deliver natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results.	<ul style="list-style-type: none"> • Standard direct install (DI) targeted primarily at very-small/small-sized customers. • Comprehensive DI will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits in combination with a customer co-pay element and enhanced on-bill financing. 	Near-term

Program Intervention Strategy	Descriptions	New Tactics	Timing
Project Financing 	Assists customer with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions through enhanced on-bill financing designed for public customers, possibly using the new California Hub for Energy Efficiency Financing (CHEEF) pilots, and assisting in gaining access to grant funds.	<ul style="list-style-type: none"> • Public Funding Assistance • On-Bill Repayment 	Near-term

*Note: Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years.

D. Public Sector Market Characterization

Public sector customers are generally characterized as: not profit-motivated; have fixed utility budgets; require a public process on key decisions, including funding and project approval; implement on a fiscal year rather than a calendar year; and follow unique purchasing guidelines. Public customers are primarily taxpayer-funded and are often subject to executive, legislative, and other mandates. These characteristics are unlike most commercial businesses – which are how public sector customers have traditionally been characterized. Other characteristics typical of public sector customers include:

Public Sector Customer Characteristics

- Lack of staff, resources, and limited in-house technical expertise;
- Diverse array of building types (e.g., office, jails, police stations, hospitals, maintenance facilities, and classrooms);
- Prescribed contracting requirements for vendor selection and payment (e.g., prevailing wage guidelines);
- Permanent entities with scheduled changes in leadership;
- Diverse communities including urban, suburban, and rural areas in varying climate zones;
- Significant level of oversight and public review;
- Unique relationship with communities served;
- Long and bureaucratic decision-making processes; and
- Public service-driven mission dominates secondary priorities.

Segments and sub-segments

The SoCalGas public sector is defined by four segments: local government, state government, federal government, and education. These public sector segments are made up of many

related sub-segments that are broken down by agency, department, or district affiliation. Current local government²⁴² and institutional partnerships are comprised of state government and institutions, and local governments (cities and counties). Special Districts²⁴³ fall into the segment that they represent based on their decision-making authority. Private hospitals, private universities, and private water agencies are considered “commercial” customers and are covered in the commercial sector chapter.

Public Sector Segments

In looking at the public sector, SoCalGas identified four unique customer segments by which to group its customers.

Local Government	State Government	Federal Government	Education
<ul style="list-style-type: none"> •City •County •Special Districts (Water, Waste, Transportation, Fire, Police, etc.) 	<ul style="list-style-type: none"> •Correctional Facilities/ •Hospitals •State Agencies & Departments 	<ul style="list-style-type: none"> •Military •Hospitals •Other Agencies •Native American Tribes 	<ul style="list-style-type: none"> •K-12 (includes private) •Higher Education: <ul style="list-style-type: none"> •California Community Colleges (CCC) •California State Universities (CSU) •University of California (UC) •UC Hospitals

Customer Landscape

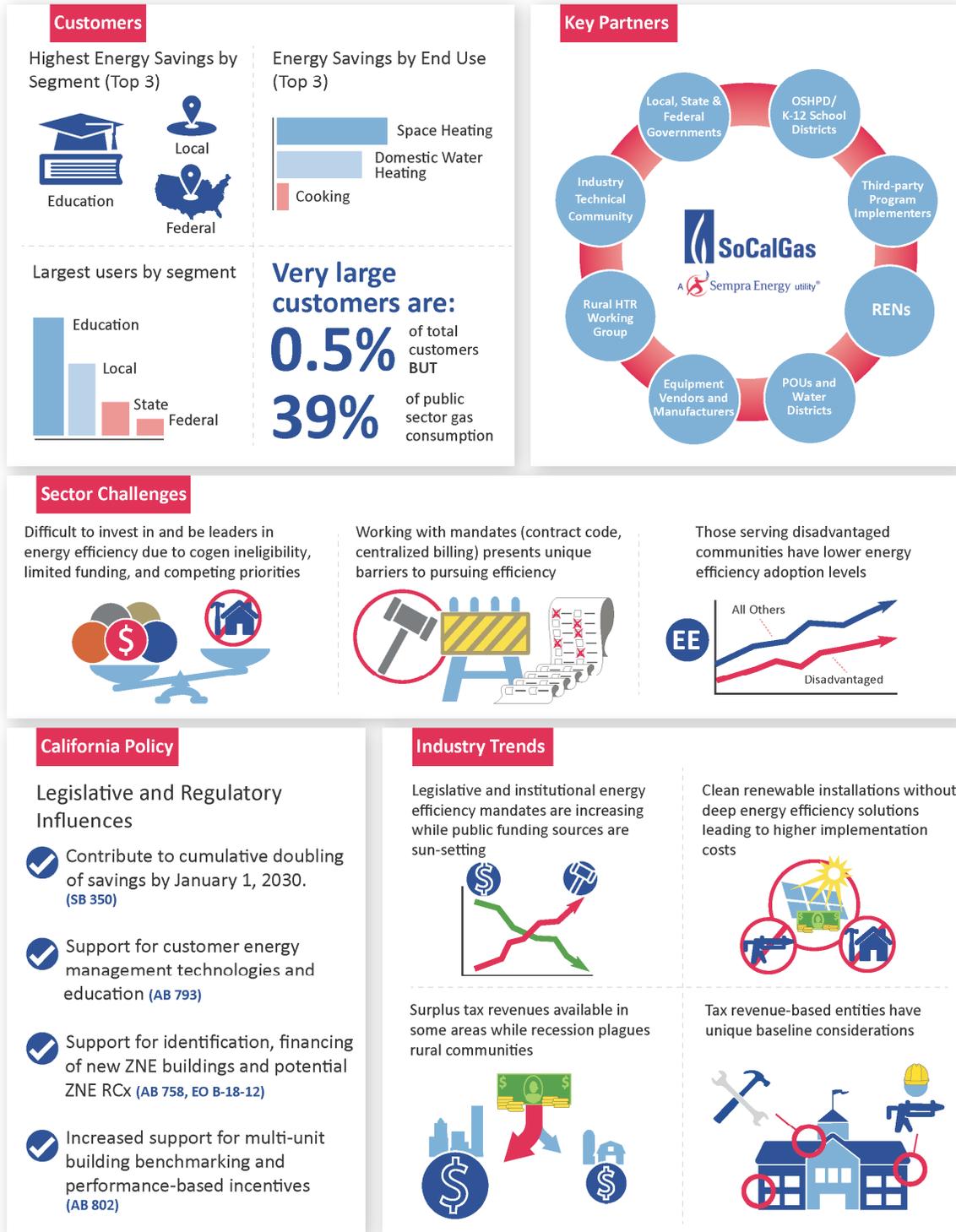
The market characterization of the public sector can be described in terms of the strengths, opportunities, policy drivers, partners, customers, challenges, and trends. Figure 1 shows the market characterization of the public sector.

²⁴² Public Housing is covered in the residential sector business plan under multi-family housing.

²⁴³ The California Special District Association defines special districts as, "a form of local government created by a local community to meet a specific need." California Special District Association. (2016). *Special districts*. Retrieved from <http://www.csga.net/special-districts/#sthash.VF8LRTFP.dpuf>

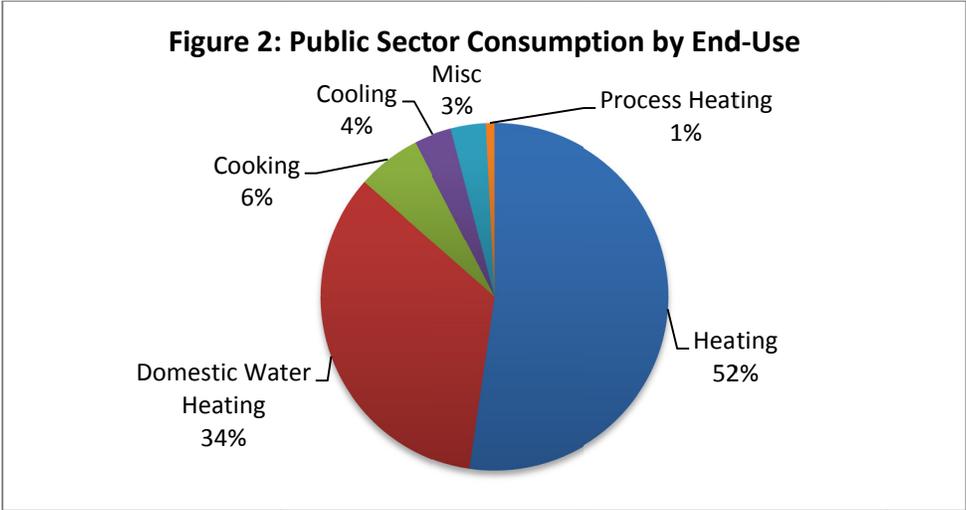
Figure 1

Public Sector - Market Characterization



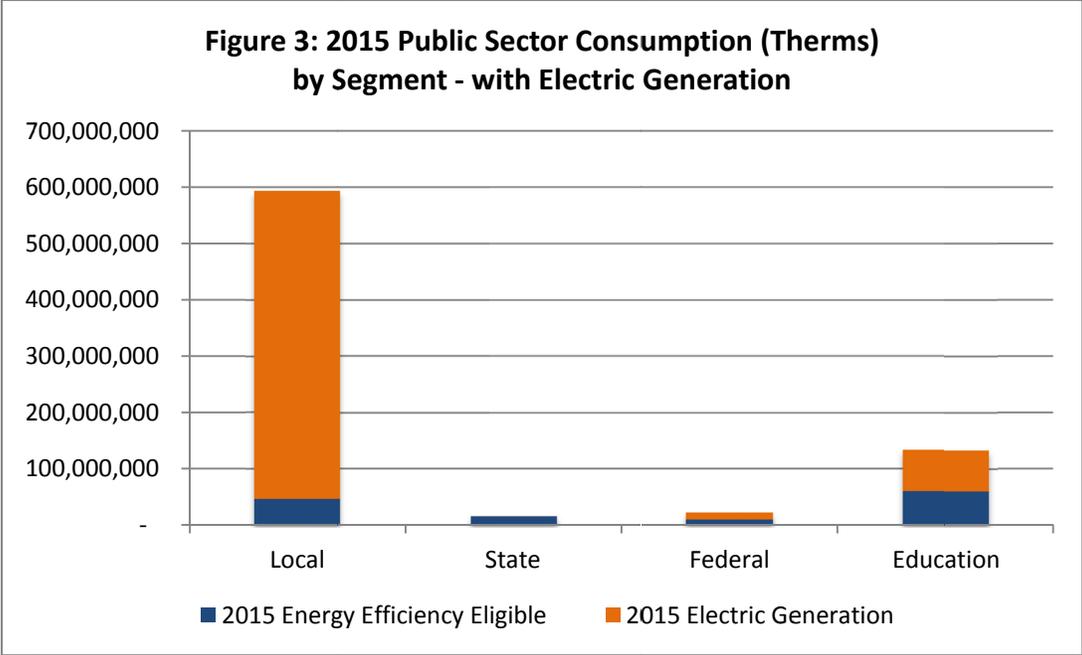
Public Sector Energy Usage

In 2015, SoCalGas public customers consumed over 134 million therms, not including gas consumed for electric generation. This public sector usage represents approximately 3% of SoCalGas’ total energy efficiency-eligible customer load. Natural gas consumption is highest for heating end-uses in the public sector as shown in Figure 2.²⁴⁴



Gas consumption by public sector customers is heavily impacted by load that is ineligible for energy efficiency programs. As shown in Figure 3, electric generation load, including cogeneration, can be more than half of the total gas consumption for individual customer segments (approximately 92% for Local, 54% for Federal, and 55% for Education). This consumption profile presents a traditional energy efficiency challenge, as electric generation consumption is exempt from paying the Public Purpose Program “surcharge” (PPPS) and thus does not qualify for energy efficiency programs under the current structure.

²⁴⁴ Includes only data from the Education segment (K-12 and Colleges), as Consumer End Use Data is not available for the remaining public sector. Itron, Inc. (2006, March). *California Commercial End-Use Survey, CEC-400-2006-005*. Retrieved from <http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF>



Usage by Customer Size

SoCalGas has divided its public sector customers into five usage categories as represented in Figure 4 and Table 7 below; the categorization is based on 2010-2015 consumption which excludes electric generation load. SoCalGas has found that a further grouping of customers equal to or below 10,000 therms per year is an effective delineation that allows SoCalGas to identify those customers who may benefit from a different or modified program offering that provides energy efficiency solutions that match their energy consumption profile. The vast majority (almost 88%) of public customers fall within the small and very small size categories while the vast majority (65%) of consumption is from large and very large customers.

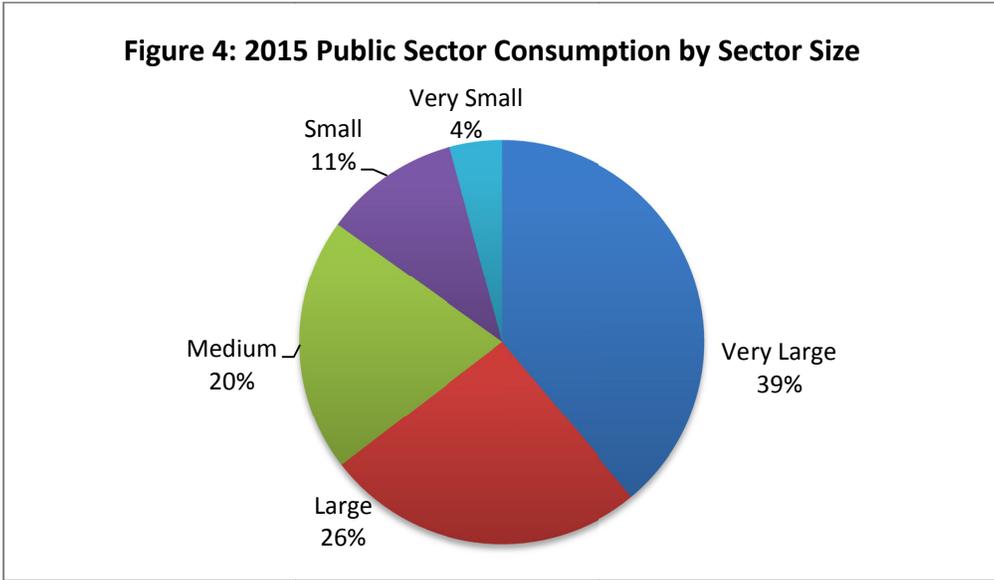
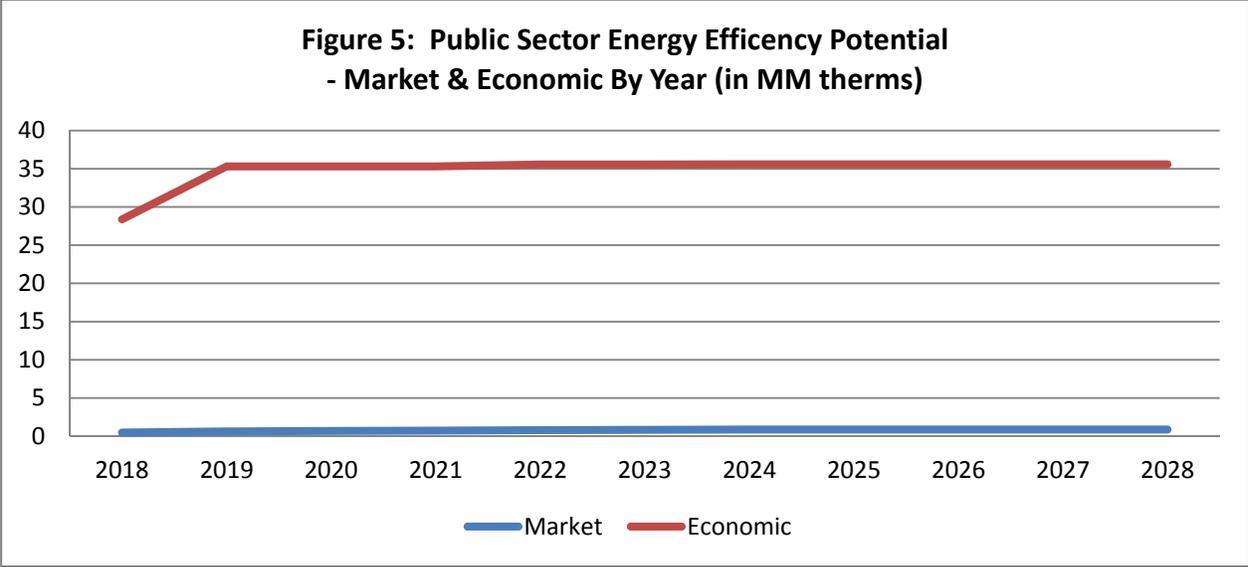


Table 7 - Energy Consumption by Customer Size (does not include electric generation and cogeneration)		
Customer Size (therms/yr)	2015 Number of Accounts	2015 Consumption (Therms)
Very Large (>250k)	65	52,151,736
Large (50k-250k)	355	34,415,698
Medium (10k - 50k)	1,207	27,309,408
Small (2 - 10k)	3,428	14,597,506
Very Small (<2k)	8,211	5,604,910
Total	13,266	134,079,258

Market & Economic Energy Efficiency Potential

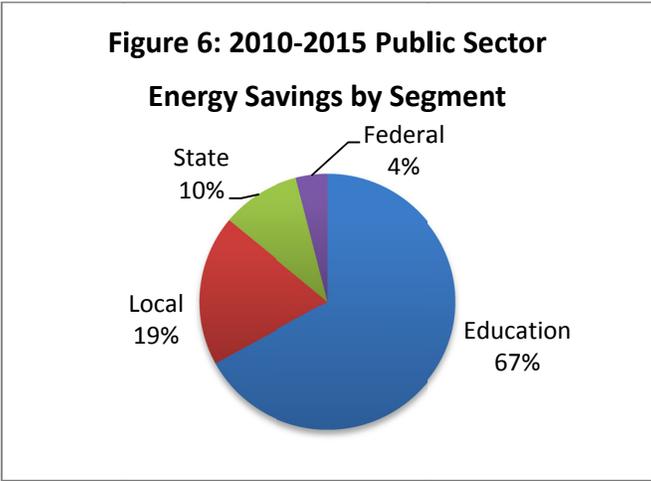
The estimated market and economic energy efficiency potential for the public sector, over the next ten years, is shown in Figure 5. Historically, public sector customers have been included in the commercial sector analyses (e.g., market potential studies). Consequently, market research has not always recognized the unique characteristics of the public sector. However, the public customer usage represents about 16% of the commercial sector (without electric generation). Until more specific data are available, this percentage is used as a proxy and applied to the commercial sector market and economic energy efficiency potential to arrive at an estimated public sector energy efficiency potential. From Figure 5, it is obvious that there is a huge difference between market and economic potential for this sector. Additional data are needed to better analyze this sector, but anecdotal evidence is clear.



Historical Sector Performance

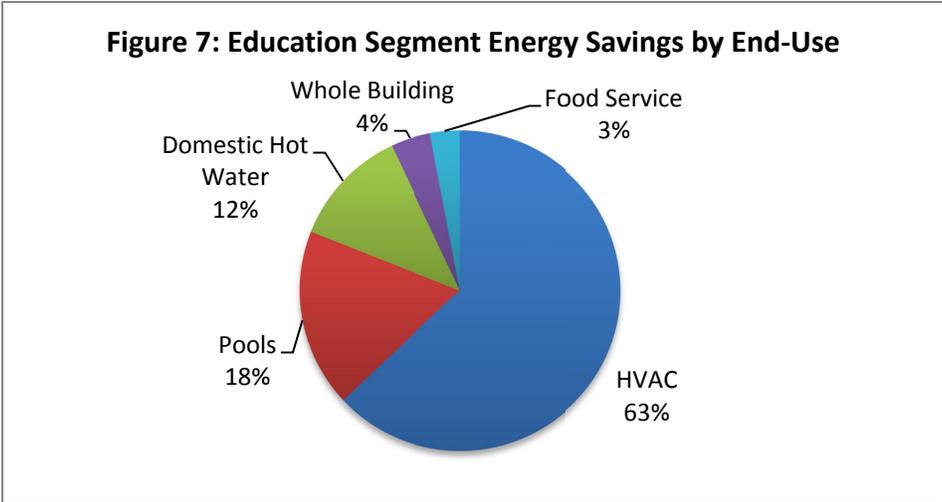
Segment

The education segment accounted for the largest portion of public sector program energy savings from 2010 to 2015, as shown in Figure 6. Other segments that account for large portions of total savings include local and state.



End-Use

Figure 7 depicts annual energy savings by end use for the education segment, the largest contributor of energy savings in the public sector.²⁴⁵ Almost two-thirds of the energy savings in this sector are associated with HVAC, followed by 18% for pool measures. Most public sector energy efficiency savings results were produced through the Calculated program, from equipment modernization measures such as equipment efficiency upgrades, variable speed drive installation, and control upgrades.



²⁴⁵ SoCalGas energy efficiency savings data, 2010-2015

Key Market Actors

To substantially increase market adoption of energy efficiency equipment in the public sector, the key market actors are the leaders of these organizations that can assist in transforming the market through adoption of public policies and practices. Additional market actors include equipment vendors, installers, and manufacturers to assist in permanently modifying equipment stocking habits as well as customer perception and acceptance of energy efficiency equipment. With unique organizational objectives of the public customer (e.g., safety and public service), partnering with various government and school district leaders and related industry associations can lead to deeper and more comprehensive energy efficiency.

Future Trends

While lacking specific data, anecdotal evidence indicates key trends in the public sector within SoCalGas' service territory, which include:

Legislative Mandates. There are several legislative mandates levied upon various public customers to promote deeper energy efficiency retrofits. These mandates are usually unfunded. SoCalGas expects to see more and more of these mandates, particularly under broader sustainability policies.

Executive Orders. Various executive orders directed at the public sector have been issued over time, and call for higher levels of energy efficiency and sustainability. These include Executive Order B-18-12, which calls for State agencies, departments, and other entities under the State's executive branch to take actions to reduce entity-wide greenhouse gas emissions by at least 10% by 2015 and 20% by 2020, as measured against a 2010 baseline.

ARRA Funding. The American Recovery and Reinvestment Act of 2009 (ARRA) helped spur investments in energy efficiency solutions to customers in the public sector. While thought to be sunsetted, there are remaining funds available to many local governments, which can continue to empower them to invest in energy efficiency and other demand-side management solutions to better manage their energy.

Proposition 39 Funding. The recent experience with energy efficiency financing for K-12 school districts and Community Colleges has been due to Prop 39 funding, which is slated to end in 2018. There will be a need to replace this funding to continue the efforts of upgrading these facilities.

Industry Standard Practices (ISP). A key baseline consideration for eligibility for energy efficiency programs, the determination of ISP for the public sector can be a make-or-break issue for whether a project can be done. The public sector by nature is comprised of not-for-profit, tax revenue-based entities with generally fixed operating and maintenance budgets. Consequently, as shown above in Figure 5, while the economic opportunities for energy efficiency are large, the market potential is very small. Given that established maintenance budgets, absent an incentive or rebate, have little impact on pursuing energy efficiency, there is

little driving these customers to replace inefficient but working equipment.²⁴⁶ Thus, the ISP is perpetual maintenance, and the effective useful life for the equipment utilized in the public sector needs an evaluation beyond what is established for the same equipment in the commercial sector.

Clean Renewables. Public customers are choosing clean renewables without incorporating deep, comprehensive energy efficiency solutions into their renewable purchases. Incorporating renewables without fully incorporating energy efficiency can result in higher implementation costs.

Increased Tax Revenues. California has mainly recovered from the 2008 recession and is now experiencing surplus tax revenue. This creates an opportunity to direct funds to assist public customers in reducing the financial barrier to energy efficiency.

Organizational Mandates. Various public customers have instituted organizational mandates such as University of California's carbon neutrality initiative to realize net zero greenhouse gases from its buildings by 2025. Achievement of these types of goals relies heavily upon assistance from energy efficiency programs.

K-12 School Calendar Changes. Public school districts are changing their traditional school calendars. Districts are moving the start of the school year to mid-August from the traditional September start date in order to complete the first semester within the same calendar year. Such changes will create a higher demand for cooling loads in August, and by extension, natural gas-fired electricity generation.

Recession Continues in Rural Communities. Recent economic studies project rural communities in California, especially in the San Joaquin Valley, to continue to have sluggish economies in contrast to other areas within the state, which have seen an increase in tax revenues since 2008. When discussing a bill to bring broadband access to California's rural communities, Assemblywoman Lorena Gonzales of San Diego described the issue as "California's rural communities face several economic challenges: the current water shortage, access to capital, high poverty rates, and environmental challenges. SoCalGas rural communities have some of the highest poverty rates in California."²⁴⁷

²⁴⁶ Navigant Consulting Inc. (2016, March 31). *AB802 Technical Analysis Potential Savings Analysis*, p. 17. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189>.

²⁴⁷ Modernize California. (2016, March 18). *Rural business and economic development groups support of AB 2395 to modernize California telecommunications policy*. Retrieved from <http://www.prnewswire.com/news-releases/rural-business-and-economic-development-groups-support-of-ab-2395-to-modernize-california-telecommunications-policy-300270676.html>.

Legislative Impacts on Strategy

There are several legislative bills providing specific guidance for the future of energy efficiency in California. From Senate Bill (SB) 350 to Assembly Bills (AB) 758, 793 and 802, there are numerous legislative directives that are shaping the next generation of energy efficiency programs. Regulatory directives were set by the Commission in the California Long Term Energy Efficiency Strategic Plan (CLTEESP). While there were no public sector-specific strategies identified in the original or updated CLTEESP, the commercial and local government directives were considered in the development of public sector strategies in this Business Plan. Table 5 contains a summary of California legislative and executive branch energy efficiency-related guidance directly impacting the public sector customer.

Policy Drivers	Guidance	Response
SB 350 – Clean Energy and Pollution Reduction Act of 2015	Achieve a cumulative doubling of savings in electricity and gas retail customers' final end uses by January 1, 2030.	SoCalGas will deliver a customer-friendly suite of energy efficiency program intervention strategies structured to significantly increase energy efficiency levels within the public sector.
AB 758 - Existing Buildings Energy Efficiency Action Plan	Strategy 3.4.1 - Look for opportunities in specific building sectors where there is evidence of ZNE technical potential, current ZNE guidance, and available financing. Strategy 3.4.3 - Make financing widely available for ZNE retrofits.	SoCalGas will partner with various public sector agencies to promote a pathway to ZNE by improving the efficiency of gas end-use technologies. Financing strategies will include an enhanced on-bill financing offering and assistance to identify and apply for alternate financing vehicles.
AB 793 – Energy Management Technology (EMT) Incentive Offering	IOUs must develop programs by January 1, 2017 that provide incentives to help residential and small/medium business customers (including schools) acquire energy management technology and educate them about these programs.	SoCalGas will offer EMT tactics to the small/medium-sized commercial-type facilities in the public sector to enable consumer-friendly, on-going virtual communication that will allow customers to continuously monitor energy consumption within their facilities. This will empower customers to permanently modify their energy consumption behavior.

Table 8 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the Public Sector Customer		
Policy Drivers	Guidance	Response
AB 802 – Benchmarking and Changes to Energy Efficiency Baselines	<p>Benchmarking - By January 1, 2017, for multi-unit buildings, utilities must provide aggregated energy usage data to its owner, its agent, or the building operator. California Energy Commission will set requirements for public disclosure of information for benchmarking purposes.</p> <p>Baselines - Authorizes utilities to provide incentives to customers for energy efficiency projects based on normalized metered energy consumption (NMEC) as a measure of energy savings.</p>	<p>While focused on benchmarking and baselines, SoCalGas will leverage this effort to support its Intelligent Outreach program strategy. Tactics such as data sharing will provide usage data to the customer to support benchmarking activities.</p> <p>Program offerings such as pay-for-performance will encourage both energy efficiency retrofit and behavioral changes through incentives based on NMEC as an estimate of energy savings.</p>
Executive Order (E.O.) B-18-12 – Greenhouse Gas Reduction for State Agencies	<p>Under E.O. B-18-12, all new State buildings and major renovations beginning design after 2025 are ordered to be constructed as Zero Net Energy facilities; with an interim target for 50% of new facilities beginning design after 2020 to be Zero Net Energy. New or major renovated State buildings and build-to-suit leases larger than 10,000 square feet are ordered to obtain LEED “Silver” certification or higher. New and existing buildings shall incorporate building commissioning to facilitate improved and efficient building operations. State agencies shall identify and pursue available financing and project-delivery mechanisms to achieve these goals.</p>	<p>SoCalGas will partner with various public sector agencies to promote a pathway to ZNE by improving the efficiency of gas end-use technologies.</p> <p>Complimentary incentive-based programs and enhanced technical assistance will support the public sector customer in meeting this executive order.</p>

A summary of the recent legislative and regulatory directives along with SoCalGas’ proposed program strategies to address these directives are detailed in Appendix A.

E. Goals, Strategies and Tactics for the Public Sector

To realize the desired sector outcomes (i.e., sector goals), the following sector-level strategies summarize the approach to achieving each of the sector-level goals. These sector strategies will rely on a coordinated set of specific program interventions intended to reduce key market barriers and increase energy efficiency levels. These strategies will be deployed throughout the various market channels at different intervals to increase customer energy efficiency adoption

levels. Due to the limited natural gas usage within this sector and the need to simplify customer engagement in the delivery of energy efficiency programs, SoCalGas proposes to coordinate program delivery with local utilities (electric, water), where practicable. This coordination has shown to be an effective strategy to allow for single customer engagement as it empowers the customer to implement a complete energy (and water) efficiency plan.

Goal 1: Achieve comprehensive, deep energy efficiency levels among all public facilities to support the achievement of zero net energy (ZNE) buildings. Reduce the high first cost market barrier through integrated program strategies that will create a self-sustaining funding model for public sector customers.

Sector Strategy: There are several actions that can help overcome the challenges to achieving deeper energy efficiency levels in the public sector, including:

- Create partnering opportunities that leverage the centralized decision-making authority within the public sector organizational framework to permanently modify the customer's behaviors in energy management.
- Provide financial incentive offerings that help overcome the high first cost barrier including enhanced incentives for customer groups and new pay-for-performance offerings that recognize behavioral energy savings.
- Encourage financing vehicles such as on-bill financing that address the unique obstacles within the public sector. Inform and assist customers regarding alternate funding sources to help offset retrofit costs.
- Provide support tools that use customer energy usage data to assist the customer in identifying energy efficiency opportunities and permanently modifying energy habits.
- Offer comprehensive direct install approaches in combination with on-bill financing and other financing mechanisms for smaller, similar facilities.
- Coordinate with Workforce Education and Training (WE&T) to provide education and training on code changes, new technologies, and skills needed to meet legislative mandates (i.e., ZNE design, benchmarking, and retrocommissioning). Additional information is provided in Section I of this chapter.

Goal 2: Incorporate energy efficiency into policies and practices to permanently modify the public customer's organizational decision-making process regarding energy efficiency solutions. Organizational change will occur through energy action plans, partnering, technical assistance, sharing best practices, and other applicable program strategies.

Sector Strategy: Permanent changes to organizational practices are needed to support aggressive advancement of energy efficiency in the public sector. As most public customers are governed by a centralized decision-making authority, they are uniquely positioned to apply a limited, efficient partnering strategy. There is a real opportunity to transform the customer's decision-making process that will result in permanent adoption of energy efficiency and other

demand-side management solutions.²⁴⁸ Program intervention strategies such as retro-commissioning, enhanced incentive offerings, strategic energy management and technical assistance coupled with changes to how energy efficiency is recognized for below code energy savings will enable public customers to address older building stock.

Goal 3: Increase energy efficiency adoption levels among public sector customers in rural and disadvantaged communities. Adoption of energy efficiency will continue²⁴⁹ and will be accomplished through a coordinated targeting of program strategies that can reduce the unique market barriers facing customers in these communities.

Sector Strategy: Increase outreach to public sector customers serving rural and disadvantaged communities through a targeted suite of rural outreach offerings.²⁵⁰ Provide a simplified program experience through a concierge approach, which will offer programs designed to overcome the unique barriers these customers face. Data analytics will inform customers of energy efficiency opportunities and ways to better manage their energy. Various program intervention strategies will be deployed such as comprehensive direct install, enhanced incentives (e.g., contractor incentives) and technical support. Workforce Education and Training (WE&T) will offer courses and training in disadvantaged communities in coordination with other public sector offerings.

Program Intervention Strategies

The following is a comprehensive list of program intervention strategies that will be directed at SoCalGas' public sector customers at various intervals through 2025. This approach supports an adaptable program portfolio that can react quickly to the dynamic market and future changes to energy efficiency policies. The strategies are intended to overcome the various market barriers identified in this Business Plan to achieve the desired sector outcomes (i.e., sector goals). These strategies will be deployed in a cohesive manner at various stages during the execution of the Business Plan to achieve the sector-level goals.

²⁴⁸ "Department of General Services work with other State agencies to develop by July 1, 2013, policies and guidelines for the operation and maintenance of State buildings to achieve operating efficiency improvements and water and resource conservation, and to continually update and incorporate these into the State Administrative Manual." California Office of Governor Edmund G. Brown Jr. (2012). Executive Order B-18-12. Retrieved from <https://www.gov.ca.gov/news.php?id=17508>.

²⁴⁹ Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 88. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

²⁵⁰ *Id.* at 89.

Figure 8

Public Sector Strategies will leverage program intervention strategies to achieve goals and realize the 10-year vision

Vision Statement

California’s public sector will incorporate energy efficiency into their policies and practices to capture all energy efficiency opportunities throughout their facilities thereby enabling a pathway to zero net energy.

Goal 1

20% increase in customer participation by 2025

Goal 2

20% increase in energy savings from each segment by 2025

Goal 3

15% increase in energy savings from rural and disadvantaged community customers by 2025



Goal 1 Strategies

- Partner to leverage centralized decision-making authority
- Use P4P and enhanced incentives that recognize behavioral savings
- Assist customers with OBF and other financing vehicles
- Provide energy usage data to help customers permanently modify behavior
- Offer comprehensive DI with OBF for smaller, similar facilities

Goal 2 Strategies

- Permanently change organizational practices through centralized partnering strategy
- Address older building stock with RCx, enhanced incentives, SEM, technical assistance, and below-code savings assistance

Goal 3 Strategies

- Provide targeted outreach to customers serving disadvantaged, rural communities
- Use concierge approach to help overcome unique barriers
- Use data analytics to advise on better energy management approaches
- Provide comprehensive DI, contractor incentives, technical support, and WE&T trainings in coordination with other customer offerings

Program Intervention Strategy: **Partnering**



Partnering can create very effective alliances where there are common goals. Mutual collaboration and coordination as well as equitable contribution of resources and commitment are key to such program strategies. Partnering with other entities, through structured arrangements, is intended to: increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement; and reduce program costs through a cost-sharing partner model.

The primary responsibility of the public sector customer is to provide a specific set of public services to its constituents. With these responsibilities, other activities, such as promotion of energy efficiency within the respective public sector organizations, become secondary. A partnering strategy can assist the customer with modifying organizational practices to consider energy efficiency and its corresponding benefits as part of regular decision-making processes. For example, public customers often limit their participation in energy efficiency programs because of existing procurement policies. K-12 schools typically procure and inventory equipment in parts (not complete pieces of equipment).²⁵¹ The customer is then hesitant to replace whole equipment because of the stranded parts inventory that would be created. Other procurement-related matters include low-bid requirements, using prevailing wages and restrictions on accessing private financing, all of which create barriers to adopting energy efficiency solutions. Partnerships can assist in evolving organizational practices that can support greater adoption of energy efficiency solutions. Ultimately, partnering will allow collaboration with various public customer segments to create deep energy retrofit plans for facility retrofits and new construction opportunities, including energy-related behavioral changes.

Partnering will also include collaboration with key industry groups to help increase sharing of energy efficiency best practices and to reduce concerns about energy efficiency performance uncertainty and increase customer awareness of energy efficiency opportunities. For instance, organizations like California Association of School Business Officials (CASBO)²⁵² hold very effective forums that reach many K-12 unified school districts at one time, thereby helping to overcome the diffused market barrier. Partnering with various public sector industry groups will also provide an opportunity to promote segment-specific emerging technologies to specific customer groups.

Partnering with other utilities (utility partnering) is also an effective approach to simplify the customer energy efficiency program experiences and to further reduce the high first cost

²⁵¹ SoCalGas customer feedback

²⁵² "CASBO serves more than 3,000 members by providing certifications and training, promoting business best practices and creating opportunities for professional collaboration. CASBO members represent every facet of school business management and operations." California Association of School Business Officials. (2016). *About CASBO*. Retrieved from <https://www.casbo.org/about>.

market barrier²⁵³ through combined utility incentives. Current local government partnerships have a long history²⁵⁴ in delivering effective gas and electric energy efficiency solutions to local governments. Collaboration with water agencies can also further the water-energy nexus by jointly identifying opportunities for customers to save both energy and water.²⁵⁵ Such partnerships also lend themselves to a higher level of technical assistance to overcome the hassle or transactional cost to adopting energy efficiency.

Intervention Strategy: Partnering				
Objectives: to increase the number of customers adopting energy efficiency; promote deeper, comprehensive energy efficiency; simplify customer engagement				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • Organizational practices • Diffused market • Hassle, transactional cost • Lack of information • Performance uncertainties 	Utility Partnering Facilitate the co-delivery of key program intervention strategies among gas and electric IOUs, POUs, Program Administrators, and water agencies.	Existing	NR	On-going
	Customer Partnerships Partnering with government entities to create energy efficiency action plans as part of the customer’s energy management plans.	Existing	NR	On-going
	Industry Partnering Partnering with industry associations to promote energy efficiency solutions to select customer-based groups.	New	NR	Near-term

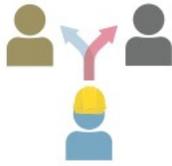
Note: R=Resource; NR = Non-resource. Near-term = 1-3 years; mid-term = 4-7 years; long-term = 8+ years

²⁵³ California’s Long Term Energy Efficiency Strategic Plan provides, "Recent legislation in CA has increased the role of local government in facilitating efficiency investments and ensuring sustainable planning. AB 811 (Levine, 2008) authorizes cities to provide low-interest loans to property owners with long-term repayments added to their annual property tax bills to help finance energy efficiency improvements and distributed generation installations. Similarly, SB 375 (Steinberg, 2008) requires metropolitan planning organizations to include —sustainable communities strategies in their regional transportation plans and creates specified incentives for the implementation of such sustainable communities strategies." California Public Utilities Commission. (2008, September). *Energy Efficiency Strategic Plan*, pp. 95-96. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

²⁵⁴ California’s Long Term Energy Efficiency Strategic Plan provides, "The CPUC has long-recognized the unique role of local governments in fostering innovation. Almost ten years ago, the CPUC directed utilities to consider programs that take advantage of the unique expertise, relationships with customers, and ability to coordinate among related activities offered by individual or groups of local government." *Id.* at 90.

²⁵⁵ California Energy Commission. (2016). *Water-energy nexus*. Retrieved from <http://www.energy.ca.gov/research/iaw/water.html>.

Program Intervention Strategy: **Intelligent Outreach**



Intelligent outreach embodies several tactical solutions to: assist customers with greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer's specific business operations. Intelligent outreach uses energy consumption data, in concert with other sources, to effectively target and inform customers about energy efficiency opportunities within their own facilities. Through a multi-faceted approach, primarily enabled by SoCalGas' advanced metering infrastructure (AMI),²⁵⁶ customers can use their energy usage data to better optimize their business operations.

With the four public sector segments, there are varied customer types, from master-metered campuses in the education segment to small, individually metered laboratories in the State and Local Government segments. For the latter, analytics applied to AMI data can help customers identify energy efficiency opportunities as well as make significant behavioral changes to manage their energy. Such data analytic methods can effectively identify facilities with higher energy efficiency potential and provide tailored energy assessments to lead the customer to make immediate behavioral changes and equipment purchases. For instance, virtual energy audits provide a simple, low touch customer experience while providing the customer with tailored ways to better manage their energy and to invest in energy efficiency retrofits. Operations and maintenance (O&M) energy efficiency opportunities can be presented to key facility staff that will enable them to implement O&M-related changes, thereby creating immediate and persistent energy savings.

For master-metered customers, more traditional outreach approaches, including facility audits, will be deployed. The facility energy audits offering will provide onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations. Industry benchmarking will be applied to individual segments and sub-segments (facility type, customer size) to inform and demonstrate energy efficiency benefits to customer, thereby helping to modify the customer's organizational practices, a key market barrier in schools in the public sector.²⁵⁷

²⁵⁶ California Public Utilities Commission. (2010, November 19). D.10-04-027.

²⁵⁷ Graff, Craig. (2015, August 6). Survey says? Higher education facility leaders want energy efficiency." *Schneider Electric Blog*. Retrieved from <http://blog.schneider-electric.com/building-management/2015/08/06/survey-says-higher-education-facility-leaders-want-energy-efficiency/>

In response to the growing energy management technology industry²⁵⁸ and legislative direction,²⁵⁹ EMTs will be used to assist customers in actively managing their energy. AMI data and EMTs can enable consumer-friendly, on-going virtual communication, to continuously monitor energy consumption within their facilities. This will empower customers to permanently modify their behavior, which will result in reliable energy efficiency savings. These technologies will also focus on appliances that can assist the customer in managing their energy, including proper equipment maintenance (e.g., HVAC self-diagnostic technology) to achieve optimal efficiency. Where practicable, the EMT tactic will also partner with electric and water agencies to provide a simple, one-touch efficiency experience. It is expected that the use of EMTs and customer AMI data will significantly reduce the hassle and transactional cost of adopting energy-efficient practices.

Due to the commonality among customers within individual segments, sharing best practices can be very effective.²⁶⁰ Where there exists opportunities to share among customers within a customer segment, sub-segment or groups, best practices forums will be created, typically in collaboration with industry groups, to reduce performance uncertainties and improve customer knowledge regarding energy efficiency practices pertinent to their business operations. For example, the current Statewide Energy Efficiency Collaborative (SEEC) creates opportunities for peer-to-peer sharing and forums that allow many of California's local governments to share energy efficiency best practices on regular basis.²⁶¹ A key focus will be to educate customers on changing operational and maintenance practices to increase energy efficiency levels in facilities operations to help permanently modify their decision-making practices.

²⁵⁸ Air Conditioning, Heating and Refrigeration News. (2016, April 27). *Energy Management Systems Market to Reach \$58.59 Billion by 2022*. Retrieved from <http://www.achrnews.com/articles/132346-energy-management-systems-market-to-reach---billion-by-2022>

²⁵⁹ Cal. Public Utilities Code § 717, provides for "(a) The commission shall require an electrical or gas corporation to do all of the following: (1) Develop a program no later than January 1, 2017, within the electrical or gas corporation's demand-side management programs authorized by the commission, to provide incentives to a residential or small or medium business customer to acquire energy management technology for use in the customer's home or place of business" and SoCalGas plans to extend such offerings to public-sector facilities.

²⁶⁰ In one study, SoCalGas PREPPS program was given some of the highest ratings for implementation (9.0 out of 10.0). In the same study, an unspecified number of respondents suggested that they would like "a forum whereby school districts can exchange experiences and ideas." Opinion Dynamics Corp. (2016, August 2). *PY2013-14 Third Party Commercial Program Value and Effectiveness Study Report (Volume I of II)*, CALMAC Study ID CPU0128.01, pp.41 and 58. Retrieved from http://www.calmac.org/publications/CPUC_3P_Report_Vol_I_FINAL_Published_Aug_2_2016.pdf

²⁶¹ Statewide Energy Efficiency Collaborative (SEEC). (2016). *statewide energy efficiency collaborative forum*. Retrieved from <http://californiaseec.org/seec-forum/>

In response to concerns from the local governments serving the rural communities,²⁶² a rural outreach tactic directed at public customers serving disadvantaged communities²⁶³ including rural populations will promote a suite of program offerings that are tailored to overcome unique barriers (e.g., limited contractor pool, higher financial barriers) facing rural public sector customers. The rural outreach approach will actively engage public customers in rural and other disadvantaged communities to develop and implement a focused energy action plan that will initially target projects with the highest energy efficiency potential, as well as other cost-effective opportunities. Rural outreach will be offered in concert with a full suite of public sector program strategies, which will move customers quickly to impactful energy efficiency solutions.

The Intelligent Outreach program strategy will also provide data sharing for local governments, consistent with the Commission data privacy framework, in support of mandated clean energy goals. Ultimately, the Intelligent Outreach strategy will reduce several market barriers, including lack of information and performance uncertainties, by showing customers how to incorporate energy efficiency solutions, behavioral and retrofit, into their business operations in very effective and efficient manner.

Intervention Strategy: Intelligent Outreach					
Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operations					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • Lack of information • Performance uncertainties • Organizational practices • Diffused 	Data Analytics Leverage AMI data to identify facilities with the highest energy efficiency potential for the customer. Benchmarking by segment and size will be a key element to this effort.	New	NR	Short-term	
	Virtual Energy Audits Virtual energy audits will be able to recommend both behavioral and retrofit opportunities to customer decision-makers and facilities staff.	New	R	Short-term	

²⁶² California Energy Efficiency Coordinating Committee. (2016, March 4). *Rural hard to reach public sector business plan recommendations*. Retrieved from <http://www.caeec.org/pub-stage-1-input>

²⁶³ Cal. Health & Safety Code § 39711 provides, “The California Environmental Protection Agency shall identify disadvantage communities for investment opportunities related to this chapter. These communities shall be identified based on geographic, socioeconomic, public health, and environmental hazard criteria, and may include, but are not limited to, either of the following: (a) Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation. (b) Areas with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment.”

Intervention Strategy: Intelligent Outreach

Objectives: to assist customers with the greater energy efficiency opportunities; improve program effectiveness and cost efficiency; create segment-specific benchmarking; and provide deeper, comprehensive energy efficiency solutions relevant to the customer’s specific business operations

Barriers	Tactics	Status	Type	Timing
market • Hassle, transactional cost	Facility Energy Audits Offers onsite comprehensive assessments to identify energy efficiency opportunities and traditional data driven interactive tools designed to engage and motivate customers to reduce their energy consumption through customized program recommendations. Such a tactic will be deployed for master-metered customer accounts and other applications not conducive to virtual energy analysis approaches.	Existing	R	On-going
	Energy Management Technologies EMTs will help customers better manage energy and will allow customers to achieve optimal efficiency with other equipment.	New	R	Short-term
	Industry Energy Efficiency Best Practices Offer, along with industry groups, a collaborative forum to help inform, excite, and accelerate energy efficiency actions among like customers.	Existing	NR	On-going
	Data Sharing Provide customers with better access to their energy usage data, enabling customers to use tools to better manage their energy. Support customers who are mandated to report progress towards sustainability goals.	Existing	NR	Short-term
	Rural Outreach Target customers that serve rural and other disadvantaged communities through a coordinated outreach effort that will promote a suite of program offerings that are tailored to overcome unique barriers facing these customers.	New	NR	Short-term

Program Intervention Strategy: Financial Incentives



This intervention strategy is a simplified suite of financial incentive offerings directed at customers to reduce the high first cost barrier: a key barrier for most customers.²⁶⁴ Recognizing the varied preferences among customers for

²⁶⁴ Eto, J., Prah, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Earnest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*, p. 12. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

different financial solutions, the program strategy offers a menu of tactics. Although incentive-based strategies like pay-for-performance may be suited for larger energy efficiency projects, in many circumstances, a one-payment approach (e.g., deemed and customized incentives) is very effective in motivating the customer to install energy efficiency equipment. Each of the tactics, within the overall customer incentive strategy, are intended to increase participation through simplified customer engagement while encouraging deeper, more comprehensive energy efficiency solutions including permanent energy behavior modification.

The high first cost market barrier is the largest barrier for public sector customers to overcome.²⁶⁵ The public sector typically has very limited capital to invest in facility improvements and the incremental cost associated with energy efficiency creates that much more of a challenge.²⁶⁶ A simplified suite of program tactics offering sufficient financial incentives can be an impactful program intervention strategy for the public customer. A pay-for-performance (P4P) approach could significantly impact the customer's capital decisions as P4P recognizes all energy savings realized by the customer's capital investment. The P4P strategy will provide incentive payments to the participating customer over a pre-determined time period on preset payment intervals based on measured savings, using normalized meter data, with a baseline of existing conditions associated with O&M and behavioral actions and equipment retrofits. A key element to a successful P4P program offering is the simplicity and ease of participation by which periodic, frequent energy savings claims associated with interval incentive payments are made.²⁶⁷ SoCalGas will leverage its recently approved High Opportunity Projects and Programs (HOPPs) for the combination of deep energy retrofits and comprehensive commissioning measures for buildings that are of a vintage that have a large "stranded energy efficiency load" that would otherwise not be economically feasible under existing calculated retrofit, commissioning, and deemed programs alone.

Other strategy tactics, such as customized and deemed incentive offerings, can help overcome the high first cost barrier by offering a simple, one-incentive payment customer experience.²⁶⁸ In addition, bundling of energy efficiency measures for like customers can reduce the

²⁶⁵ Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 59. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

²⁶⁶ Borgeson, M. G., & Zimring, M. (2013, April). *Financing energy upgrades for K-12 school districts*. Retrieved from https://www1.eere.energy.gov/wip/solutioncenter/pdfs/financing_energy_upgrades_k-12.pdf

²⁶⁷ The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, p. 32. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

²⁶⁸ Southern California Gas (SoCalGas) Company. (2016). *Rebates and incentives for businesses*. Retrieved from <https://www.socalgas.com/for-your-business/energy-savings/rebates-and-incentives>

customer’s perceived hassle with making energy efficiency improvements.²⁶⁹ A simple, tiered-incentive structure that increases financial incentives as higher levels of energy efficiency are realized is another way to promote deeper energy efficiency solutions.

The whole building approach views the building as a system, rather than collection of components, in which each system interacts with each other systems such as HVAC, the building envelope, and lighting. SoCalGas believes that a whole building approach can help to change operational practices and help overcome the customer’s cost to pursue energy efficiency.

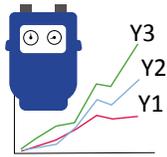
Overall, to encourage greater customer adoption of energy efficiency solutions, program requirements and the customer experience will be simplified to facilitate ease of program participation while maintaining appropriate program safeguards.

Intervention Strategy: Financial Incentives					
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Split incentive • Organizational practices • Diffused market • Hassle, transactional cost 	<p>Pay-for-Performance</p> <p>Targets more comprehensive energy efficiency projects. The P4P strategy will provide incentive payments to the participating customer over a pre-determined period on preset payment intervals based on measured savings, using normalized meter data, with a baseline of existing conditions associated with O&M and behavioral actions and equipment retrofits.</p>	New	R	Near-term	
	<p>Customized Incentives</p> <p>Offers financial incentives for customized retrofit energy efficiency projects. The program offering features incentives based on calculated energy savings for measures installed as recommended by comprehensive technical and design assistance for customized retrofits and new construction. It offers a calculation method that can consider system and resource interactions, to support integrated, whole system, and multi-resource management approaches.</p>	Existing	R	On-going	

²⁶⁹ United States Environmental Protection Agency. (2011). *Energy efficiency in local government operations: A guide to developing and implementing greenhouse gas reduction programs*, p. 37. Retrieved from https://www.epa.gov/sites/production/files/2015-08/documents/ee_municipal_operations.pdf

Intervention Strategy: Financial Incentives				
Objectives: to encourage deeper, more comprehensive energy efficiency solutions including permanent behavior modification				
Barriers	Tactics	Status	Type	Timing
	<p>Deemed Incentives Offers financial incentives based on predetermined energy savings. It also features rebates per unit measure for installed energy-saving projects and provides the IOU, equipment vendors, and customers a simple transaction and encourages greater market adoption of emerging energy efficiency technologies and applications.</p>	Existing	R	On-going
	<p>Bundled Measures Provides an integrated approach by bundling various measures together to provide an all-inclusive solution to the customer based on customer profile (segment, size, energy usage) primarily for smaller-sized customers. The bundled strategy will integrate education, financing, and technical assistance in support of the installation of energy efficiency measures.</p>	New	R	Short-term
	<p>Whole building A process that views the building as a system, rather than collection of components, in which each system interacts with other systems such as HVAC, the building envelope, and lighting. The approach is also directed at the new construction segment by promoting integrated design through owner incentives, design team incentives, and design assistance to participants who design energy-efficient spaces.</p>	Existing	R	On-going
	<p>Retro-commissioning (RCx) Assist customers with operational improvements to optimize how existing equipment operates as an integrated system.</p>	Existing	R	Near-term
	<p>Monitoring-based commissioning (MBCx) Combines ongoing building energy system monitoring with standard RCx practices with the aim of providing substantial, persistent, energy savings.</p>	Existing	R	Near-term

Program Intervention Strategy: **Strategic Energy Management (SEM)**



SEM is a program intervention strategy focused on achieving deeper and permanent energy efficiency levels for larger operations through improved customer operational and maintenance practices and energy efficiency equipment installations. SEM provides a multi-year customer engagement to permanently reshape customer operational behaviors by: (1) developing and implementing a long-term energy planning strategy; and (2) permanently integrating energy management into their business planning at all organizational levels, from the shop floor to corporate management. Continuous monitoring of energy usage confirms the energy savings realized by the SEM program strategy.

The public sector customer’s organizational decision-making process is dominated by their core mission to serve the public. The SEM strategy targets larger, more sophisticated public sector customers to permanently modify their decision-making process, thereby changing previous organizational practices that did not consider energy efficiency in their capital and process improvement decisions. To overcome performance uncertainties, continuous monitoring of energy usage will be a key tactic in this program strategy. Previous SEM approaches have been troubled with limited availability of energy consumption data.²⁷⁰ With AMI, data collection will significantly improve SEM’s effectiveness, thereby expanding the strategy to public sector customers. To encourage a greater level of retrofits and behavioral changes, a pay-for-performance tactic will be offered to customers, helping to reduce the high first cost barrier.

Intervention Strategy: Strategic Energy Management				
Objectives: to increase energy efficiency in business operations				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> Organizational practices Lack of information Performance uncertainties High first cost 	Pay-for-Performance Multi-year pay-for-performance incentives based on realized energy savings that balance the customer’s need for greater operational efficiency and ensure ratepayer benefit.	New	NR	Near-term
	Modified Savings Analysis A “bottom-up” approach of enumerating measures to demonstrate the impact of SEM on the customer operations.	New	NR	Near-term

²⁷⁰ The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, pp. 34-35. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

Intervention Strategy: Strategic Energy Management				
Objectives: to increase energy efficiency in business operations				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> Hassle, transactional cost 	Use of AMI data When estimating energy savings with regression, the probability of detecting savings increases with higher data frequency. Savings are more likely to be detected with more frequent data collection using AMI data.	New	NR	Near-term
	Cross Promotion SEM’s multi-year engagement allows an opportunity to promote other energy efficiency offerings, as well as clean renewable opportunities, including renewable natural gas.	New	NR	Near-term
	Meter Large Projects When the customer implements both capital and O&M measures during the same period, the program may employ metering of the capital project(s) to identify capital energy efficiency savings separately from O&M energy efficiency savings.	New	NR	Near-term

Program Intervention Strategy: Direct Install



The direct install (DI) program strategy delivers natural gas energy efficiency solutions, with electric and water efficiency, where feasible, to achieve near-term measurable results primarily for smaller-sized customers. A comprehensive DI tactic will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits. Comprehensive DI will rely, in part, on ratepayer funds and, in part, on customer co-fund contributions and/or customer financing through on-bill financing or other financing vehicles.

The public sector is dominated by smaller facilities throughout the four customer segments. Per the public sector market characterization, many public customers operate numerous smaller facilities that typically have similar energy usage profiles, such as K-12 schools and state agency departments (e.g., Department of Motor Vehicles). With limited access to capital and performance uncertainty regarding future benefits, many customers do not consider energy efficiency retrofits for these facilities. Paired with market barriers including the perceived high first cost, split-incentives, hassle factor, and lack of awareness, customers are less willing to pursue energy efficiency retrofits. A DI strategy can overcome each of these market barriers by offering installation of low/no cost energy efficiency measures to the customer. By using pre-selected contractors under contract to the Program Administrator, these trained contractors can assess the optimal energy efficiency solution for the customer’s site and properly install the

equipment. A comprehensive DI offering will extend beyond the standard DI offering to achieve deeper, more comprehensive energy efficiency equipment retrofits. In coordination with a customer’s energy action plan, comprehensive DI will extend beyond prior DI offerings, which provide only a limited energy efficiency measure list. Comprehensive DI relies on a customer co-pay approach, where the customer pays a portion of the retrofit costs, which can significantly reduce the cost to the ratepayer. Other funding sources, such as Prop 39 funds, district funds, and/or on-bill financing can be used by the customer to fund their co-payment contribution. Comprehensive DI will accommodate public sector procurement policy requirements such as prevailing wage requirements and using in-house staff to perform work, where applicable.

To further improve the strategy’s effectiveness, the offering will be coupled with data analytics to identify smaller-sized customers with greater energy efficiency potential. A partnering strategy with utilities that share a common customer base will also be used to reduce implementation costs. In addition, the public sector DI strategy will be coordinated and promoted with the small business DI strategy within the commercial sector.

Intervention Strategy: Direct Install					
Objectives: to achieve near-term measurable results primarily for smaller-sized customers					
Barriers	Tactics	Status	Type	Timing	
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Split-incentive • Lack of information • Performance uncertainties 	Standard Direct Install Targets smaller-sized customers through the intelligent outreach strategy, which will identify facilities with the greatest energy efficiency opportunity. The standard DI offering will provide a limited list of low/no cost energy efficiency measures.	New	NR	Near-term	
	Comprehensive Direct Install Encourages deeper energy savings by offering more comprehensive energy efficiency measures. Comprehensive DI will utilize qualified contractors that will engage directly with customers to install measures. A co-pay option will be offered to the customer along with on-bill financing to offset the initial cost of the energy efficiency equipment.	New	NR	Near-term	

Program Intervention Strategy: Technical Assistance



Technical assistance is an information strategy focused on educating and training key facility personnel on energy efficiency practices and providing supplemental assistance in energy efficiency project development and implementation.

In the public sector, the lack of resources (high first cost barrier) within various organizations is a major hurdle in pursuing energy efficiency.²⁷¹ Technical assistance is an information strategy focused on educating and training key facility personnel on energy efficiency practices and providing supplemental assistance²⁷² in energy efficiency project development and implementation. Tools such as ClearPath and Ways to Save²⁷³ empower the customer to make appropriate decisions on energy efficiency opportunities within their facilities. The technical assistance strategy will also be key to creating, implementing, and maintaining momentum of the customer’s energy action plan, where applicable. Assistance will also be offered to customers to aggressively pursue Prop 39 funds and other funding sources.

Intervention Strategy: Technical Assistance				
Objectives: to assist customer with identification and implementation of energy efficiency in their businesses				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Hassle, transactional cost • Organizational practices • Lack of information • Performance uncertainties 	Technical Training Educates and trains key facility personnel on energy efficiency practices to promote long-lasting behavioral changes.	Existing	NR	Near-term
	Technical Support Provides supplemental technical assistance to customer in energy efficiency project development and implementation and in assisting in applying for Prop 39 funding and other sources.	Existing	NR	On-going

²⁷¹ Eto, J., Prah, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Earnest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*, p. 12. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

²⁷² Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 48. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

²⁷³ Statewide Energy Efficiency Collaborative (SEEC). (2016). *Feature list for the SEEC Clearpath California*. Retrieved from <http://californiaseec.org/seec-clearpath/feature-list-for-the-climate-and-energy-management-suite>; See also Southern California Gas (SoCalGas) Company. (2016). *Ways to save tool for businesses*. Retrieved at <https://www.socalgas.com/for-your-business/energy-savings/ways-to-save>

Program Intervention Strategy: **Financing**



The Public Financing program strategy relies upon various financing vehicles, including on-bill financing, to encourage public customers to adopt deeper, more comprehensive energy efficiency solutions. For many public customers, financing solutions will be encouraged to offset customer's financial contribution for an energy efficiency retrofit, or for the co-pay element of a comprehensive direct install program, to overcome the customer's financial barriers. On-Bill Financing (OBF) and the statewide California Hub for Energy Efficiency Finance (CHEEF) finance pilots will be leveraged as an essential part of this strategy.

In recognition of the unique characteristics in the public sector, including their permanency as public institutions, an enhanced OBF strategy will be offered to public customers to encourage deeper, more comprehensive energy efficiency within their facilities. Public financing is a pathway to address the high first cost barrier and to permanently modify organizational decision-making practices regarding energy efficiency-related improvements.

On-bill financing is the most effective solution when offered jointly with a customer incentive thereby making it an ideal program strategy to overcome the first high cost barrier to energy efficiency.²⁷⁴ On-bill financing offerings yield positive customer feedback for its simple, low customer interaction approach.²⁷⁵ Smaller-sized public facilities can leverage financing solutions in combination with a comprehensive DI program strategy to further reduce the high first cost and hassle factor market barriers. The public OBF program strategy will enhance the standard OBF program by employing several tactics: extending the loan period to reduce the re-payment burden, increasing the eligible loan amount commensurate with the energy efficiency retrofit opportunity, and possibly offering “construction” loan financing to address up-front funding issues. One issue many public sector customers have when doing larger projects is lack of up-front capital to pay contractors and vendors, to cover installment payments, or deposits to get the project moving. Oftentimes, customers use what is sometimes referred to “construction financing” to cover this short-term need, but it is costly and difficult to obtain. Consequently, SoCalGas is intending to develop a construction loan program as part of its OBF strategy to fill this gap. The OBF strategy proposed will allow public customers to finance deeper, more comprehensive energy efficiency projects. Where applicable, other financing strategies will be offered.

The Public Financing Assistance (PFA) tactic will be offered to public customers to encourage self-sustaining funding of energy efficiency projects and other DSM solutions, including clean

²⁷⁴ Leventis, G., Fadrhonc, E. M., Kramer, C., & Goldman, C. (2016, November). *Current Practices in Efficiency Financing: An Overview for State and Local Governments* (No. LBNL-1006406). Retrieved from <https://emp.lbl.gov/sites/all/files/lbnl-1006406.pdf>

²⁷⁵ *Id.* at 5.

renewables.²⁷⁶ The PFA offering will educate customers on how to create a self-sustaining funding mechanism. Developing and providing the seed-funds needed to start a PFA program are a key factor in adopting such programs, so the PFA encourages the customer to set aside the funds created by prior energy efficiency project rebates and/or bill savings into a dedicated fund within a customer’s annual operating budget. These customer funds can be used in combination with on-bill financing, as well as non-ratepayer funding sources (e.g., Prop 39, bonds). This ultimately will allow the public sector to create a more self-reliant funding model. PFA will also assist customers with identifying alternate, non-ratepayer funding sources. For example, PFA can assist unified school districts in the development of bond initiatives to include mandatory funding of energy efficiency and clean renewable projects.

Intervention Strategy: Financing				
Objectives: to assist customers with the high cost of equipment retrofits in support of deeper, more comprehensive energy efficiency solutions				
Barriers	Tactics	Status	Type	Timing
<ul style="list-style-type: none"> • High first cost • Organizational practices • Hassle factor 	On-Bill Financing Offers interest-free, utility ratepayer financed, unsecured energy efficiency loans to qualified nonresidential customers with qualified projects, which are repaid over time via the customer’s utility bill. ²⁷⁷	Existing	NR, R	Near-term
	Public Funding Assistance Provides help to customers in creating a self-sustaining funding mechanism to fund future energy efficiency projects. Offers assistance in identifying and applying for alternate non-ratepayer funded energy efficiency financing.	New	NR, R	Near-term
	Credit Enhancement Provides interest subsidies for financial institutions as an incentive for offering low interest loans.	Existing	NR, R	Near-term
	On-Bill Repayment Privately financed, unsecured energy efficiency loans to qualified customers with qualified projects, which are repaid over time via the customer’s utility bill.	New	NR, R	Near Term

²⁷⁶ LADWP and LAUSD have developed a revolving fund for future demand response activities.

²⁷⁷ Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*, p. 87. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

F. Performance Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the Business Plan proposes key sector metrics. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the Program Administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach facilitates metric tracking while keeping the monitoring costs to reasonable levels. The sector-specific metrics are presented in Table 6 below. Over time, metrics and targets may be adjusted and improved to more accurately reflect sector progress.

Table 9 - Public Sector Metric Table								
10-Year Vision:								
The public sector customers are generally governed by a centralized decision-making authority that are uniquely positioned to permanently transform their respective organization’s decision-making process that will result in deeper energy efficiency and adoption of other DSM solutions including clean renewables.								
Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Many public sector customers have low energy efficiency adoption.	1. Increase adoption of energy efficiency solutions by customers that have significant energy efficiency potential to support ZNE-ready buildings.	Partnering	Increase number of public sector customer participating in energy efficiency programs.	2015 participation levels.	Program tracking data.	Increase the number of program participants by 15% over 2015 levels by Year 3.	Increase the number of program participants by 35% over 2015 levels by Year 7.	Increase the number of program participants by 50% over 2015 levels by Year 10.
		Intelligent Outreach						
		Customer Incentives						
		Direct Install						
		Financing						
		SEM						
		RCx/MBCx						
Technical Assistance								
Public sector-specific mandates (e.g. public contract code,	2. Permanently modify organizational practices to have customers	Partnering	Increase adoption of permanent energy efficiency	Market characterization study needed.	Program tracking data.	Increase number of policies that promote energy	Increase number of policies that promote energy	Increase number of policies that promote energy
		Intelligent Outreach						
		Technical Assistance						

Table 9 - Public Sector Metric Table

10-Year Vision:
 The public sector customers are generally governed by a centralized decision-making authority that are uniquely positioned to permanently transform their respective organization’s decision-making process that will result in deeper energy efficiency and adoption of other DSM solutions including clean renewables.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
sustainability goals, and centralized energy billing practices) create competing priorities that do not consider energy efficiency.	naturally consider and adopt energy efficiency solutions by incorporating energy efficiency into applicable energy mandates, policies, and practices.	SEM	mandates, policies, and practices.			efficiency by 5% over 2015 levels by Year 3.	efficiency by 20% over 2015 levels by Year 7.	efficiency by 50% over 2015 levels by Year 10.
Public customers serving disadvantaged communities are particularly impacted, which is demonstrated	3. Increase energy efficiency levels among public sector customers in disadvantaged communities.	Partnering	Increase in energy efficiency savings from public sector customers in rural and disadvantaged communities.	Program tracking data.	Program tracking data.	Increase energy efficiency savings from public customers in rural and disadvantaged communities	Increase energy efficiency savings from public customers in rural and disadvantaged communities	Increase energy efficiency savings from public customers in rural and disadvantaged communities
		Intelligent Outreach						
		Customer Incentives						
		Direct Install						
		Financing						
		SEM						
		RCx/MBCx						

Table 9 - Public Sector Metric Table

10-Year Vision:

The public sector customers are generally governed by a centralized decision-making authority that are uniquely positioned to permanently transform their respective organization’s decision-making process that will result in deeper energy efficiency and adoption of other DSM solutions including clean renewables.

Problem Statement	Desired Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
by low energy efficiency adoption levels.		Technical Assistance				by 5% over 2015 levels by Year 3.	by 15% over 2015 levels by Year 7.	by 50% over 2015 levels by Year 10.

G. Key Partners

The success of the public sector Business Plan will rely on positive, collaborative relationships with a number of market actors, Program Administrators, regulators, and other government entities. Table 10 below includes a list of key partners that will help SoCalGas successfully achieve its ambitious vision for the public sector.

Table 10 - Key Partners	
Key Partners	Support Activity
Program Administrators	<ul style="list-style-type: none"> • Deliver dual-fuel programs to reach more customers; • Leverage all available best practices and promote statewide consistency, where appropriate; • Simplify program engagement; • Capture all energy efficiency benefits including operational energy savings; and • Conduct market research that will identify and better understand unique barriers to energy efficiency investments.
Publicly-owned Utilities (POUs) and Water Districts	<ul style="list-style-type: none"> • Continue to actively coordinate with POUs and water agencies to effectively deliver energy and water efficiency programs; • Engage in partnership and co-delivery arrangements with POUs and water agencies when there is a shared customer base (gas, electric) to simplify the customer engagement and achieve higher levels of energy efficiency; and • Coordinate with POUs and water agencies throughout California and other regions to share best practices in program administration, design, and delivery.
Regional Energy Networks	<ul style="list-style-type: none"> • SoCalGas will continue its collaboration and coordination with SoCalREN to offer complimentary energy efficiency program offerings through on-going, regularly scheduled meetings and conferences; and • Ensure minimal overlap and duplication of services.
Local and State Governments	<ul style="list-style-type: none"> • SoCalGas will leverage its existing partnerships with local and state governments to assist in the development and implementation of program strategies to assist the broader local and state government public sector customers, including those who serve rural and disadvantaged communities.
State and federal agencies	<ul style="list-style-type: none"> • SoCalGas will work with state and federal agencies (e.g., DFA, DWR, USDA) to promote greater levels of energy efficiency adoption throughout the various customer segments.
Office of Statewide Health Planning and Development (OSHPD)	<ul style="list-style-type: none"> • SoCalGas will work with OSHPD to incorporate energy efficiency in hospital design guidelines and for approval of energy efficiency retrofits.
K-12 School Districts	<ul style="list-style-type: none"> • Actively work with K-12 school districts to create and implement an energy efficiency retrofit plan that includes permanent behavioral changes to capture deeper energy efficiency savings.

Table 10 - Key Partners	
Key Partners	Support Activity
California Public Utilities Commission and Key Stakeholders	<ul style="list-style-type: none"> SoCalGas will work with the Commission and other key stakeholders to investigate ways to simplify program requirements and to identify policies that will recognize all energy efficiency benefits associated with the sector energy efficiency programs.
Third-party Program Implementers	<ul style="list-style-type: none"> Solicit new and innovative programs from third-party program implementers to address the sector. Leveraging third-party programs allows Program Administrators to draw upon creative program solutions that can be quickly and effectively targeted to these customers. Continued collaboration with program implementers throughout the program’s lifecycle will be an integral part of program success.
Rural Hard to Reach Working Group	<ul style="list-style-type: none"> SoCalGas will leverage its existing relationship with the Rural Hard to Reach Working Group to assist in efforts with industry associations; the concept will also be employed in other areas of the service territory.
Public Organizations	<ul style="list-style-type: none"> Public organizations can provide an effective path to sector collaboration, particularly by serving as a trusted source of information about business concerns facing specific segments. Public organizations have the ability to survey their membership to find common concerns and potential solutions. Understanding these concerns can help Program Administrators construct value propositions and tailor their program offerings to best serve these customers. Public organizations have established communications channels with the public segments that can further facilitate education of public sector customers about energy efficiency programs through a variety of forums, such as social and print media, ad hoc round tables, and regular meetings. SoCalGas will collaborate with public organizations to increase program promotion and customer awareness of the benefits of energy efficiency investments.
Industry Technical Community	<ul style="list-style-type: none"> Specialized technical assistance with expertise in specific segments can be highly effective in identifying energy savings opportunities in facilities. This expertise can be provided by resources that include utility in-house experts, independent technical consultants, and equipment vendors.
Equipment Vendor and Manufacturers	<ul style="list-style-type: none"> SoCalGas will actively work with equipment vendors and manufacturers to promote greater adoption of energy-efficient equipment among various customer segments.

Table 10 - Key Partners	
Key Partners	Support Activity
California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) for financing	<ul style="list-style-type: none"> Financing will be a key program intervention strategy to overcome the high first cost of energy efficiency in the public sector. SoCalGas will continue its long-term collaboration with CAEATFA to design and promote innovative financing strategies that will encourage greater customer investment in energy efficiency. However, the financing for the public sector will rely mostly on an enhanced OBF offering, and engaging various grant opportunities.

H. Local Government Partnership Statewide Consistency

A key to successful program administration is having an open, positive collaboration among program implementers and other Program Administrators. SoCalGas is committed to a coordinated and very collaborative, on-going relationship among all implementers and Program Administrators.

Over the last ten years, California’s four IOUs have closely collaborated with local partners to make Local Government Partnership (LGP) programs operate more effectively and efficiently for customers and the communities served. This includes making program offerings, where possible, more consistent across the state. There have been a number of LGP activities that have aligned statewide over the past several years including the statewide California Long-term Energy Efficiency Strategic Plan (“Strategic Plan”) menu, the streamlined statewide Strategic Plan Semi-Annual Reporting template, and LGP performance management metrics. Other activities have aligned across multiple IOUs and are on their way to become consistent statewide, such as expanded direct install program offerings, and a move to regionalize partnerships. The IOUs, however, realize that there is still much room for improvement. In the short term, the IOUs will work closely with local partners to drive toward greater consistency across the state, while allowing partners to retain their ability to tailor programs to their local needs.

One opportunity for improving consistency across IOUs is to adopt best practices. SoCalGas and the other IOUs are considering adopting a model similar to Southern California Edison’s (SCE) tiered Energy Leader model that includes natural gas in the model for all Local Government Partners, not just those in overlapping regions. In addition to aligning programs and adopting best practices, the IOUs are considering other strategies to improve the consistency of LGP administration across multi-IOU LGPs, such as developing consistent reporting requirements, offering similar contract terms and duration, and establishing a lead IOU for each LGP to coordinate joint-program activities within a region.

The IOUs are also working on aligning statewide across Strategic Plan activities. Currently, there is a statewide menu for Strategic Plan Activities as well as a statewide template for Strategic Plan Semi-Annual Reporting. Going forward, the IOUs will look to SCE’s new Strategic Plan model for opportunities to be more consistent statewide.

Supporting local governments' access to non-energy efficiency funding sources provides another opportunity for statewide consistency. The IOUs would work with the Statewide Best Practices Coordinator or another third-party entity to identify and promote alternative funding sources (both internal and external to IOUs). These sources could be used to strengthen and supplement the work that local governments are already pursuing (e.g., providing broader greenhouse gas reduction funding). Funding opportunities could be documented and managed in a database that will be made available to all local governments statewide. In addition, IOUs will explore leveraging LGP resources such as the SEEC Forum and All Partner meetings to provide information and support for alternative funding opportunities (such as Cap and Trade Funding, California Energy Commission Grants, Federal Grants, etc.).

As Core programs ordered to statewide implementation continue to transition, IOUs anticipate that LGPs will benefit from these changes as partnerships actively leverage new statewide programs, such as commercial HVAC, Savings by Design, Primary Lighting, and Gas and Electric Emerging Technologies.

In support of continuous improvement of statewide consistency, the IOUs will utilize the California Energy Efficiency Coordinating Committee Public Sector Sub-committee on an on-going basis to discuss opportunities to improve program administration, share best practices, and provide a venue to determine whether a given solution should be adopted across the state. Other future opportunities for greater statewide consistency include contracting, Core program coordination, and transitioning partnerships to an Integrated Demand-Side Management focus.

The ultimate goal of energy efficiency market transformation programs is to drive the market to a point where the adoption of all cost-effective energy efficiency is standard practice. To that end, over the coming years the IOUs will work closely with key stakeholders to evolve the existing partnership model to more effectively transform local governments to become self-sustaining leaders of energy efficiency. Some potential ideas may include adopting energy efficiency revolving funds, encouraging a self-funding model for energy managers, and leveraging other sources of funding.

I. Cross-cutting Sector Coordination

Local Marketing and Statewide Marketing, Education & Outreach Integration

The sector programs will rely on a combination of locally targeted promotion of specific energy efficiency programs tailored to the various segments throughout the sector. There will be a focus on historically underserved customers with higher energy efficiency potential, through data analytics, to encourage greater program participation.

Since the statewide Marketing, Education, and Outreach (ME&O) program's short-term goal is focused on the mass market customer (i.e., residential and small business owners) and with relatively few public sector customers compared to the overall customer base, the public sector program will rely on targeted outreach efforts to inform public customers on the importance of energy efficiency, their opportunities to act, and the benefits of their actions. SoCalGas will actively participate in both the development of the five-year ME&O Strategic Roadmap and

Annual Joint Consumer Action Plans to coordinate program offerings with the statewide marketing efforts and to support the short- and long-term goals of the ME&O program.

Workforce Education & Training Integration

The Workforce Education & Training (WE&T) effort is well positioned in its role of facilitating training on the skills needed by the workforce to perform the type, level, and quality of work to reduce energy consumption and achieve the energy savings targeted by the State. WE&T will provide classes, seminars, consultations, and demonstrations to support local government training programs for code compliance. To achieve this, WE&T staff will collaborate with the public sector to expand relationships with government (local, state, and federal) departments, agencies, and partnerships. The WE&T team can also leverage connections with public education entities to further advance the goals of the public sector.

WE&T will also assist public customers (and their staffs) by providing technical education and/or in field training to help the public customer convert interest into energy efficiency actions. Public sector education and training offerings will align with energy savings potential data and focus primarily on large public facility equipment such as boilers and steam plants. Training programs will be targeted to designers, engineers, contractors, operators, owners, facility managers, public workers, and local government staff managing facilities with high potential energy reduction opportunities across building types. Education and training will target disadvantaged communities in coordination with the public sector to achieve the following goals:

- achieve comprehensive, deep energy efficiency levels among all facilities to support the achievement of zero net energy (ZNE) buildings; and
- increase energy efficiency levels among public sector customers in disadvantaged communities.

Emerging Technologies

The statewide Gas and Electric Emerging Technologies Programs (ETPs) have a number of long-running partnerships with public entities, including schools and universities, hospitals, water and waste water treatment facilities, military bases, and federal, state, county, and local government agencies. The Gas and Electric ETPs will support these entities by screening technologies that can be used in the implementation of Executive Order B-18-12, helping to identify energy-saving technologies that are economically viable for cash-strapped agencies, and exploring innovative new solutions for which some public buildings are uniquely positioned to adopt.

Across California, the Gas and Electric ETPs are assisting in public sector efforts to implement state initiatives. These initiatives include Executive Order B-18-12, which stipulates that state agencies reduce grid-based energy purchases by at least 20% by 2018, and incorporate building commissioning into projects to help ensure new buildings perform at maximum efficiency. The statewide Gas and Electric ETPs will help to advance these efforts by evaluating commissioning

solutions and offering support for technologies that can decrease overall energy expenditures specifically in the public sector.

The economics of the public sector sometimes allows facilities to explore efficiency upgrades with a payback period that would be out-of-reach for cash-strapped private sector customers. For these public sector customers, Gas and Electric ETPs can offer expertise and support for pilot demonstrations. The Gas and Electric ETPs also work to accelerate the time-to-market for emerging solutions that may be too new or difficult to justify for a small business but may be a good fit for some public facilities. These sorts of activities align well with SB 350, which will require adoption of innovative new solutions.

Codes & Standards

The Statewide Codes and Standards (C&S) Program advances technologies into code through advocacy work with standards and code-setting bodies, such as the California Energy Commission (CEC) and the Department of Energy (DOE), to strengthen energy efficiency regulations by improving compliance with existing C&S and assisting local governments to develop ordinances (reach codes) that exceed statewide minimum requirements. The C&S effort will work with public sector customers, primarily local government customers on code compliance improvement activities. Local government customers will also receive assistance to improve their code check practices and policies as well as updating their internal systems supporting code compliance. Local governments will also be encouraged to participate in industry best practices regarding code compliance.

Financing

Please refer to the Finance section of the cross-cutting chapter for more information on the CHEEF pilots. The public sector will have access to at least one of the nonresidential pilots, which will have an on-bill feature (but no credit enhancement).

Other DSM Programs

To assist customers in managing their energy, the program strategies presented in this Business Plan will be coordinated and integrated with other customer demand-side opportunities, where feasible.

Integrated DSM

Integrated Demand-side Management (IDSM) encourages the integration of a full range of DSM options such as energy efficiency, advanced metering, low income energy efficiency, distributed generation, and alternative fuel vehicles. In short, IDSM is fundamental to achieving California's strategic energy goals, as presented in the CLTEESP. IDSM efforts will continue to identify and promulgate best practices, address implementation, and program policy issues across customer DSM programs. IDSM will specifically look for integration opportunities, identify integration barriers, and work with both Program Administrators and program implementers to promote the advancement of integration, using lessons learned, and best

practices to establish a continuous improvement process. Although, not a program, IDSM will help other DSM programs to integrate with and complement each other to facilitate a simple, effective DSM engagement with the customer.

Demand Response

The public sector Business Plan proposes to leverage emerging energy management technologies to assist customers in actively managing their energy remotely. This will include merging AMI technology with advanced energy efficiency and energy management technologies to permanently modify customer behavior, which will result in reliable energy efficiency savings and serve to support utility demand response activities. Where practicable, these efforts will also partner with electric and water agencies with AMI technologies to provide a simple, one-touch efficiency and demand response experience.

Alternative Fuel Vehicles

The public transportation industry has undergone a major vehicle transformation over the past decade because of municipal agencies setting ambitious emissions reduction standards for the benefit of the communities they serve. From compressed natural gas, liquefied natural gas, biodiesel, hydrogen, and propane autogas buses, to hybrid-electric and all-electric buses, nearly 40 percent of transit vehicles across the country are running on alternative fuels according to the American Public Transportation Association.²⁷⁸ In California, SB 350, codified in Public Utilities Code § 740.12(a)(1), states the following goal: “Advanced clean vehicles and fuels are needed to reduce petroleum use, to meet air quality standards, to improve public health, and to achieve greenhouse gas emissions reduction goals.” The public sector Business Plan proposes to increase awareness of alternative fuel vehicle options to serve the public transportation needs and significantly reduce NOx and GHG emissions. Consistent with SB 350’s goals to address barriers to access for low-income customers to zero-emission and near-zero-emission transportation options,²⁷⁹ outreach efforts directed at disadvantaged communities will also emphasize the benefits and opportunities for alternative fuel vehicles supporting the public sector. Additionally, local government planning for climate action plans includes elements for transportation (often creating the largest impact), where integration with energy efficiency will be critical.

Statewide Implementation

SoCalGas will collaborate and coordinate with other program administrators on the effective implementation of any statewide program offerings. Programs designed to engage directly with specific market actors at the midstream and upstream market channels will be

²⁷⁸ American Public Transportation Association. (2012, September). *Transit on the cutting edge of clean technology*. Retrieved at <http://www.apta.com/resources/statistics/documents/transit-clean-technology.pdf>

²⁷⁹ See Clean Energy and Pollution Reduction Act of 2015, California Senate Bill 350. (2015). See Cal. Public Utilities Code § 25327(d).

implemented on a statewide basis. Other downstream programs, beyond what is presented in the Business Plan, may also be considered candidates for statewide implementation.

Local Implementation

Local and regional solutions are necessary for the achievement of the public sector vision, goals, and objectives. Many of the current programs offered are done so in coordination with publicly-owned utilities (POUs). Such partnerships with POUs will continue at a local level. For example, SoCalGas has a strong partnership with the Los Angeles Department of Water and Power (LADWP), the largest municipality in the nation, to jointly design and deliver energy efficiency programs to a shared customer base. Such activities will continue to be implemented by the POU and/or implemented by SoCalGas-selected and managed third-party program implementers. SoCalGas will also work with other POUs to identify good program candidates to join statewide implementation efforts, where feasible.

IOU Program Implementation and Support

SoCalGas proposes to continue implementation of certain downstream programs (i.e., programs delivered directly to the customer) where it is reasonable and practicable to do so. SoCalGas will also continue to actively support the delivery of third-party programs. For example, customer services, such as incentive payments and inspections, will be provided by SoCalGas to support third-party program implementers and to safeguard ratepayer funds. For program efficiency, the customers will also be directed to the SoCalGas portal to maintain a simple, easy program participation experience for the customer. In addition, at times, it is more efficient and productive to leverage the natural relationship between SoCalGas and its customers. As the trusted energy advisor, SoCalGas has an ongoing relationship with its customers on all energy matters including energy efficiency. SoCalGas proposes to continue to promote energy efficiency programs to the customers and customer groups in order to improve the likelihood that customers will adopt energy efficiency.

J. Evaluation, Measurement, & Verification (EM&V) Considerations

Despite all the unique characteristics of the public sector, there has been no research on the overall public sector, and limited research on each of the four distinct segments.²⁸⁰ Appendix B provides references to studies and evaluations conducted to date to for specific existing programs that would fall under the public sector umbrella. A deeper examination of each of the segments including those public customers who serve disadvantaged communities is needed.

²⁸⁰ Since the public sector is newly characterized, there are no evaluation studies or recommendations for the sector as a whole. However, there have been EM&V studies for Local Government Partnerships and Institutional Partnerships.

For the local government segment, SoCalGas, along with the other IOUs, plans to conduct a comprehensive process evaluation as recommended by the California Evaluation Framework (CEF)²⁸¹ on all of its LGPs in a multi-year, multi-wave research effort. To accommodate comprehensive process evaluations for each LGP within a limited budget, the IOUs propose to conduct comprehensive process evaluations on a subset of individual LGPs each year, rotating across all LGPs in their service territory so that each LGP will receive a comprehensive process evaluation every four to five years. The IOUs propose to use a common scope of work for all individual process evaluations of the LGPs so that the findings can be compared year after year. After all LGPs have been evaluated, at the end of the four to five year period, the cycle will begin again. This will allow evaluators to provide customized and specific recommendations to each LGP being evaluated. Currently, there are no plans or budget to do EM&V research for Institutional Partnerships. The IOUs had proposed a small budget for studies to look at Institutional Partnerships but it was not approved.

The public customer can benefit greatly from permanent changes to their energy consumption practices. For instance, several operational changes can have a great impact in the amount of energy consumed by public sector customers. Estimating the impact of behavioral measures will be paramount to the near and long-term success in achieving the overall goal of the public sector Business Plan.

The following are recommendations to improve the body of knowledge regarding the public sector.

Market Research and Process Evaluation:

- Conduct a market study to identify the four segments within the public sector and to examine their unique characteristics and trends within their specific segment and sub-segment.
- Conduct a market study to identify opportunities to increase energy efficiency levels for public customers serving disadvantaged communities.
- Conduct market research on zero net energy opportunities especially for the Education segment.
- Examine local and state procurement practices to better inform what permanent changes need to occur with public procurement practices to place greater emphasis on energy efficiency.

²⁸¹ “Most programs evolve as they move through the implementation process. Even if program documents were originally developed with detailed step-by-step implementation descriptions, they are typically outdated in terms of their content and accuracy. This is not a criticism of energy programs or of their descriptive documents. Rather it is an acceptance of the understanding that programs evolve as they move through the design and delivery process and this evolution occurs on an ongoing basis.” TecMarket Works. (2006, January). *The California evaluation framework*, p. 208. Retrieved from https://www.energycodes.gov/sites/default/files/documents/bp_CaliforniaEvaluationFramework.pdf

- Survey public customers to identify where program participation process can be simplified.

Load Impact:

- Use normalized metered energy consumption data to determine the overall impact of O&M and behavior measures as an enhanced approach to quantify energy savings. For this approach, energy savings are calculated as the difference between the normalized metered energy consumption for baseline and post-intervention time periods.

CODES AND STANDARDS CHAPTER

A. Codes and Standards Vision

California has ambitious state policy goals that include doubling energy efficiency savings in electricity and natural gas end uses by 2030 (Senate Bill (SB) 350), and Zero Net Energy (ZNE) new and existing buildings, as well as longer-term greenhouse gas (GHG) objectives (SB 32). To achieve these goals, the state must continue to increase energy savings and change the way it uses resources. Past codes and standards (C&S) efforts have delivered substantial cost-effective savings, and Program Administrators envision continuing and refining these activities (see right) to maximize energy savings.²⁸² The vision for C&S moving forward is based on:

“A broad range of aggressive and continually improving minimum and higher voluntary sets of energy codes and standards will be adopted to greatly accelerate the wide-spread deployment of zero-net energy and highly efficient buildings and equipment. The effectiveness of codes and standards will be enhanced by improved code compliance as well as coordinated voluntary efficiency activities.” — California Energy Efficiency Strategic Plan

Refining the existing program

- Supporting all building codes and appliance standards with significant potential savings, of interest to code setting bodies, will ensure savings opportunities are realized.²⁸³
- Continued compliance improvement efforts, including targeted compliance efforts and development of electronic compliance infrastructure, will ensure potential savings from advocacy are realized “on the ground”.

Supporting multifaceted objectives

- California’s energy and climate-related policy goals are diverse in scope, including energy efficiency, demand reduction, renewable energy, onsite generation, grid connectivity, demand response, energy storage capacity, ZNE buildings, water efficiency, and alternative fuel vehicles. C&S must be designed and implemented with these multifaceted objectives in mind to support continued progress. While

²⁸² Ettenson, L. & Heavey, C. (2015, August). *California’s golden energy efficiency opportunity: ramping up success to save billions and meet climate goals*, p. 17. Retrieved from <https://www.nrdc.org/sites/default/files/ca-energy-efficiency-opportunity-report.pdf>

²⁸³ Most C&S work is directed at code setting bodies such as the California Energy Commission (Energy Commission), Department of Energy (DOE). Others include the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), the International Code Council (ICC), and entities that produce data or ratings referenced by codes and standards, and those in compliance-related professions.

energy efficiency will continue to be C&S's foundational goal, Program Administrators will also engage in other statewide goals that have indirect energy impacts.

- Success will entail actively engaging in broader internal and external groups to achieve the state's policy goals.

Codes and Standards Goals

The C&S program strives to reach energy savings targets of 5,222 giga-watt hours (GWh) and 123 million therms (MMT) between 2018 and 2024, and a reduction in demand of 1488 megawatts (MW) over the same period, ultimately contributing to the state's policy objectives to double energy savings and path towards zero net energy (ZNE) buildings.

C&S supports California's energy and climate-related policy goals through three overarching strategies, including:

- Advocacy that responds to all opportunities for significant savings through new codes and standards (i.e., local reach codes, state, and federal);
- Technical assistance to local governments that increases the adoption of local reach codes that support the development and adoption of statewide and national code changes;
- Compliance improvement activities that strive to maintain high compliance margins for buildings constructed or altered within the Title 24, Part 6 compliance process; and improve compliance margins for selected, high-importance building code measures and appliance standards.

B. C&S Proposal Compared to Prior Program Cycles

Some of the differences between past C&S efforts and proposed future efforts include more targeted compliance activities focusing on high-impact areas and updating antiquated compliance processes. C&S will continue to conduct primary research and analyses to support C&S objectives and state policy goals, guided by the California Public Utilities Commission (Commission), the California Energy Commission (CEC), and other state agencies' goals. Investment in research and data collection efforts will enhance advocacy by increasing the quality of code change proposals. C&S will also collaborate with code setting entities to identify research areas that will be of highest value.

To meet the goals laid out in the vision, the Program Administrators identified four major intervention strategies (detailed in Section E: Approach to Achieving Goals) for C&S, with particular emphasis on how it differs from past practice.²⁸⁴

²⁸⁴ For more information on C&S in prior cycles, see the 2013-2014 program implementation plans (PIPs) at <http://eestats.cpuc.ca.gov/>.

Advocacy to Support Building Codes and Appliance Standards

Advocacy activities develop proposals for building codes and appliance standards. In prior years, these efforts were housed within a single program that addressed C&S issues at the state and national levels (e.g. the CEC's Order Instituting Rulemaking (OIR) for Title 20 Appliance Standards and the United States Department of Energy's (DOE) ongoing rulemaking for Federal Appliance Standards).

In the near-term, the statewide Building Code & State Appliance Standards subprograms will be separated from the National (and possibly International) Standards subprogram and activities will remain local. The National Standards program will work on DOE appliance standards and test procedures, multiple national (and possibly international, as applicable) agencies or organizations that develop mandatory or voluntary standards, test procedures, labels, and/or protocols that could directly impact California customers and goals.²⁸⁵

Technical Assistance to Local Governments to Help Adopt Reach Codes

This strategy has traditionally included technical support for local governments interested in adopting ordinances that exceed state building energy codes (Title 24, Part 6). This resulted in cost-effectiveness reports that local governments used to adopt ordinances, which were submitted to the CEC for approval and filed with the Building Standards Commission (BSC). As local governments are increasingly focused on reducing GHG emissions, their interest expands beyond the standard performance-based reach codes. In response, C&S reach codes efforts will expand to include support for ordinances requiring measures beyond traditional energy efficiency measures, such as voluntary standards, renewable energy, alternative fuels vehicle infrastructure, energy storage, demand response, and water saving measures.

- In the near-term, Program Administrators will work with local government partnerships to educate local elected officials and staff regarding the value of reach codes, and help prepare cost-effectiveness studies that support both the CAL Green Voluntary Tier rulemaking process and the development of comprehensive ZNE reach codes.
- In the long-term, Program Administrators will support the development of tools to support local jurisdictions as they track, quantify, and report reach code energy savings and greenhouse gas reductions as a result of energy conservation and savings.

Compliance Improvement Activities

These activities complement advocacy efforts by ensuring potential savings from C&S are realized and persist over time. This strategy targets market actors throughout the compliance supply chain, providing technical support, education, outreach, and resources to improve

²⁸⁵ These includes, but are not limited to, American Society of Heating, Refrigerating, and Air Conditioning Engineers (model building codes, such as ASHRAE 90.1 and 189.1), International Code Council (model building codes, such as the International Energy Conservation Code and the International Green Construction Code), the Environmental Protection Agency (ENERGY STAR labels), the Federal Trade Commission (EnergyGuide labels), Institute of Electrical and Electronics Engineers (e.g., IEEE 802.3 Energy Efficient Ethernet), International Electrotechnical Commission (test procedures), etc.

compliance with both building and appliance energy standards. Moving forward, Program Administrators will place a greater emphasis on developing clear code proposals that minimize misinterpretation. The Program Administrators will also design and market trainings that use the appropriate modality for specific market actors.

In the near term, this strategy will help market actors understand C&S and provide role-based trainings to improve compliance, particularly for the areas with the highest potential impacts.

In the long-term, this strategy will support the development of an electronic repository to track new construction and building alteration activity, as well as software tools to ensure accurate monitoring and compliance reporting.

Key Learnings from Recent EM&V Reports of California's Codes and Standards Programs

Past evaluations have focused on building codes, appliance standards, and compliance improvement. As a result, evaluation recommendations restricted to these subprograms. The following summary of recommendations is adapted from findings in the *2010-2012 C&S Impact Evaluation*²⁸⁶ and the *Codes and Standards Compliance Improvement Program Years 2013-14 Process Evaluation Final Report*²⁸⁷.

Building Codes & Appliances Standards Advocacy

- A major challenge in program evaluation has been the lack of program documentation typical to other energy efficiency programs. Improving and tracking program documentation to include market data and increased documentation on Investor Owned Utility (IOU) efforts would facilitate program evaluation. Completing the program documentation at a more regular interval would ensure that information is retained.
- Building envelopes present IOUs with opportunities for codes and standards intervention. This major building component was shown to be just below 2008 code requirements in all surveyed sites.
- IOUs should continue their appliances standards work, as appliance standards compliance has been high (typically 80+ percent).

Compliance Improvement

- The IOUs have made noticeable progress with the development and improvement of the Energy Code Ace (ECA) website, which provides code compliance trainings and resources to building industry professionals. Building professionals identified increasing

²⁸⁶ Cadmus, Energy Services Division & DNV GL. (2014, August). *Statewide Codes and Standards Program Impact Evaluation Report for Program Years 2010-2012, CALMAC Study ID CPU0070.03*. Retrieved from http://calmac.org/publications/CS_Evaluation_Report_FINAL_10052014-2.pdf

²⁸⁷ DNV GL. (2016, April 19). *Codes and Standards Compliance Improvement Program Years 2013-14 Process Evaluation Final Report, CALMAC Study ID CPU0129*. Retrieved from http://calmac.org/publications/ComplianceImprovementImpactEvaluationDraftReport_FINAL-OUT.pdf

awareness of the tools, training and resources offered via ECA. C&S can continue this progress by identifying code areas that are particularly vulnerable to noncompliance and tailoring trainings to continually highlight and target those areas.

- Although in-person trainings have been well-received, building industry professionals are less likely to attend. IOUs can tap into the remote training market by expanding online ECA training.
- IOUs can use external partnerships to make training materials and links available on other industry sites where professionals are known to seek information and support.
- IOUs have an opportunity to increase code compliance by providing education to counter perceptions that code compliance is unmanageably complex.

C. Savings, Budget, and Cost-Effectiveness

As Business Plans were envisioned as “a comprehensive vision outlining long-term strategic initiatives and intervention strategies,”²⁸⁸ SoCalGas provides energy savings goals, budgets, and cost-effectiveness forecasts that represent its best estimates to realize its portfolio vision, while retaining flexibility to accommodate potential market or regulatory changes. Each year, SoCalGas will file a Tier 2 advice letter (AL) that provides detailed goals, budgets and cost-effectiveness for the Commission’s review and approval.²⁸⁹

Sector Budget

SoCalGas’ Business Plan budget provides general information on the expected levels of annual spending for 2018-2025, along with 2016 and 2017 approved budgets for reference. As provided in Commission Decision (D.) 15-10-028, SoCalGas’ Business Plan budget represents its best estimates of spending for the life of the Business Plan.²⁹⁰ The intent is to allow Program Administrators flexibility to adjust spending during the life of the Business Plan.²⁹¹ SoCalGas will file a Tier 2 AL annually, containing a detailed budget for the next calendar year’s energy efficiency portfolio.²⁹² The Tier 2 AL budgets will include detailed budgets for cost recovery, transfer, and contracting purposes.²⁹³

Table 1 – Sector Budget (\$000s)

Sector	2016*	2017*	2018	2019	2020	2021	2022	2023	2024	2025
Cross-Cutting: C&S	\$843	\$843	\$843	\$862	\$881	\$902	\$922	\$943	\$965	\$987

*2016 and 2017 are shown for historical purposes.

²⁸⁸ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 48.

²⁸⁹ California Public Utilities Commission. (2015, October 28). D.15-10-028, OP 4.

²⁹⁰ “It [the budget] will establish a “ballpark” figure for spending for the life of the business plan.”

California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 55.

²⁹¹ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 56.

²⁹² California Public Utilities Commission. (2015, October 28). D.15-10-028, OP 4.

²⁹³ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 56.

Energy Savings Forecast

SoCalGas has used the energy savings forecast provided in the “Energy Efficiency Potential and Goals Study for 2015 and Beyond,” approved in D.15-10-028, as the foundation for its projected energy savings goals for 2018-2025. Table 2 contains the net therm savings forecast for the 2018-2025 timeframe and shows 2016 and 2017 for reference. C&S goals are shown as net annual goals.

Savings	2016*	2017*	2018	2019	2020	2021	2022	2023	2024	2025
Annual	17.31	13.87	12.70	12.60	12.20	10.90	10.30	9.60	9.10	9.10

*2016 and 2017 are shown for historical purposes. The values reflect net energy savings from compliance filings.

SoCalGas’ net annual energy savings forecast is directional in nature, and meant to reflect best estimates of energy and demand savings potential. SoCalGas recognizes the energy savings goals will be updated to meet the SB 350 energy efficiency targets set by the CEC no later than November 1, 2017, and will update its energy savings forecasts once the Commission approves new energy savings targets.

Table 3 presents annual and lifecycle net emissions avoided forecasts for Cross-Cutting Codes and Standards program.

Gross Emissions Avoided	CO ₂ (tons)	NO _x (lbs)	PM-10 (lbs)
Annual	561,164	895,955	0
Lifecycle	7,368,556	11,782,694	0

Table 4 shows the near-term cost-effectiveness for the Cross-Cutting Codes and Standards program.

Sector	TRC	PAC
Cross-Cutting: C&S	1.90	291.65

SoCalGas conducted a cost-effectiveness analysis of its proposed C&S activities in compliance with D.15-10-028 and the California Standard Practice Manual,²⁹⁴ using the 2017 updated avoided costs, as required in Rulemaking 14-10-003.

²⁹⁴ California Public Utilities Commission. (2001). *California standard practice manual: economic analysis of demand side management programs and projects*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=7741>

SoCalGas' cost-effectiveness calculation represents the near term years of its Business Plans (2018-2020), and is directional in nature. Meaning, SoCalGas will strive to meet the cost-effectiveness projections set forth for the sector, but requests flexibility to accommodate potential market or regulatory changes. Through the annual Tier 2 ALs, SoCalGas will provide the Commission updated cost-effectiveness forecasts for each year of Business Plan implementation.

Through implementation of its Business Plan, SoCalGas seeks to make significant impact in reducing energy waste cost-effectively and maximizing the value of energy efficiency for customers, for the grid, and for the state.

D. C&S Landscape

C&S impacts a broad range of stakeholders in the building industry supply chain, while appliance standards impact all customers purchasing regulated products (See Appendix D for a complete list of C&S customers and stakeholders). Since C&S efforts impact virtually all of the Program Administrators' customers, identifying salient trends and barriers is critical to designing intervention strategies that advance progress towards state and national policy goals.

Trends

- **Increasing Commission and CEC emphasis on C&S:** In recent years, the Commission has communicated the importance of C&S.^{295,296,297} Additionally, the CEC expects IOUs to support building standards in accordance with the Warren-Alquist Act.²⁹⁸ These agencies recognize the primacy of C&S in achieving state policy goals.
- **Increasing number of state policy drivers:** California has a growing number of energy- and climate-related policy goals that are expressed in executive orders, legislative bills, and state agency action plans, such as SB 350 and SB 32.
 - The CPUC has indicated the California's publicly-funded energy efficiency programs are an integral part of the state's fight against climate change and GHG

California's energy efficiency building codes and standards have saved more than 15,000 GWh and 600 million therms since 2003 and over \$75 billion since the mid-1970s.

²⁹⁵ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 246.

²⁹⁶ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 249.

²⁹⁷ California Public Utilities Commission, Energy Division. (2016, February). *Regulating energy efficiency: A primer on the CPUC's energy efficiency programs*. Retrieved from http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/News_Room/Fact_Sheets/English/Regulating%20Energy%20Efficiency%200216.pdf

²⁹⁸ California Energy Commission. (2016, February). *Warren-Alquist State Energy Resources Conservation and Development Act, Public Resources Code Section 25000 et seq., CEC-140-2016-002*. Retrieved from <http://www.energy.ca.gov/2016publications/CEC-140-2016-002/CEC-140-2016-002.pdf>

reductions.²⁹⁹ California’s policy goals are diverse in scope, including targets over the next 35 years for energy efficiency, demand reduction, renewable energy, onsite generation, grid connectivity, demand response, energy storage capacity, ZNE buildings, water efficiency, and alternative fuels vehicle. To these ends, C&S must be deployed holistically with these multifaceted objectives in mind.³⁰⁰

Figure 1 - California State Policy Goals

	2020	2025	2030	2050
Greenhouse Gases	1990 levels (AB 32)		40% below 1990 levels (SB 32)	80% below 1990 levels (E.O. B-30-15)
Efficiency			2x energy efficiency goals ¹	
Zero Net Energy Buildings	100% of new Res. ²	100% of new state buildings ²	100% of new Com., 50% Com. Retrofits ²	
Renewable Portfolio Standard	33% ³		50% ¹	
Transportation		1.5 million ZEVs ⁴		
Fuels			Displace 30% of petroleum use with alternative fuels ⁵	
Water	20% less water per capita in Res. & Com. buildings ⁶			
High-GWP Gases	Reduce GHG emissions from HFCs by 10 MMtCO ₂ e ⁷			
Energy Storage	1.3 GW Storage Procurement ⁸			

- 1. Senate Bill 350
- 2. CA’s Long Term Energy Efficiency Strategic Plan
- 3. Senate Bill X1-2
- 4. Governor’s ZEV Action Plan
- 5. Assembly Bill 1007
- 6. Senate Bill X7-7
- 7. AB 32 Scoping Plan (CARB)
- 8. CPUC D.10-03-040

Supporting Agencies



- Evolving state and federal activities:** State and national regulatory agencies are affected by the CEC’s funding fluctuations, which impact their ability to allocate resources toward codes and standards topics. As a national leader in energy efficiency policy, California’s rulemakings influence national agendas. When activity increases in California, the effect is seen in other states in federal rulemakings. For example, appliance rulemakings in California can spur action on new or stalled proceedings at the DOE. Over the next ten years, priorities at the state and national levels may evolve, requiring flexibility in how California executes its C&S strategies. Program Administrators’ consistency in C&S support allows California to achieve its state policy objectives despite evolving state and federal funding priorities.

²⁹⁹ Eilert, P., Rubin, E., & Zhang, Y. (2016). Codes and standards climate strategy, *2016 ACEEE Summer Study on Energy Efficiency in Buildings*, pp. 5-1 – 5-16. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/5_615.pdf

³⁰⁰ *Id.*

- **Increasing requirements for rigorous data to support CEC rulemakings:** Statewide C&S initiatives support the CEC in their various rulemakings by providing data that the building and manufacturing industries require to support underlying calculations of costs effectiveness. In addition to energy savings, the CEC increasingly considers pricing information, technology readiness, user friendliness, and how the measure will be applied in practice in buildings and equipment.³⁰¹ Verifiable qualitative analysis is needed to respond to these needs.
- **Increasing focus on existing buildings:**³⁰² Activities surrounding ZNE goals have been heavily focused on residential new construction. In the next ten years, the focus will shift from residential to non-residential new construction to meet the state’s 2030 ZNE goals. As the code for new construction is rapidly approaching ZNE targets for residential buildings, with nonresidential goals soon thereafter, existing buildings also offer a prime opportunity for energy savings. In particular, dramatic increases in the energy efficiency of appliances and system solutions in existing buildings are necessary to achieve SB 350’s goals to double the efficiency of existing buildings by 2030. Retrofitting existing buildings poses veritable challenges due to the broad range of project types, design and construction arrangements, and constraints caused by existing conditions. The efficiency of existing buildings may be improved through code enhancement proposals focused on building alterations and inefficient appliances. In addition, compliance improvement efforts are especially important to ensure intended savings are fully realized.

Barriers

The trends outlined above offer insight into the gaps between the needs of the end customer and what is available to fill them. To overcome these barriers, a range of activities—from policy changes to process improvements—are needed.

- **Lack of consistent state policies and holistic long-term planning to meet those goals:** Disconnects between state policies present barriers to integrated implementation.
 - The California Long Term Energy Efficiency Strategic Plan’s (CLTEESP) ZNE goals do not fully align with AB 32’s GHG reduction goals in terms of metrics, measurements, and milestones.^{303,304}

³⁰¹ For a more in depth discussion, see Codes and Standards: A path to affordable amenity and customer satisfaction. McHugh, J., Chase, A., Fernstrom, G., McGaraghan, M., Worth, C., & Eilert, P. (2016). Codes and Standards: A path to affordable amenity and customer satisfaction. *2016 ACEEE Summer Study on Energy Efficiency in Buildings*, pp.8-1 – 8-12. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/8_1140.pdf

³⁰² See Comprehensive Energy Efficiency in Existing Buildings Law, California Assembly Bill 758 (2009).

³⁰³ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>.

- CEC’s building energy standards (Title 24, Part 6) include the scope to accommodate a robust set of integrated requirements for renewable generation, energy storage, and demand response.³⁰⁵ However, IOU funding for energy efficiency and other distributed energy resources (DERs) efforts are authorized in separate proceedings, which can inhibit seamless advocacy efforts across DERs.
- For Southern California, stringent air quality requirements for reduced NOx and particulate matter in non-attainment areas have been difficult to reconcile, as they conflict at times with the efficiency of stationary sources.³⁰⁶
- Program Administrators believe the greatest impacts will come from looking across policy drivers, broad DER areas, and technologies. For example, achieving ZNE for new and existing buildings while maintaining transmission and distribution (T&D) grid stability benefits from the flexibility brought about by the integration of various systems in buildings and communities, integration of photovoltaic (PV) and battery storage, and expansion of demand response and alternative fuels and electric vehicle (EV) infrastructures. Moreover, with rapidly approaching ZNE goals and relatively short code cycles, this work must accelerate.³⁰⁷
- There is a lack of appropriate definitions and models for multi-family buildings. Multi-family housing has multiple sub-types that make it more challenging to address as a single sector with regard to building standards. Multi-family includes some of the following common configurations: 2- story townhomes, 3- story apartments, and 4-story vertical mixed-use apartments over commercial space such as a café or retail store. Each type has different occupancy with energy use intensities that are specific to the type. For example, low-rise multi-family building construction is covered by similar residential building standards

³⁰⁴ California Environmental Protection Agency, Air Resources Board. (2014, May). *First update to the climate change scoping plan, building on the framework*. Retrieved from

https://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf

³⁰⁵ Sections § 25000.1, § 25402, § 25402.6, and § 25403.5 of the Warren Alquist Act describe scoping that includes these topics. California Energy Commission. (2016, February). *Warren-Alquist State Energy Resources Conservation and Development Act, Public Resources Code Section 25000 et seq., CEC-140-2016-002*, p.62. Retrieved from <http://www.energy.ca.gov/2016publications/CEC-140-2016-002/CEC-140-2016-002.pdf>

³⁰⁶ South Coast Air Quality Management District. (2016, December). *2016 Draft Air quality management plan, Appendix IV compliance with other Clean Air Act Requirements*, p. IV-A-49. Retrieved from <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/draft-final-aqmp/strikeout/appvidec2016.pdf?sfvrsn=6>

³⁰⁷ For a more in depth discussion, see Putting it all together: Leveraging codes and standards to accelerate integration of demand-side resources. Hauenstein, H., Beasley, A., Uraine, C., Worth, C., Tartaglia, S., & Anderson, M. (2016). Putting it all together: Leveraging codes and standards to accelerate integration of demand-side resources, *2016 ACEEE Summer Study on Energy Efficiency in Buildings*, pp. 5-1 – 5-14. Retrieved from http://aceee.org/files/proceedings/2016/data/papers/5_1095.pdf

as single family residential. Given the specific energy use intensities associated with multi-family, this approach creates unintentional issues, such as misaligned standards related to hot water, HVAC, and common areas. This causes confusion among developers, architects, and building officials. There is an immediate need to assess multi-family building energy standards to address the specific energy use characteristics associated with low-rise and high-rise multi-family projects.

- The Program Administrators' long-term tactical planning efforts will improve coordination across programs and transfer knowledge learned from those activities to targeted industry actors.³⁰⁸
- **Data deficits:** Program Administrators find rulemakings often end in compromise between code setting bodies and industry representatives, and the amount of compromise depends on the quality of data available to defend a proposed rule. Since code setting bodies are required to demonstrate the cost-effectiveness and feasibility of proposed standards, successful advocacy efforts are built on defensible, up to date, and rigorous data. However, because many industry representatives consider their product-related data to be confidential, most useful data is derived from research conducted by either the code setting body or IOUs.
 - Defending a proposed rule requires information that demonstrates the viability of the technology and its role in energy-efficient systems. Beyond this basic viability, Program Administrators find a dearth of accurate and useful data on the performance of newer technologies, as well as a deficient understanding of the impact of widespread adoption on the intended system—both areas that are critical for setting new codes.
- **State resource constraints** – Developing code change proposals, gathering stakeholder input, designing compliance processes, and offering resources to support the implementation of C&S is a resource-intensive process. Code setting entities, such as the CEC, have relied on stakeholders to contribute code change proposals and participate in the rulemaking process.
 - Insufficient resources exist for state agencies to conduct all the supporting activities necessary to evolve state standards in pursuit of policy goals. Since 2002, the IOUs have submitted 157 Codes and Standards Enhancement (CASE) reports,³⁰⁹ and developed a Compliance Improvement subprogram to support resource shortfalls.

³⁰⁸ Working across teams, especially with those that are investing in program strategies that look at systems rather than system components, will result in broadly applicable results.

³⁰⁹ 46 Title 20 CASE Reports and 111 Title 24, Part 6 CASE Reports.

- **Federal preemption** –As the scope of the DOE’s federal appliance program expands, it becomes increasingly important for California’s C&S initiatives to actively participate in the federal rulemaking process due to “federal preemption.”³¹⁰
 - California often sets higher minimum standards than is established at the federal standards level. For example, after commercial clothes washers (California adopted commercial clothes washers standards in Title 20 in 2003) became federally covered products through the Energy Policy Act of 2005 (EPA 2005), California could no longer update standards beyond federally adopted efficiency criteria. Accordingly, as the DOE’s appliance program expands, fewer appliances are available to the CEC to incorporate into Title 20. Efforts must be both focused on the federal level and on completing California adoption of energy-efficient standards with the highest levels of efficiency before the DOE begins its rulemaking process for those appliances. The DOE process is much longer than the CEC’s process, stranding cost-effective energy savings.
- **Local governments lack awareness about which reach codes can help them achieve their goals, and lack the resources needed to adopt reach codes:** A “reach code” is a locally mandated code or alternative compliance path that is more aggressive than the current California Building Energy Efficiency Standards, resulting in buildings that achieve higher energy savings. In California, the unique authority given to cities and counties to adopt reach codes allows local jurisdictions to aggressively pursue their local Climate Action Plan goals as well as the Commission’s goal of achieving ZNE for all new residential construction by 2020 and for all new nonresidential construction by 2030.³¹¹
 - Every local government must determine the type of reach code ordinance best suited to meet its unique GHG reduction goals.³¹² However, local governments may lack the awareness, knowledge, and resources needed to develop and adopt these codes. Typically, this includes deciding whether to adopt “performance based” CAL Green Energy Efficiency Tiers (e.g. exceeding base

³¹⁰ Federal preemption is the invalidation of any state law that conflicts with federal law; and for appliance efficiency regulations, the effect of minimum federal standards is to cap state appliance standards. Federal law includes an option for states to petition DOE for a preemption waiver, but no state has successfully done so and Program Administrators do not consider this a practical option.

³¹¹ Reach codes play an important role in ZNE by providing an opportunity to test advanced energy efficiency building practices with designers, building owners, plan examiners, field inspectors, and other development stakeholders. Further, reach code measures work in tandem with utility energy efficiency program incentives designed to accelerate market acceptance and adoption of ZNE building energy practices.

³¹² The Cadmus Group, Inc. & DNV-GL. (2014, May). *Reach Code Subprogram 2010-2012 Process and Pilot Impact Evaluations, CALMAC Study ID CPU0070.02*, pp.2-6. Retrieved from http://www.calmac.org/publications/PY2010-2012_Reach_Code_Study_Published.pdf

code by 15%),³¹³ mandate “prescriptive” energy efficiency measures (e.g. cool roofs),³¹⁴ or require “renewable energy” installation (e.g. solar photovoltaic systems).³¹⁵

- State law requires “local governmental agencies wishing to enforce locally adopted energy conservation standards” to submit a study with supporting analysis to the CEC demonstrating how they calculated energy savings and cost-effectiveness. However, local governments are often limited in their ability to meet this requirement.³¹⁶
- **Inadequate or absent compliance infrastructure and burdensome compliance processes:** California’s collective investment in a modernized electronic infrastructure to increase the efficiency of the compliance process for Title 24, Part 6 has lagged and compliance continues to be perceived as a time consuming and paper-heavy endeavor.³¹⁷ Transitioning to a streamlined compliance process, including the potential creation of registries, databases and other electronic infrastructure, will require a significant investment. However, the Program Administrators believe developing easy-to-use compliance tools and processes is critical for enabling increased compliance.
 - Compliance software struggled to keep pace with the rapid increase in the complexity, breadth, and stringency of building codes over the last two code cycles. This was due in part to the transition from the two-dimensional building modeling DOE 2 program to CBECC-COM, which uses a three-dimensional user interface that uses and an underlying engine based on EnergyPlus. While the EnergyPlus software engine is more capable of simulating advanced building

³¹³ CAL Green (Title 24 Part 11) identifies several voluntary Tiers requiring “performance-based” energy code compliance thresholds that exceed the Title 24 building energy efficiency standards by a certain percentage (e.g., 15%). The performance approach allows considerable flexibility in the way that designers and builders can customize the set of energy measures that are best suited to the project’s needs and characteristics, provided the building energy performance meets or exceeds the minimum requirements. California Building Standards Commission. (2013, July). *California 2013 Green Building Standards Code, California Code of Regulations, Title 24, Part II*. Retrieved from <https://www.documents.dgs.ca.gov/bsc/CALGreen/2013-California-Green-Building-Standards-Code.PDF>

³¹⁴ Prescriptive-based requires installing specific Title 24 building energy measure(s) such as cool roofs, lighting, hot water distribution systems, water efficiency, and/or commercial kitchen applications.

³¹⁵ Mandating installation of renewable energy measures does not necessarily require following California’s Preferred Loading Order: energy efficiency, demand response, renewables, and distributed generation.

³¹⁶ California Energy Commission. (2015, June). *2016 Building energy efficiency standards for residential and nonresidential buildings, CEC-400-2015-037-CMF, Part 1, Article 1, Section § 10-106*. Retrieved from <http://www.energy.ca.gov/2015publications/CEC-400-2015-037/CEC-400-2015-037-CMF.pdf>

³¹⁷ Compliance Improvement Advisory Group. (2016). *White papers*. Retrieved from <http://www.caciag.com/Issues>

technologies, the transition caused delays in the implementation of the standards.³¹⁸

- There is a gap between the compliance software results which are an “asset rating” of a building and the actual operation or performance of a building. This issue has been increasingly problematic because a code compliant ZNE building does not necessarily reflect actual ZNE operation, in which case customers and building owners are expecting ZNE code buildings to have a zero energy bill.
- To achieve the state’s goal of ZNE for all newly constructed commercial buildings by 2030, building owners and operators must employ compliance software that offers new functionality to both analyze advanced building and design strategies and demonstrate that projects meet ZNE goals.

C&S strategies seek to overcome these key barriers, as explained in greater detail in *Section E, Approach to Achieving Goals*.

E. Approach to Achieving C&S Goals

Intervention 1—Advocacy for Building Codes and Appliance Standards at All Levels³¹⁹

The CLTEESP’s first goal for C&S is to “continually strengthen and expand building and appliance codes and standards as market experience reveals greater efficiency opportunities and compelling economic benefits.”³²⁰ To this end, C&S advocacy efforts will reach multiple levels of decision making across building codes and appliance standards. Specifically, advocacy efforts include strategies to change:

- **State Building Codes:** A state building codes strategy influences proceedings conducted by the CEC and other state agencies. Since building codes determine the efficiency of new buildings, additions, and changes to existing buildings that trigger a permit, they directly influence building design and construction as they

“...the scale of the goals and challenges at hand—including that of putting all new commercial buildings on a path to zero net energy by 2030, and meeting AB 32’s emission reduction targets—prompts an accelerated strategy to make the codes more stringent and cover more end uses and measures.” - CLTEESP, p. 63

³¹⁸ California Energy Commission. (2016). *Revised effective date for the 2013 California building energy efficiency standards*. Retrieved from

http://www.energy.ca.gov/title24/2013standards/2013_standards_revised_effective_date.html

³¹⁹ Advocacy strategies are implemented statewide, per D.16-08-019. California Public Utilities Commission, Energy Division. (2016, August 25). D.16-08-019.

³²⁰ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 63. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

relate to ZNE goals.^{321,322} The scope of Title 24, Part 6 has expanded over time to control plug loads, outdoor lighting and some industrial process equipment. The relatively new Title 24, Part 11 Green Building Standards cover water efficiency including site irrigation, building materials, and provision for electric vehicle charging.³²³

- **State Appliance Standards:** The state appliance standards strategy influences rulemakings conducted by the CEC to improve the efficiency of appliances in California. Since appliance standards impact efficiencies of equipment in both new and existing buildings, they are a powerful policy tool for saving energy and reducing GHG emissions. Appliance standards are enforced by the CEC through the appliances database and occasional monitoring of products sold into the California market. Appliance standards are also referenced by the building standards and enforced by building officials in more than 500 California jurisdictions.
- **National Codes and Standards:** This strategy seeks to influence a broad range of national building codes and appliance standards that impact California regulations. For example, federal appliance and equipment standards, which are embodied in Title 20, have grown to cover products representing about 90% of home energy use, 60% of commercial building energy use, and 30% of industrial energy use.³²⁴ Hence, federal appliance standards are often the strongest policy tool for reducing energy use in existing buildings and a large part of achieving ZNE in both new and existing buildings. In addition to DOE appliance standards and test procedures, multiple national agencies

³²¹ For more information on plans to improve building codes in new construction, see *Zero net energy action plan: Commercial building sector 2010-2012*. California Public Utilities Commission. (2011, June). *Zero net energy action plan: Commercial building sector 2010-2012*, p. 10-12. Retrieved from <http://www.cpuc.ca.gov/NR/rdonlyres/6C2310FE-AFE0-48E4-AF03-530A99D28FCE/0/ZNEActionPlanFINAL83110.pdf>

³²² For more information on efforts to improve state building standards in existing buildings see *California's existing buildings energy efficiency action plan update December 2016*. California Energy Commission. (2016, December). *California's existing buildings energy efficiency action plan update December 2016*, CEC-400-2016-023CMF, p. 20-21. Retrieved from http://docketpublic.energy.ca.gov/PublicDocuments/16-EBP-01/TN214801_20161214T155117_Existing_Building_Energy_Efficiency_Plan_Update_Deceber_2016_Thi.pdf

³²³ See *2016 California Green Building Standards Code*. California Building Standards Commission. (2016). *2016 Green Building Standards Code, Part 11*. Retrieved from <http://codes.iccsafe.org/app/book/toc/2016/California/Green/index.html>

³²⁴ National estimates from the Building Technologies Office of the Department of Energy. United States Department of Energy, Office of Energy Efficiency & Renewable Energy. (2016). *Appliance and equipment standards program*. Retrieved from <https://energy.gov/eere/buildings/appliance-and-equipment-standards-program>

or organizations exist that develop mandatory or voluntary standards, test procedures, labels, and/or protocols that could directly impact California customers and goals.³²⁵

In the short-term, the Program Administrators will continue to inform the design of code proposals through research and analysis, such as CASE reports for particular measures of interest by the CEC. Program Administrators will also play an active role in expanding research and analyses, providing targeted research on specific measures (e.g., water use, building materials, and ventilation), and updating test methods and ratings used by industry groups, technical committees, and regulatory agencies to ensure they reflect the most recent information and align with state policy goals for residential and non-residential buildings.

In addition to continuing these efforts through the mid-term, Program Administrators will improve the quality of information provided to the CEC and engage a broader range of stakeholders to participate in regulatory proceedings. Program Administrators will also expand advocacy efforts to focus on code proposals that enable the grid of the future, such as demand response and grid connectivity.

Intervention Strategy: Advocacy for Building Codes and Appliance Standards			
Barriers	Example Tactics	Existing, New, or Modified	Short, Mid, or Long-term
State resource constraints	Lead the creation of detailed CASE proposals for agreed upon topics of interest to the CEC and other code setting bodies.	E	S,M,L
	Expand research and analyses to improve the quality of data included in code change proposals. ³²⁶	M	S,M,L
Data deficits	Provide research and analysis for measures such as water use, building materials, ventilation, and source pollutants.	M	S,M,L

³²⁵ These includes, but are not limited to, American Society of Heating, Refrigerating, and Air Conditioning Engineers (model building codes, such as ASHRAE 90.1 and 189.1), International Code Council (model building codes, such as the International Energy Conservation Code and the International Green Construction Code), the Environmental Protection Agency (ENERGY STAR labels), the Federal Trade Commission (EnergyGuide labels), Institute of Electrical and Electronics Engineers (e.g., IEEE 802.3 Energy Efficient Ethernet), International Electrotechnical Commission (test procedures), etc.

³²⁶ Research may include a variety of activities: field surveys to collect population data; collection of internet data to determine costs, availability, performance, and compliance; tactical surveys on specific technologies, industries, markets, behavior, and satisfaction; lab tests, etc. Research will be conducted in multiple subprograms and there will be some overlap. While most data collection and market analysis aimed at long term code objectives will be conducted out of the code readiness subprogram, codes and standards research on specific measures and building types for open or near-term rulemakings will continue be conducted in other subprogram areas: California Building Codes, California Appliance Standards, and National Regulations. Additionally, support for Reach Codes will continue to include research in various areas.

Intervention Strategy: Advocacy for Building Codes and Appliance Standards			
Barriers	Example Tactics	Existing, New, or Modified	Short, Mid, or Long-term
Federal preemption	Actively participate and influence the development and updating of test methods and ratings with industry groups (NEMA, AHRI, etc.), technical committees (ASHRAE, IES, IEEE, etc.) voluntary programs (DLC, CEE, EPA/ENERGY STAR, etc.), and regulatory agencies (DOE, ICC, etc.).	M	S,M
	Provide market analysis and gather high-quality market data, usage patterns and product performance to inform code change proposals.	M	M
	Lead a general review of test procedures used to determine performance of appliances for federal and state standards.	N	S
	Proactively engage and foster improved working relationships with a broader range of affected stakeholders and recruit them to directly communicate to the CEC and participate in rulemakings.	N	M
	Proactively enhance regulations to include demand response requirements, grid connectivity, etc. to enable the plug and play grid.	N	M
	Improve quality of information supplied to the CEC for their interactions with federal agencies.	N	M
<p>Sectors: Residential, Commercial, Industrial, Public, ET</p> <p>Other: DR</p> <p>Partners: Code-setting entities: California Energy Commission (CEC), Building Standards Commission (BSC), Housing and Community Development (HCD), California Air Resources Board (CARB), State Fire Marshall (SFM); Code enforcement community members (CALBO, CSLB); IOU Energy Efficiency Programs; National Building Code Development Entities: ICC, ASHRAE, IAPMO NFPA; Standards Setting entities: ASHRAE, ICC IES, ASTM, ENERGYSTAR, IAPMO; Manufacturing community representatives; Design and construction community members; Municipal utilities: SMUD, LADWP; Compliance software developers; Simulation software developers (e.g. DOE EnergyPlus developers: DOE, NREL, LBNL); Energy efficiency and Demand Response advocates</p>			

Intervention 2— Technical Assistance for Local Governments to Develop and Pass Reach Codes

The CLTEESP defines reach codes as “codes that direct contractors to construct buildings significantly more energy efficient than required by conventional building codes.”³²⁷ These progressive codes are often part of a local government’s climate action plan and provide crucial experience for understanding the implementation issues associated with a new code before it is rolled out on a statewide basis. While Program Administrators will continue existing support such as developing cost-effectiveness studies per climate zone, drafting model ordinance templates, creating compliance support tools, and assisting with the reach code application process, this strategy will be expanded in the future by raising the bar for reach code measures (e.g. CAL Green Voluntary Tiers and a ZNE reach code). Program Administrators will increase the adoption of local reach codes that support the development and adoption of statewide and national code changes.

In the short-term, Program Administrators will collaborate with the CEC, BSC, and Housing & Community Development (HCD) to prepare cost-effectiveness studies of Title 24, Part 11 CAL Green Voluntary Tiers to explore incorporating these measures into future reach code designs.³²⁸ This tiered approach aligns with the CLTEESP’s call for a “balance between mandatory, prescriptive, and beyond-code ‘reach standards’.”³²⁹ Program Administrators will also develop a comprehensive ZNE reach code in support of the CLTEESP’s call for all non-residential buildings to be ZNE by 2030—this tactic is also identified as a long-term strategy in the CLTEESP.³³⁰ In addition, the Program Administrators will coordinate energy efficiency program offerings with reach code measures and increase publicly-owned utility (POU) participation and education efforts to help local governments understand the benefits and best practices of implementing reach codes in their communities.

“Local governments play an important role, both in the enforcement of Title 24, Part 6 for building construction and renovation and in the development of local ‘reach’ codes that can serve as pilots for statewide codes...These important efforts serve to continually ‘raise the bar’ for California’s statewide standards.” -CLTEESP, p. 64

³²⁷ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 121. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

³²⁸ CalGREEN incorporates three levels of energy efficiency: a basic level (Title 24), 15 percent over Title 24 and 30 percent over Title 24. California Public Utilities Commission. (2011, June). *Zero net energy action plan: Commercial building sector 2010-2012*, p. 10-12. Retrieved from <http://www.cpuc.ca.gov/NR/rdonlyres/6C2310FE-AFE0-48E4-AF03-530A99D28FCE/0/ZNEActionPlanFINAL83110.pdf>

³²⁹ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 65. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

³³⁰ *Id.* at 64.

In the mid-term, Program Administrators will explore opportunities to provide resources for homebuyers, tenants, landlords, appraisers, and lenders to become aware and appreciate the value of highly energy efficient homes compared to conventional homes. Opportunities may include developing tools for appraisers and lenders to facilitate the process of recognizing and valuing high performance energy efficiency features in homes. These tools may include home energy score, green multiple listing service, energy efficiency mortgages, and mandatory building energy disclosure at time-of-sale.

Ultimately, reach codes play a leading role in spurring above-code innovation that advances progress towards the state’s energy efficiency and ZNE goals.

Intervention Strategy: Technical assistance for local governments to develop and pass reach codes			
Barriers	Example Tactics	Existing, New, or Modified	Short, Mid, or Long-term
Local governments lack awareness about which reach codes can help them achieve their goals, and lack the resources needed to adopt reach codes	Lead development of tools in collaboration with local jurisdictions that track, quantify, and report reach code energy savings and greenhouse gas reductions.	E	S
	Coordinate with energy efficiency programs (e.g. Savings By Design) to align programs with reach code measures.	M	S, M
	Support coordination between the CEC, BSC and HCD staff to leverage Title 24 Part 11 CAL Green Voluntary Tiers as a primary source for reach code measures by preparing cost- effectiveness studies that support the CAL Green Voluntary Tier rulemaking process.	M	S
	Support collaboration with the CEC, regional energy networks, POUs, local government partnerships, regional public affairs, and other stakeholders to educate elected officials and staff regarding the value of reach codes, requirements and best practices for reach code adoption, and tools and resources available to aid implementation.	M	S
	Support local initiatives to improve efficiency in existing residential buildings (e.g. home energy score, green efficiency mortgage, mandatory energy disclosure, etc.).	N	M
	Develop a comprehensive ZNE reach code that integrates energy efficiency, renewables, alternative fuels, cogeneration, energy storage, demand response, and water saving measures with prescriptive measures for each targeted area.	N	S
<p>Sectors: Public, Commercial, Residential</p> <p>Partners: Code-setting entities: California Energy Commission; IOU Internal Programs; POUs; Local Government Partnership Program; State and local governments; Code enforcement community; IOU Statewide C&S Team</p>			

Intervention 3— Compliance Improvement Activities

Although rigorous and progressive code development has saved Californians more than 15,000 GWh, 600 million therms since 2003 and \$75 billion since the mid-1970s,³³¹ non-compliance remains a barrier to achieving even deeper savings.³³² Moving forward, Program Administrators will enhance compliance improvement activities to maintain high compliance margins for whole buildings and appliances and improve compliance margins for selected, high importance C&S. Through compliance improvement efforts, critical market actors will better understand their unique role in compliance, and will be equipped with the specific knowledge, skill, and tools they need to quickly, easily, and effectively perform their compliance job tasks.

Activities conducted in support of this strategy target market actors throughout the entire compliance supply chain by providing needs-based tools, training, resources and outreach. Compliance improvement will also include assessing existing codes and evaluating the performance of the codes to assess its effectiveness.

“Compliance with California’s efficiency codes and standards varies enormously, especially with respect to building codes...It has been estimated that at least 30 percent of the technical energy savings potential of energy codes is lost due to non-compliance—but in reality there is inadequate understanding of code compliance rates or the resulting degradation of performance.” - -CLTEESP, p. 66

Intervention Strategy: Compliance Improvement Activities			
Barriers	Example Tactics	Existing, New, or Modified	Short, Mid, or Long-term
Inadequate or absent compliance infrastructure and burdensome	Develop and implement role-based training that teaches market actors how to perform their unique compliance job tasks	E	S
	Develop tools and resources that help market actors understand codes and standards, and reduce burdensome	M	S

³³¹ Ettenson, L. & Heavey, C. (2015, August). *California’s golden energy efficiency opportunity: ramping up success to save billions and meet climate goals*, p. 17. Retrieved from <https://www.nrdc.org/sites/default/files/ca-energy-efficiency-opportunity-report.pdf>

³³² For more information, see *California’s existing buildings energy efficiency action plan update December 2016*. California Energy Commission. (2016, December). *California’s existing buildings energy efficiency action plan update December 2016, CEC-400-2016-023CMF*, pp. 66. Retrieved from http://docketpublic.energy.ca.gov/PublicDocuments/16-EBP-01/TN214801_20161214T155117_Existing_Building_Energy_Efficiency_Plan_Update_Deceber_2016_Thi.pdf

Intervention Strategy: Compliance Improvement Activities			
Barriers	Example Tactics	Existing, New, or Modified	Short, Mid, or Long-term
compliance processes	processes		
	Develop training using the appropriate modalities per market actor	M	S
	Conduct outreach to increase awareness of the value of compliance with California’s energy standards and publicize the availability of tools, training and resources to support improved compliance	M	S
	Increase clarity and usability of codes by incorporating user-centered design in code development.	M	M
	Develop an electronic repository to track repeated patterns of non-compliance by builders and repeated errors by energy analysts. This data can be used to improve next version of code.	N	M,L
	Electronic repository provides feedback on common errors, which measures are used etc. This data can be used to improve next version of code.	N	M,L
<p>Sectors: Residential, Industrial, Commercial, Public, WE&T, Emerging Technologies, Other: DR Partners: Code-setting entities: California Energy Commission, HCD, BSC; Other state agencies; Investor Owner Utilities: IOU Statewide C&S Team, Programs, WE&T, DR, Local Government Partnerships; Utilities: POUs and water districts; Code enforcement community; Design, construction, energy consultant community members; Manufacturing community representatives; State and local governments; Regional Energy Networks; Research community members; California’s higher education institutions; Energy and sustainability non-profits</p>			

Intervention 4 – Planning and Coordination

Planning and Coordination leads strategic planning activities within the energy efficiency portfolio to identify priorities for the building and appliance code advocacy programs. This ensures that the statewide program functions collaboratively with the objectives of the other groups internal and external to the IOUs, such as incentive program managers and other organizations involved with code development. The C&S program will expand activities to include working with demand-side management incentive T&D staff to establish long-term goals for certain building types, systems, and equipment. Once a future goal/vision is established, the teams will then work backwards to develop integrated plans with clear near-term, mid-term, and long-term activities. Each integrated plan will clearly connect to supporting at least one—and most likely multiple—statewide policy goals. Given the increased integration efforts with other programs, Program Administrators will work towards informing new EM&V protocols that appropriately assess and incent collaboration.

Planning and Coordination efforts include:

- Maintaining and expanding the interrelationships with external as well as internal stakeholders.
 - For external stakeholders, many efforts in California are neither coordinated nor integrated at the level needed to address state policy. Long-term integrated planning is needed to develop and implement an integrated dynamic approach to achieving state policy goals and maximize energy savings.
 - For internal stakeholders, such as various cross-cutting program groups within SoCalGas and across all energy efficiency programs, a well-coordinated effort is necessary to prevent duplication of efforts and increase collaboration to advance mutual programmatic goals. This will lend itself to also capture DER synergies and maintain demand reliability.
- Integrated planning which envisions what the future building stock and appliance market would be in a world that achieves the State’s energy, water and GHG goals and coordinates a plan that achieves these goals.

Through this planning, C&S expects to see improved alignment with internal and external stakeholders engaged in codes and standards.

Intervention Strategy: Planning and Coordination support strategic planning activities with stakeholders			
Barriers	Example Tactics	Existing, New, or Modified	Short, Mid, or Long-term
Lack of Coordination	Lead the establishment and facilitation of a communications forum with regulatory agencies and critical stakeholders to appropriately structure and phase in DERs as it relates to advancing codes and standards.	N	S,M,L
	Lead the establishment and facilitation of a communications forum with internal utility transmission and distribution system organizations, including grid operations, distribution and transmission planning, load forecasting, and line extension policies.	N	S,M
	Lead the continuation of existing strategic planning activities and enhance coordination across the energy efficiency portfolio and other IDER groups, by developing new tools to communicate existing standards and future work.	M	S,M
	Support development of technology trajectories that incorporate market transformation tools available to specific energy efficiency portfolio programs to facilitate future adoption by State or Federal building and/or appliance codes.	M	S,M,L
Sectors: Residential, Commercial, Industrial, Public, Agricultural, Statewide IOUs Partners: Code Setting Entities: California Energy Commission, California Public Utilities Commission, ASHRAE, ICC, DOE; Municipal utilities: SMUD, LADWP			

Rescuing “Stranded” Potential

California’s C&S are moving forward rapidly to help meet the state’s policy goals. While increasingly stringent code creates new opportunities to save energy in new and existing buildings, bringing existing buildings into compliance with current codes can be out of reach for many customers. IOU program incentive structures have historically focused on getting customers who are in compliance with code to go beyond code. Before the passage of AB 802, IOUs offered limited energy efficiency programs and incentives to effectively target outdated, inefficient equipment, operating significantly below current code levels. The combination of more progressive building codes and the limitations of historic incentive structures create a wedge of “stranded” savings potential.

SoCalGas proposes an integrated approach to mitigate stranded potential by strategically shifting to existing conditions baselines for voluntary programs and improving collaboration between C&S and voluntary programs.

Existing Conditions Baseline

Prior to AB802, most IOU energy efficiency programs only incentivized efficiency savings that exceeded current building codes, operating under the default assumption that existing equipment would be replaced with new code-compliant equipment absent the program. Thanks to AB 802, baselines will more frequently be based on existing conditions. This shift presents the opportunity for IOUs to mitigate stranded potential by further incentivizing equipment upgrades using an existing condition or repaired equipment baseline. In this way, customers who have the most inefficient – but otherwise fully functional equipment – may be offered greater incentives than before, to achieve code-compliance and beyond in a cost-effective manner. Further, using existing conditions baselines allow for targeting of customers with high energy use using advanced metering infrastructure (AMI) data – a powerful tool for identifying stranded potential.

Improved Collaboration with Voluntary Programs

C&S works closely with the CEC to implement new building codes and appliance standards through an open stakeholder process. Although this process has effectively achieved energy savings, it has not incorporated the lessons learned from voluntary programs on market effects. The C&S program and the voluntary programs are increasing their collaboration to incorporate lessons learned from the implementation of each code cycle. This feedback will provide lessons on improved stakeholder collaboration, insight into loopholes, increases in costs to customers, contractor education gaps, and customer acceptance of specific technologies. Work to simplify codes during development of new code change proposals should help alleviate stranded potential by reducing complexity and improving code compliance.

F. Statewide Administration

D.16-08-019 modifies the program administration structure for all upstream and midstream programs, market transformation efforts, and select downstream programs, such that these programs become “statewide.” D.16-08-019 defines statewide programs as being delivered uniformly throughout the IOU service territories and overseen by a single lead Program

Administrator.³³³ Statewide efforts are required to comprise at least 25% of each IOU’s portfolio budget.³³⁴

Please refer to the Executive Summary for Program Administrators’ proposals for statewide programs and/or subprograms.

G. Solicitation Strategies and Transition Timeline

D. 16-08-019 sets a minimum target of 60% of the utility’s total portfolio budget, including administrative costs and EM&V, to be proposed, designed, and delivered by third parties by the end of 2020.³³⁵ Please refer to the Executive Summary for SoCalGas’ complete solicitation strategy and transition timeline, by sector.

H. Metrics and EM&V

Program Administrators understand the importance of ensuring that all metrics provide value to the Commission, Program Administrators, and other stakeholders. Program Administrators also recognize that listed metrics can have powerful and unintended effects.³³⁶

These metrics are consistent with the agreed-upon statewide guiding principles for the metrics shared with the Energy Division on August 16, 2016 (see below).

Table 5 - Guiding Principles for Metrics	
Metrics should...	
Be used and useful by Program Administrators to manage portfolio	
Be timely	
Rely on data used in program implementation	
Be simple to understand and clear of any subjectivity	
Have longevity	

The guiding principles also indicate that metrics are not a replacement for EM&V. Additionally, not all metrics have a readily interpretable meaning, so context is needed. As such, the Business Plan provides context on the metrics in the notes section of the metrics table.

³³³ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 51.
³³⁴ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 65.
³³⁵ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 74.
³³⁶ Perrin, in an article in the American Journal of Evaluation, discussed certain known limitations of performance metrics. Among these limitations, he described varying interpretation of the “same” term and concepts, goal displacement, use of meaningless and irrelevant measures, and cost-savings vs. cost-shifting. Perrin, B. (1998). Effective use and misuse of performance measurement. *American Journal of Evaluation*, Vol. 19, Issue 3, p. 367. Retrieved from https://www.researchgate.net/publication/238224436_Effective_Use_and_Misuse_of_Performance_M easurement

Because C&S is a program rather than a sector, this section presents information on program-level metrics and indicators that will be explored more in the development of the implementation plan for C&S. It also shows the savings goals for this program in Table 6 below.

Metrics Measuring C&S Goals

C&S and the other cross-cutting programs are focused on supporting statewide policy objectives, such as the doubling of energy efficiency by 2030 and efforts to work towards ZNE buildings. Each of the cross-cutting programs supports statewide goals.

C&S's primary goal is to cost-effectively reduce energy use for ratepayers and significantly increase the likelihood that California will achieve its climate goals.

Specific energy saving goals for C&S include the following:

- The C&S program strives to reach statewide energy use reduction targets of 5,222 GWh and 123 MMT between 2018 and 2024, and a reduction in demand of 1488 MW over the same period.

C&S supports California's energy and climate-related policy goals through four overarching strategies, including:

- Advocacy that responds to all opportunities for significant savings through new codes and standards (i.e., local reach codes, state, and federal)
- Technical assistance to local governments that increases the adoption of local reach codes that support the development and adoption of statewide and national code changes
- Compliance improvement activities that strive to maintain high compliance margins for buildings constructed or altered within the Title 24, Part 6 compliance process; and improve compliance margins for selected, high-importance building code measures and appliance standards
- Planning and coordination activities within the energy efficiency portfolio to identify priorities for the building and appliance code advocacy programs

Energy savings is the primary metric for C&S at the Business Plan level. C&S savings goals are shown in Table 6 below. It also lists several indicators that will be used to measure strategies at the implementation-plan level; however, this list will be revised and finalized based on the final program design. Over time, metrics and targets may be adjusted and improved to more accurately reflect program progress.

Table 6 - Statewide C&S Metrics									
Statewide Goals	Intervention Strategies	Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-6 years)	Long Term Target (7-9 years)		
Maximize customer energy and water savings, and minimize greenhouse gas emissions Save 5222 GWh, 1488 MW, 123 MM Therms and 123 GHG from C&S efforts	Support all state and federal C&S efforts that significantly impact energy use of CA buildings and appliances	Electricity Savings	Average of GWh/year across 2011-2015	CPUC potential study forecast	2018 - 925 GWh / 19.5 MMT / 233 MW	2021 - 739 GWh / 17.5 MMT / 213 MW	2024 543 GWh		
		Demand Savings	Average of MW / year across 2011-2015	CPUC impact evaluation	2019 - 909 GWh / 19.5 MMT / 234 MW	2022 - 668 GWh / 16.6 MMT / 203 MW	2024 185 MW		
		MM Therm Savings	Average of MM Therms/year across 2011-2015	Survey samples conducted as part of IOU-sponsored C&S EM&V	2020 - 863 GWh / 19.1 MMT / 229 MW	2023 - 575 GWh / 15.8 MMT / 191 MW	2024 15.0 MMT		
		Indicators							
		Number of cost-effective measures adopted into building codes or appliance standards by state agencies							
		Number of cost-effective measures adopted into appliance standards by federal agencies							
		Number of analyses (e.g. CASE studies and appliance standard studies)							
Number of tools that support new codes (before the effective date)									
Number of trainings to support new codes (before the effective date)									
Annual GHG reduction									

I. EM&V Preparedness and Research Needs

D.16-08-019 included a shift in the delivery of programs so that more of the portfolio is delivered by external third-party implementers. As such, the Program Administrator role is shifting, and there is a greater need for market-level and portfolio-level research to (1) ensure that the Program Administrators identify gaps in their portfolios and select programs that focus on areas where there is potential, (2) enable tracking of the Business Plan strategic direction, and (3) help third-party implementers understand the market.

The nature of impact and process studies are also expected to change:

- Impact evaluations are critical, and a cornerstone of validating the cost-effectiveness of any program. A growing number of impact evaluations will begin to be built on embedded data collection and/or will be able to increasingly rely on normalized meter based savings.
- Process evaluations will remain important to continuous improvement of the portfolio over the rolling cycle. These will be used to inform program designs, reduce uncertainties and minimize the costs of energy savings to the IOUs and ratepayers.
- SoCalGas expects to need quickly turn-around evaluations that inform third-party effectiveness and ensure that the programs provide the outcomes that they proposed to deliver.

Note that all program designs should be evaluable. Potential bidders will be asked to demonstrate their evaluability and document what data will be collected through the program, and the methods for assessing impacts.

EM&V Research Needs

C&S has identified several overarching data gaps in C&S. The research for this sector will be contingent on the needs of the portfolio as a whole and the annual research budget for this sector. However, the following studies should be considered in the EM&V Research Plan.

Studies to support C&S:

- **Program attribution study (forthcoming):** Program attribution has been difficult to determine. Studying the potential indicators for program attribution will provide greater clarity on attributing program savings to the IOUs.
- **Code compliance study:** Anecdotal evidence on code compliance is often discussed but actual measurements of code compliance are minimal. Studying code compliance on HVAC measures and non-resource lighting will provide information on areas for the program to improve code proposals in these two key areas.
- **Periodic market studies to determine market effects:** Potential study provides a market baseline for specific building systems that will be targeted by the program. Tracking the uptake of efficient systems requires additional data collection and analysis. The baseline study should be updated twice, once by the end of year five and the other by the end of year nine.

As described below, 2015 planned IOU-led studies include those to 1) determine code readiness, 2) explore methods for Title 24, Part 6 improvement, and 3) conduct a process evaluation of IOU C&S Program trainings, classes, and tools.

EM&V within C&S

EM&V activities supporting the C&S Program serve three distinct needs:

- All of the baseline data collection efforts described next employ C&S, rather than EM&V, dollars since they are integral to program implementation. They are considered part of the program implementation process, rather than the formal EM&V process. Detailed baseline data collection forms the basis for support of federal and State standards development. Standards development, at both the state and federal levels, is grounded in a firm understanding of existing conditions of energy use by appliance, system, and market segment. Without current appliance/equipment usage information by market segment credible estimates of standard's savings, lifecycle cost, and prospective cost-effectiveness it is impossible to present a persuasive case for adoption of a proposed standard. Large, statistically valid samples of customer-specific appliance holdings, building conditions, and consumption patterns are obligatory for establishing the appropriate scope and level of a proposed standard. These efforts demand carefully designed sampling plans, extensive on-site survey efforts, and energy use metering at both the appliance/system and whole building levels. Optimally the sample designs must be sufficiently robust to allow testing of potential efficiency changes to support the standard development process.

The detailed baseline data collection efforts are also critical in the examination and characterization of compliance issues that have arisen with current standards. This is essential so as to not create similar compliance issues as standards are ratcheted upward.

- Development and tracking of program implementation metrics to gauge sub-program effectiveness is essential to continued improvement of program implementation efforts. Advocacy efforts are the key driver of readily measurable energy savings for the C&S Program. Rigorous recording and detailing of IOU advocacy efforts is essential in order to determine the relative impact of IOU efforts on passage of new codes and standards. Such information, gathered as part of program implementation efforts, is used in the preparation of Code Change Theory Reports (CCTRs) that form the basis for program attribution determination by Commission impact consultants.

The use of program implementation metrics is also important in determining the effectiveness of C&S efforts for which direct energy savings information is not readily available. Compliance Improvement efforts, for example, are not easily measured by changes in program savings due to the cost of obtaining detailed compliance data. In particular, building standards compliance data is notoriously costly to obtain. Hence,

program efforts are measured by a variety of non-savings implementation metrics that track the effectiveness of compliance improvement/education efforts.

Non-resource implementation metrics are also necessary to track the reach code support efforts that comprise the IOUs' Reach Code subprogram. While reach codes do generate direct savings the IOU efforts are aimed at providing tools for local jurisdictions to implement reach codes. It is up to the jurisdictions to use the tools as part of their enforcement efforts.

- The Program Administrator' share of EM&V budget is expected to increase to 40% from 27.5%. As funding allows, the Program Administrators plan to conduct market studies similar to the PG&E's Codes & Standards Home Energy Use Study by conducting on-site surveys, modeled after NEEA's Residential Building Stock Assessment. Results will be used for C&S program advocacy efforts and will track adoption of new technologies.

Appendix A to Codes & Standards: Codes and Standards Value

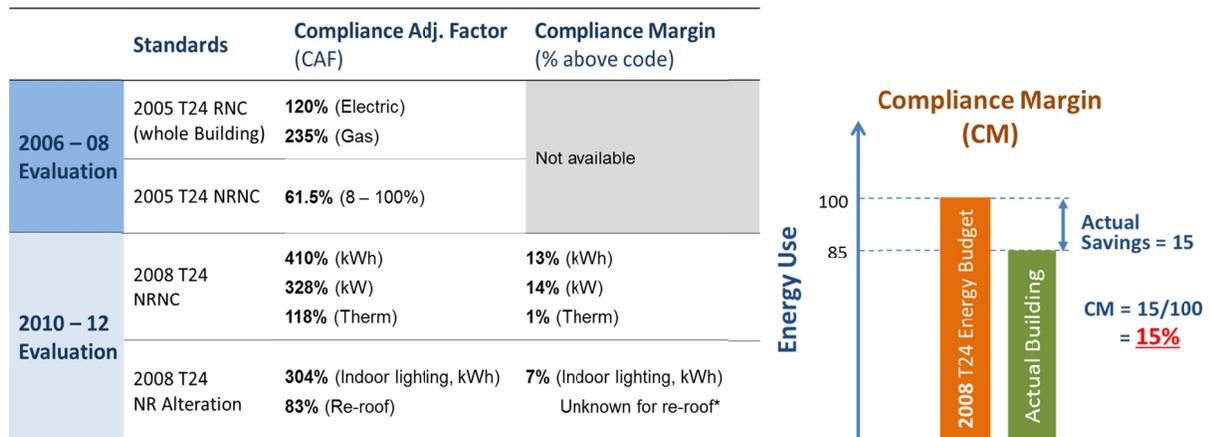
Roles for Codes & Standards Program within the Cross-Cutting Sector

The C&S Program emerged during the late 1990s when California’s first attempted to transition away from resource acquisition to market transformation programs. The program objective was to cause permanent reductions in energy use through improvements to the Building Energy Efficiency Standards and Appliance Standards. Circa 2005, advocacy was extended to include federal appliance standards, which are embodied in Title 20 after a DOE final rule.

For measures included in incentive programs, codification of a measure provides an exit strategy to sunset incentive support for technologies that have graduated from emerging to standard practice, completing transformation and releasing funds to be used for new technologies. To ensure the savings from newly adopted codes and standards are realized, the compliance improvement team conducts education and training, and develops tools, to help individuals within compliance supply chain (builders, contractors, manufacturers, etc.) correctly implement state and federal regulations.

Figure 1 shows, based on Commission evaluations, that compliance margins (percent beyond code) for whole buildings and lighting alterations exceed code baselines, indicating robust compliance with building codes from an energy use perspective.

Figure 1 - Compliance Margins from Commission Evaluations^{337,338}



³³⁷ KEMA, Inc., The Cadmus Group, Inc., Itron, Inc., Nexus Market Research, Inc., & ENRG, Inc. (2010, April 9). *Codes & Standards (C&S) Programs Impact Evaluation California Investor Owned Utilities’ Codes and Standards Program Evaluation for Program Years 2006-2008*, CALMAC Study ID CPU0051.01.

Retrieved from

http://www.calmac.org/publications/Codes_Standards_Vol_III_FinalEvaluationReportUpdated_04122010.pdf

³³⁸ Cadmus, Energy Services Division & DNV GL. (2014, August). *Statewide Codes and Standards Program Impact Evaluation Report for Program Years 2010-2012*, CALMAC Study ID CPU0070.03. Retrieved from http://calmac.org/publications/CS_Evaluation_Report_FINAL_10052014-2.pdf

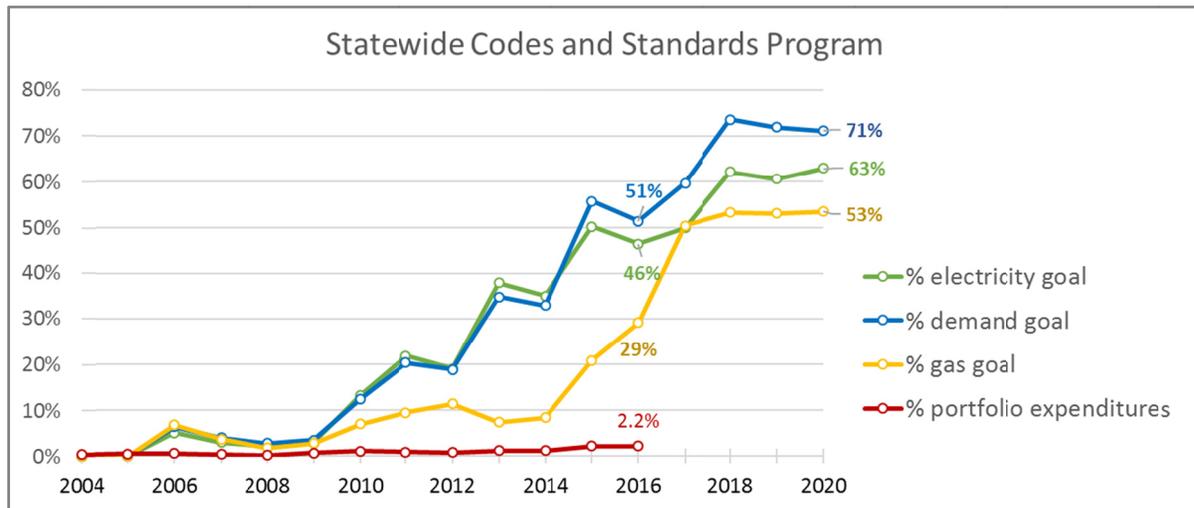
Through reach codes, and planning and coordination activities, the program conducts activities to advance and harmonize codes, standards, and ratings by local governments, ASHRAE and others, such that they support California building codes and appliance standards and other goals. Internal coordination serves to inform programs regarding upcoming changes and gather information to support future code enhancement proposals.

How does it support the portfolio

The C&S program is an extremely cost-effective program since savings continue to accrue for many years following the C&S program advocacy activities. In 2016, with a statewide budget equal to approximately 2.2 percent of the portfolio total, the C&S Program will generate approximately half of the portfolio electric savings (46 percent electricity, 51 percent demand) and almost one-third (29 percent) of gas savings.

Given delays between research and rulemakings, and between adoption and effective dates, several years may lapse between advocacy efforts realized savings. The savings shown illustrate that measures adopted because of C&S Program efforts conducted through March 2016 will continue to produce savings equal to more than half of the total portfolio savings through 2020. The activities described in this Business Plan will produce savings from appliance and building standards scheduled for adoption before 2020, and will set the stage for a stream of savings to be realized in future code cycles.

Figure 2- Codes and Standards Program Budget and Savings³³⁹



Just as the C&S program serves a diverse customer landscape, it also plays a cross-cutting role in supporting the other programs within energy efficiency. Accurate data derived from data gathering from code-driven research and market analysis to support the development of effective standards may also be a resource for program developers and implementers serving customers that the standard will eventually impact. This positions the C&S program to share knowledge through existing relationships.

Benefits to customers

C&S activities benefits California’s customers by:

- 1) Significantly reducing in energy bills for all customers;³⁴⁰

³³⁹ Note: the estimated demand, electricity, and gas percentages are calculated by dividing the C&S savings by the total portfolio savings (C&S and incentive programs). The C&S Program savings are based on adopted standards (thru March 2016) for which Statewide IOU team conducted advocacy efforts. The C&S savings are derived from either Commission Impact Evaluations (for standards that became effective in 2006 thru 2012) or IOU estimates (for standards that become effective in 2013 and beyond). The incentive program savings are estimated based on Commission evaluation results (for savings from 2004 to 2012), IOU estimates (for savings from 2013-15), and incentive programs goals provided in D.15-10-028 (2016 and beyond). Per prior Commission policy, C&S Program savings are *net* and incentive programs savings are *gross*. [Note: D.16-08-019 has now recommended that incentive program goals be measured in *net* goals rather than *gross* goals to address potential free ridership concerns.]

³⁴⁰ For example, annual bill reductions per home resulting from the Statewide C&S program advocacy is estimated at \$400/year for newly constructed homes and \$100/year for existing homes. See slide 4 of the May 4, 2016 Stage 2 Statewide C&S presentation for the EE Coordinating Council. California Energy Efficiency Coordinating Committee. (2016, May 4). *Codes and Standards program: Statewide presentation*. Retrieved from http://media.wix.com/ugd/0c9650_7b6b1a4581114c73b658ca50b37ba625.pdf

- 2) Providing a solution for the “split incentive” problem faced by a larger percentage of customers who are tenants. (Many landlords purchase appliances based upon first cost, so the improved standards provide the best chance for improved energy efficiency for tenants.); and
- 3) Supporting building design teams, contractors, customers and government agencies to improve their ability to comply with codes and standards.

C&S activities benefits state agencies by:

- 1) Achieving progress toward Commission, CEC, and California Air Resources Board (CARB) policy goals;
- 2) Coordinating with other entities to support the state’s ambitious energy policy goals; and
- 3) Assisting local governments in developing ordinances that exceed statewide minimum requirements.

External Community and Economic Impacts and Benefits

Codes and standards have far-reaching impacts, throughout California and beyond. California frequently leads the nation in setting stringent codes and standards, and many of the benefits realized in California spillover to other states nationwide, and also internationally.

When a code or standard is adopted, it begins permanently changing the market, and the covered technology (or equipment or activity) typically becomes standard practice. Impacts from these market changes provide significant benefits to both IOU and non-IOU customers throughout the state. This benefit affects those who participate in IOU incentive programs as well as those who do not. The CEC estimates that savings from implementation of the 2016 building standards will reduce annual statewide greenhouse gas emissions by 160,000 metric tons of CO₂ emissions.³⁴¹

In addition, the economic benefits continue to accrue with each transaction following a code adoption translating to reduced operating costs which directly impact the bottom line for everyone, including:

- Local governments: increase ability to meet local goals through supporting standards implementation;
- Local businesses: increase profits, reduce prices; and
- Homeowners and residents: lower energy costs, increase in discretionary income.

An increase in discretionary income produces increased spending, at least some of which will be spent at locally-owned businesses, compounding the benefits further through the local multiplier effect, which posits that money spent within the community produces a greater local economic benefit as it recirculates and is re-invested in the community.

³⁴¹ California Energy Commission. (2015, June). *2016 Building energy efficiency standards for residential and nonresidential buildings, CEC-400-2015-037-CMF*, Part 1, Article 1, Section § 10-106. Retrieved from <http://www.energy.ca.gov/2015publications/CEC-400-2015-037/CEC-400-2015-037-CMF.pdf>

Updated codes often spur market innovation to increase customer functionality and energy efficiency. One good example of this is residential clothes washers. In 2006 DOE implemented a clothes washer standard that improved the efficiency to push most top loader washers out of the market. This was a pretty progressive move towards energy efficiency at a time when top loading washers still dominated the market. Front loaders were a premium product in the US even if they dominated the market in Europe. As a result of DOE's regulation manufacturers now produce a low cost front loading washing machine that saves water and energy (while still effectively cleaning clothes). This type of code-driven innovation has encouraged manufacturers to engineer better products while saving energy.

The C&S program creates jobs through direct employment, indirect employment, and induced employment. The program creates jobs in all three categories with a significant amount created from induced employment which accounts for the expenditure-induced effects in the general economy due to the economic activity and spending of direct and indirect employees. These shared benefits are reinvested in local economies by millions of customers. Wei et al. (2010) estimates that energy efficiency creates 0.17 to 0.59 net job-years per GWH saved.³⁴² By comparison, they estimate that the coal and natural gas industries create 0.11 net job-years per GWH produced. When utilizing a mid-point for the energy efficiency range (0.38 net job-years per GWH saved), and assuming 80,000 GWH in committed statewide efficiency savings from codes and standards by 2026, the resulting cumulative job creation would be a projected 30,400 jobs.

Appendix B to Codes & Standards: Customer Landscape

C&S affect many stakeholders in the building industry supply chain. Appliance standards impact all customers who purchase regulated products. Considering this, the influence of C&S has an effect on virtually all customers. With respect to advocacy engagement, priority stakeholders include those who can affect the success of standards in the rulemaking process and through implementation. Stakeholders include, but are not limited to:

- a. Local, state and federal government agencies
 - i. Local jurisdictions
 - ii. State agencies
 - iii. Federal agencies
- b. Utility colleagues
 - i. California investor-owned utility (IOU) partner utilities
 - ii. Non-California based IOUs operating in California
 - iii. California-based municipal utilities
 - iv. National utility partners

³⁴² Wei, M., Patadia, S., & Kammen, D.M. (2009, November 14). Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US?. *Energy Policy, Issue 38*, pp. 919-931. Retrieved from <https://www.scribd.com/document/85731271/Putting-Renewables-and-Energy-Efficiency-to-Work-How-Many-Jobs-Can-the-Clean-Energy-Industry-Generate-in-the-US-Patadia-2009>

- v. Third-party implementers
- vi. Trade professionals
- c. Standards, testing, and ratings organizations
 - i. Professional organizations (ASHRAE, IES etc.)
 - ii. Industry organizations (AHRI, NEMA, AGA, CTI etc.)
 - iii. Voluntary equipment rating programs (ENERGYSTAR, DesignLights Consortium, CEE, WaterSense etc.)
 - iv. Building rating programs (LEED, PassiveHouse, Eprogram administrator PortfolioManager, Living Building Rating etc.)
 - v. Building testing organizations (HERS, NatHERS, ATTs, Commissioning Organizations)
 - vi. Governmental organizations (DOE, NIST, National Labs, Eprogram administrator)
- d. Enforcement agencies
 - i. Building inspectors
 - ii. Plans examiners
 - iii. Building official advocacy groups (CALBO)
- e. Regional partnerships & advocacy groups
- f. Construction industry market actors
 - i. Design professionals, contractors, engineering firms, energy consultants, HERS raters, and acceptance test technicians
- g. Construction industry suppliers
 - i. Manufacturers, distributors, and retailers
 - ii. Industry associations
- h. Building owners and operators
 - i. Building owners (BOMA, California Business Properties Association, etc.)
 - ii. Occupants (employee unions, retailers etc.)
- i. Demand response providers
 - i. California utilities
 - ii. Third-party implementers
 - iii. DR Equipment providers
- j. Renewable energy providers
 - i. Solar equipment manufacturers
 - ii. Solar installation companies
 - iii. Renewable energy advocacy groups (CalSEIA, Environmental Groups)

EMERGING TECHNOLOGIES CHAPTER

A. Emerging Technologies Market Characterization

Overview

The Gas and Electric Emerging Technologies Programs (ETP)³⁴³ are non-resource programs designed to help California ratepayer-funded programs meet the energy reduction needs of the most populous state in the nation by identifying cost-effective measures that deliver reliable energy savings. ETP supports the Program Administrators by fulfilling three objectives:

1. Ensure that programs have a comprehensive set of suitable technology options for new measures.
2. Ensure Program Administrators receive actionable market information to inform program delivery.
3. Ensure that technology development partners understand what measures energy efficiency programs need.

ETP's vision is to anticipate the latest emerging technology trends in order to bring innovative, verified gas and electric technologies to Program Administrators

Customer Landscape

ETP's primary stakeholder and target audience are the Program Administrators, rather than the consumer or technology end user.³⁴⁴ ETP itself is not a customer-facing program. ETP supports the ambitious objectives in the California Strategic Plan and legislative initiatives by directly supporting ratepayer-funded programs including the Codes and Standards (C&S) program. As a non-resource program, ETP provides information to program managers and designers who make the ultimate decision of which technologies to offer through incentive programs; these program managers also design market interventions to promote customer use of energy-

³⁴³ In this document, the acronym "ET" refers to emerging technologies (or the emerging technology sector in general) or to the activities of an emerging technology workgroup within a single company. The acronym "ETP" refers to the statewide Emerging Technology Program, an organized, collaborative effort of ET workgroup stakeholders from each IOU. The ETP supports increased EE market demand and technology supply by contributing to the development, assessment, and deployment of new and under-utilized EE measures (that is, technologies, practices, and tools).

³⁴⁴ This is verified in a recent evaluation of the ETCC website (the primary means by which ETP disseminates its reports): only 7 of 81 survey respondents said they were just ET consumers, while all others categorized themselves as EE professionals, ET developers, vendors, manufacturers and distributors. The evaluators concluded that ETP was successful in reaching its intended target audience. Opinion Dynamics Corp. & Energy and Resource Solutions. (2015, November). *PY2013-2014 Emerging Technologies Program Targeted Effectiveness Study Report*, CALMAC Study ID CPU0112.01. Retrieved from http://www.calmac.org/publications/PY2013-2014_ETP_Targeted_Effectiveness_Evaluation_Volume_I_FINAL.pdf

efficient technologies. ETP relies on Program Administrators to conduct any market interventions or directly achieve market transformation.

The overarching need of the Program Administrators is for new measures. Table 1 breaks down three needs and shows how they drive ETP’s objectives and strategies. Each of these strategies will be discussed later in this chapter.

Table 1- ETP's Objectives and Strategies		
Program Administrator Needs	ETP Objectives	ETP Strategies
Identify new measures	Ensure that Program Administrators have a comprehensive set of suitable technology options for new measures.	Strategy 1: Develop and execute Technology Priority Maps (TPMs).
Understand how the market will respond to new measures	Ensure that Program Administrators receive actionable market information to inform program delivery.	Strategy 2: Solicit and meet Program Administrator requests for additional market or customer research on emerging technology measures.
Technologies Suited for California ratepayer programs	Ensure that technology development partners understand what measures Program Administrators need.	Strategy 3: Work with technology developers with products <1 year from commercialization, including new technology vendors, manufacturers, and entrepreneurs.
		Strategy 4: Work technology developers with products <5 years from commercialization, including CEC, universities and colleges.

ETP can also help Program Administrators address their market barriers. Program Administrators (along with retailers, trade allies, and/or contractors) may be reluctant to embrace new technologies that require changes to existing business models³⁴⁵ (e.g., a plumber making a service call might encourage a customer to purchase a less-efficient traditional water heater because the plumber is unfamiliar with the installation requirements for a more advanced, higher-efficiency heat pump water heater or condensing water heater). ETP has enlisted the Workforce Education and Training (WE&T) Program to address some instances of this market challenge by helping to design courses that train contractors on proper installation

³⁴⁵ Eto, J., Prah, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Ernest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

methods, thereby assuring Program Administrators that the market would take up the emerging technology or be ready for an upcoming change to Codes and Standards. Program Administrators need information about customer technology preferences to support the design of measure offerings. ETP can help by conducting customer research on specific emerging technologies. This will reduce information costs³⁴⁶ of understanding customer responses to those technologies.³⁴⁷

B. ETP Vision, Budget, Trends, and Challenges

ETP Vision

ETP's vision is to anticipate the latest emerging technology trends in order to bring innovative, verified gas and electric technologies to Program Administrators. Being on the forefront of these trends is an important component of ETP's efforts to support the achievement of California's ambitious energy savings and GHG reduction goals, in an environment in which energy efficiency avoided costs³⁴⁸ have declined, placing great pressure on ratepayer programs to stay cost-effective. Program implementers assume much of the portfolio risk that is inherent with offering any new or unproven technologies to customers, which can manifest in evaluation studies as low realization rates. By finding innovations and managing their risk to the portfolio through vetting by ETP, Program Administrators can maximize program impacts and cost-effectiveness.

Sector Budget

SoCalGas' Business Plan budget provides general information on the expected levels of annual spending for 2018-2025, along with 2016 and 2017 approved budgets for reference. As provided in D.15-10-028, SoCalGas' Business Plan budget represents its best estimates of spending for the life of the Business Plan.³⁴⁹ The intent is to allow program administrators flexibility to adjust spending during the life of the Business Plan.³⁵⁰ SoCalGas and other Program Administrators will file Tier 2 AL annually, containing a detailed budget for the next

³⁴⁶ *Id.*

³⁴⁷ Note that market characterization studies that include uncovering market barriers and describing supply chains are under the purview of EM&V. ETP does not conduct market segment characterization studies, but instead conducts limited customer research specific to a particular emerging technology.

³⁴⁸ Horii, B., Price, S., Cutter, E., Ming, Z., & Chawla, K. (2016, August 1). Avoided costs 2016 interim update, *Energy and Environmental Economics, Inc.*, pp. 41-44. Retrieved from <http://www.energydataweb.com/cpucFiles/pdaDocs/1591/Avoided%20Cost%202016%20Update-OUT.pdf>

³⁴⁹ "It [the budget] will establish a "ballpark" figure for spending for the life of the business plan." California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 55.

³⁵⁰ California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 56.

Cross-cutting: Emerging Technologies Program

calendar year’s energy efficiency portfolio.³⁵¹ The Tier 2 AL budgets will include detailed budgets for cost recovery, transfer, and contracting purposes.³⁵²

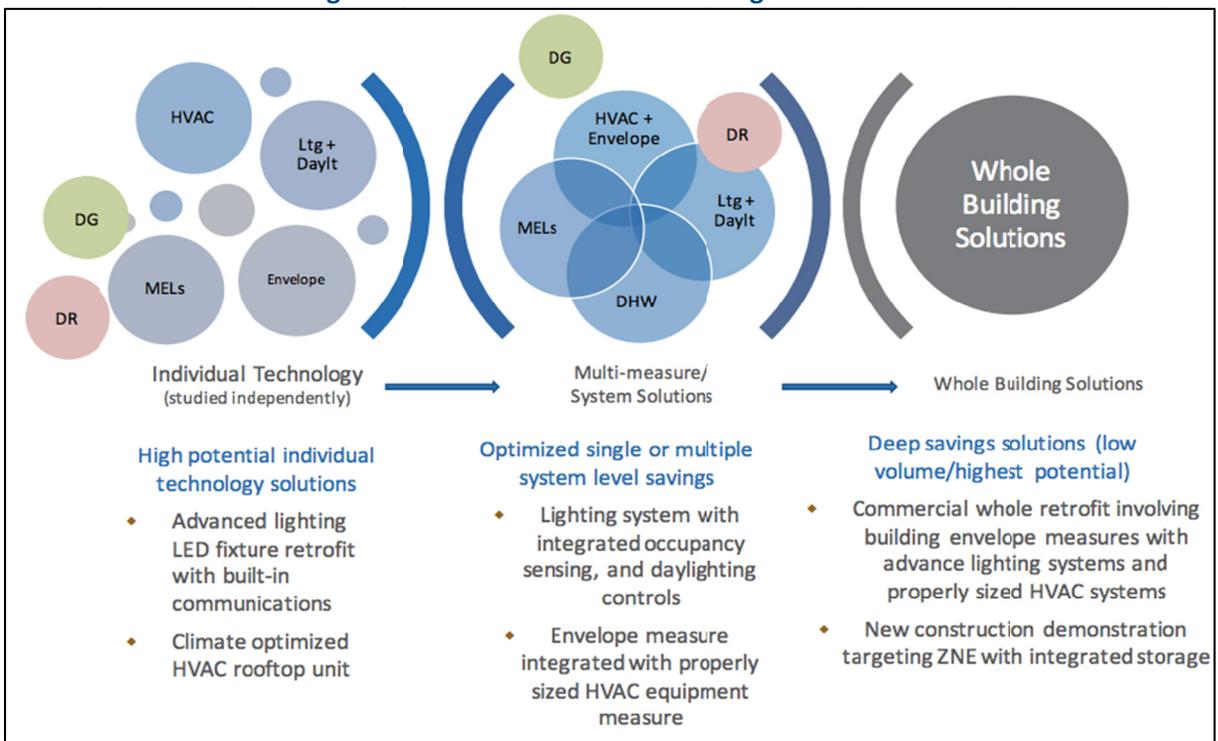
Table 2 – Sector Budget (\$000s)										
Sector	2016*	2017*	2018	2019	2020	2021	2022	2023	2024	2025
Emerging Technologies	\$1,823	\$1,748	\$1,748	\$1,789	\$1,831	\$1,874	\$1,919	\$1,964	\$2,010	\$2,058

*2016 and 2017 are shown for historical purposes.

Trends in Emerging Technologies

The latest trends in emerging technologies reflect an evolving marketplace where previously complex solutions have become technically feasible, where data is gathered and used in new ways, and where products go beyond simple "plug and play" gadgets and become complex, interrelated ecosystems. These trends include moves toward Integrated Distributed Energy Resources (IDER), use of data analytics, growth of internet-connected measures, and delivery of holistic, systems-level solutions through bundled measures. Figure 1 describes the evolution of measures based on these trends.

Figure 1 - Evolution of Whole Building Solutions³⁵³



³⁵¹ California Public Utilities Commission. (2015, October 28). D.15-10-028, OP 4.

³⁵² California Public Utilities Commission. (2015, October 28). D.15-10-028, p. 56.

³⁵³ Over the years, ETP has evaluated many individual technologies that save customers energy, including advanced lighting and heating, ventilation, and air conditioning (HVAC) products (left). Because repeatedly reaching customers with one-time energy efficiency measures can be difficult, ETP also pursues integrated solutions that bring together several stand-alone technologies into a single package

IDER: One of the most far-reaching trends is ETP's increasing role in supporting other utility activities, such as distributed generation (DG), demand response (DR), and energy storage. In addition, a recent resolution from the California Public Utilities Commission (Commission) to increase natural gas winter reliability³⁵⁴ provides new roles for ETP's support. This new integration of activities offers utilities the potential to provide greater value to customers by moving to a model of DSM procurement that can address grid needs and gas system management in real time.

Data analytics: There has been a proliferation of new data streams (energy usage via mobile apps and consumer "big data") coupled with new analytical tools such as Green Button Connect, a White-House-led initiative, which enables residential and business customers to provide energy usage data to third-party vendors. These vendors can develop new tools and services to potentially streamline and accelerate emerging technology penetration, support measurement and verification (M&V) approaches, and enable the development of new behavioral programs. A host of new products in this area, such as energy management systems (EMS) that intelligently optimize a building's operations in real time, are showing early success in targeting customers and delivering savings across sectors. EMS have become increasingly powerful in recent years with the proliferation of inexpensive building sensors, enhanced wireless communication capabilities, and increasingly intelligent automation and analytical functionality.

Internet-connected measures: As more devices are connected to the Internet, aging hardware can now be upgraded with the latest features through a simple software update. This can have implications for both market adoption and savings potential. The software development cycle is faster than for hardware, so the marketplace now evolves more rapidly. Because installing new software costs much less than upgrading hardware, this evolution could reduce adoption barriers by enabling product upgrades instead of replacements. Additionally, software patches can instantly convert an already-installed technology into a new product with totally different energy characteristics that adapts to changing needs.

Bundled measures for holistic solutions: As energy efficiency portfolios have matured, many of the easy energy savings opportunities for individual products are no longer available. The above technology trends could enable a shift away from seeing technologies as stand-alone, to thinking more holistically about multiple systems or entire buildings. This thinking emphasizes the interplay that a lighting system must have with an HVAC system to meet a certain energy strategy while maintaining adequate service levels. By thinking about building systems

(center). Deeper savings can be realized by going beyond integrated systems to offer whole-building solutions (right). Treating a home or commercial building in a holistic manner can have additional customer benefits, such as added controls, increased comfort or making achieving energy goals easier.

³⁵⁴ California Public Utilities Commission, Energy Division. (2016, November 10). *Resolution G-3522, Southern California Gas Company requesting approval of the proposed winter demand response programs*. Retrieved from <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M168/K808/168808853.docx>.

holistically, it is possible to design spaces so that newly added components do not interfere with the energy savings or other operational parameters, of existing components. Taking a set of technologies that individually offer low savings potential and bundling them into one large package will allow utilities to tap into new savings opportunities where the whole is greater than the sum of its parts.

Challenges to ET Measure Development

In the technology development continuum³⁵⁵, ETP's contribution is during the technology assessment and validation stages, usually after the commercialization stage. ETP depends on technology developers and manufacturers to innovate, conduct research and development (R&D), and create new technologies and potential products for consideration in energy efficiency portfolios. After ETP recommendations are adopted as measures, ETP then must rely on program implementers to design programs, set incentive levels, conduct marketing around new measures, and provide product information directly to the mass market. ETP's testing results are typically redacted to be name brand- and model-anonymous, without co-branding and endorsement, and designed to show the savings for the technology category. It is important for stakeholders to understand ETP's role so that its achievements and boundaries can be recognized. In an environment where portfolio cost-effectiveness is increasingly harder to achieve, and every ratepayer dollar must be carefully directed, ETP's ultimate role is to help Program Administrators and program designers of energy efficiency programs to decide which technologies can meet California's energy needs.

Policy and Regulatory Challenges

Policy and regulatory challenges³⁵⁶ exist that hinder program adoption of emerging technologies. While ETP and the Program Administrators are addressing these challenges, ETP's full value to the portfolio cannot be realized until they are overcome. ETP is a stakeholder in forums addressing technical challenges, and the Program Administrators are exploring ways to bring about policy changes to allow greater innovation into the portfolio.

- Program administrators are reluctant to offer emerging technologies when their impact on overall portfolio cost-effectiveness is uncertain. ETPs operated in other areas, such as Sacramento Municipal Utility District³⁵⁷ and New York State Energy

³⁵⁵ Godin, B. (2006). The linear model of innovation. *Science, Technology, & Human Values, Vol 31, Issue 6*, pp. 639 – 667. Retrieved from <http://journals.sagepub.com/doi/abs/10.1177/0162243906291865>

³⁵⁶ The term market challenge is used instead of market barrier because market barrier usually refers to barriers facing end-use customers. ETP is not a customer-facing program.

³⁵⁷ Evergreen Economics & Willems, P. (2015, August). *Study of the California Utility Internal Measure Development Process*, CALMAC Study ID SCE0380.01, pp. 5-6. Retrieved from http://www.calmac.org/publications/SCE_Final_UIMD_Report.pdf

- Research and Development Authority,³⁵⁸ have addressed this barrier by creating special exemptions for emerging technologies from cost-effectiveness requirements.
- Policies are still evolving for behavioral interventions that would qualify for energy efficiency incentive programs. ETP can help inform policy makers by gathering data and developing tools to help measure impacts of behavioral interventions. In 2016, ETP developed a validated scale that can be used to measure the relative effectiveness of different behavioral interventions.³⁵⁹
 - Current customer confidentiality regulations that limit access to AMI data can slow digital innovation.³⁶⁰ ETP can help by working with vendors that allow customers to access their own data while anonymizing customer data to the vendor.
 - Different proceedings³⁶¹ for energy efficiency, demand response (DR), and distributed generation (DG) programs create funding silos that hinder coordination of integrated demand-side management (IDSM) projects and customer incentives. ETP can help by testing energy management systems that can accommodate energy efficiency, DR, and DG technology, in anticipation of potential policy changes to remove funding silos.
 - The existing net energy metering (NEM) tariff can limit DG and Combined Heat and Power applications due to separate accounting treatments of renewable customer-generators.³⁶² The lack of clarity around workpaper requirements means that ETP data for workpapers are sometimes not sufficient, necessitating a follow up data collection effort. These workpaper data parameters are not made available to the IOUs at the outset of a project. This challenge hampers ETP's ability to develop a clear scope of work with concrete deliverables that are needed to effectively bid out

³⁵⁸ Kisch, T., Barnacle, B., Savio, P., Smith, S., & Clyburn, J. (2016, March 22). Market development programs - Addressing barriers for emerging technologies through scaled deployments and strategic supply chain interventions. *2016 ACEEE Summer Study on Energy Efficiency in Buildings*. Retrieved from http://www.aceee.org/files/proceedings/2016/data/papers/7_1041.pdf

³⁵⁹ Emerging Technologies Coordinating Council. (2016). *Dimensions of energy behavior: Psychometric testing of scales for assessing behavioral interventions in demand side management programs*. Retrieved from <http://www.etcc-ca.com/reports/dimensions-energy-behavior-psychometric-testing-scales-assessing-behavioral-interventions>.

³⁶⁰ California Public Utilities Commission. (n.d.) *Energy Data Access Committee (EDAC)*. Retrieved from <http://www.cpuc.ca.gov/General.aspx?id=10151>

³⁶¹ The Commission's "Legislative Umbrellas" illustrate the coordination needed across multiple proceedings. California Public Utilities Commission. (n.d.). *Legislative umbrellas, A simple approach to track regulatory progress toward legislative goals*. Retrieved from http://www.cpuc.ca.gov/Proceedings_Umbrella

³⁶² Under the existing NEM framework, customers receive credits at the full retail price per kWh exported as described in [Public Utilities Code] Section 2827(h). This is a higher credit rate than other programs, such as the fuel cell NEM program (Section 2827.10) that only provide compensation at the interconnected IOU's generation rate. Section 2827(g) exempts [renewable] NEM facilities from the standby charges that many other categories of self-generation must pay. California Public Utilities Commission. (2016, January 28). D.16-01-44, p. 14.

and manager third-party implementers. This same lack of clarity also negatively impacts the California Energy Commission Electric Program Investment Charge program, which has asked for a clear set of workpaper requirements so that their ratepayer-funded research may eventually be transferred to measures for programs.³⁶³

C. Value of ETP

To support Program Administrators effectively, ETP conducted over 300 technology evaluations and over two dozen demonstrations and showcases in the 2013–2015 program cycle.³⁶⁴ These efforts have supported the development or enhancement of numerous new energy efficiency program measures, education programs, and codes and standards. Importantly, these efforts have filtered out technologies for ratepayer programs due to having a long payback or low value to portfolio, allowing program designers and implementers to direct limited resources to measures with reliable savings. ETP Appendix A summarizes ETP's accomplishments. This section describes how ETP provides benefits to customers, to market transformation initiatives, to regulatory and legislative initiatives, and to non-energy priorities. ETP's support of cross-cutting programs such as WE&T and Codes & Standards will be described in a later section.

Benefits to Customers

Although ETP is not a customer-facing program, ETP's work can affect customers indirectly. End-use customers can benefit through acceleration of viable new products to enter the marketplace due in part to ETP's assurance to Program Administrators that an emerging technology is suitable for their program. However, the baseline for the counterfactual is difficult to establish. Also, because Program Administrators set incentives and design outreach, the ultimate adoption rate is largely determined by the Program Administrator's efforts.

Support for Regulatory and Legislative Initiatives

Through ETP's direct support of the portfolio and codes and standards, ETP also works to advance underlying state initiatives and policies, including Senate Bill (SB) 350, Assembly Bill (AB) 793, and AB 802. Chief among these is the California Long-Term Energy Efficiency Strategic Plan (CLTEESP), which describes such major long-term initiatives as transitioning the state's building inventory to Zero Net Energy (ZNE) and is accelerating the development and adoption

³⁶³ California Energy Commission. (2016, December 8). *Discussion on the Investor-owned utilities' emerging technology (ET) Programs and the California Energy Commission's energy efficiency research programs*. Retrieved from <http://www.energy.ca.gov/calendar/index.php?eID=2814>

³⁶⁴ IOU ETP program records.

of next-generation lighting and HVAC technologies.³⁶⁵ Overall, 86% of ETP projects align with CLTEESP.³⁶⁶

In addition to the overarching CLTEESP, ETP is working to support a number of more focused state policies, including:

- **SB 350**, which seeks to double efficiency goals in the state's building stock by 2030. ETP sees integrated solutions as a key path towards doubling energy savings.
- **AB 793**, which seeks to enable smarter energy management through advanced technologies. ETP continues to assess data display and presentation solutions that can drive residential and non-residential energy savings.
- **AB 802**, which includes "to-code" improvements for underperforming buildings (stranded savings), facilitates enhanced access to building performance data, and paves the way to meter-based savings for customers. In some cases, meter-based savings can require extensive submetering, and ETP has begun to assess smart electric panels with built-in current transformer sensors for each breaker, and communicating compact gas meters that may someday provide inexpensive and accurate sub-metered data.

Beyond Energy Efficiency

With the rapid increase of both utility-scale renewables and behind-the-meter (BTM)³⁶⁷ distributed energy resources (DER) on the grid, it is becoming increasingly challenging to manage the imbalance between power supply and demand in real-time, particularly because the balance can fluctuate within seconds. These fluctuations occur at both the system-wide level and at the neighborhood level (e.g., substation, transformer). Fortunately, ETP can play a role in helping to overcome such grid challenges by working in concert with programs and technologies on both sides of the meter to deliver resources capable of responding to grid needs.

In addition, ETP serves other purposes. One of these is ETP's work on natural and alternative refrigerants. Older types of refrigerants found in appliances, air conditioners, and industrial equipment are harmful to the ozone layer and act as powerful greenhouse gases (GHGs). ETP supports the phase-out of these compounds by working to verify the viability and energy savings potential of new alternatives.

Another critical issue facing California is an ongoing drought that has strained water resources. Recognizing a link between water and energy, water-energy nexus, ETP is working with utility

³⁶⁵ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan January 2011 Update*, §2.1.1. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

³⁶⁶ Opinion Dynamics Corp., & Energy and Resource Solutions. (2015, November). *PY2013-2014 Emerging Technologies Program Targeted Effectiveness Study Report, CALMAC Study ID CPU0112.01*, , p. 2. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1381/PY2013-2014ETPTargetedEffectivenessEvaluation_Volume1_9-30-2015.pdf

³⁶⁷ "Behind the meter" refers to any activity, technology, or infrastructural elements that occur before electricity or gas enters a customer's home or business through the meter. This includes centralized generation and transmission, grid management, and utility storage.

agriculture stakeholders to find and accelerate adoption of energy-saving technologies that also deliver water savings.

ETP also works to support the conversion of the transportation sector away from petroleum to electric and alternative fuel vehicles. ETP has collaborated with the Emerging Markets & Technology (EM&T) Program, the Transmission & Distribution Advanced Technologies organization, and the C&S Program to understand the charging infrastructure for electric vehicles, with the eventual goal of delivering effective energy management options through advanced controls that will facilitate time-of-need charging.

D. ETP Strategies

ETP is being modified to accommodate its redesign as a statewide (SW) program pursuant to Commission Decision (D.) 16-08-019. The primary change will be the use of TPMs to strategically guide research. ETP's objectives remain essentially the same³⁶⁸, and are to address three overarching needs as mentioned in Table 1. This section provides more details about the strategies that ETP has chosen to meet those objectives, and examples of past tactics. More details on the tactics will be provided in the Implementation Plans.

Objective 1: Ensure that programs have a comprehensive set of suitable technology options for new measures.

Strategy: Develop and execute Technology Priority Maps (TPMs)

Metrics for Objective 1: Number of TPMs initiated; number of TPMs updated, and number of projects initiated.

To ensure all high priority areas are addressed,³⁶⁹ ETP's strategy is to use collaboratively-designed TPMs to drive the ETP research agenda. ETP believes TPMs are the best choice for ensuring that Program Administrators have a comprehensive set of measure candidates. The IOUs already have technology roadmaps that align with both State policy priorities and their own customer needs. By integrating each Program Administrator's existing technology roadmaps whenever possible, ETP can have a head start at developing TPMs that align with 1) California policy and 2) the needs of ratepayer-funded programs. The TPMs may include projects addressing all stages of the technology product development lifecycle, including informing technology developers with desired specifications of new measures, conducting lab and field assessments, demonstrations, showcases, pilots, and market studies.

The strategy of using TPMs allows a modular approach to addressing policy priorities. TPMs can cover a broad priority area, for example all of Residential HVAC, or targeted to delve deeply into a particular application within a particular sector, such as fault detection and diagnostics

³⁶⁸ Changes in ETP is as follows: ETP previous categorization of activities by subprograms is not needed because each TPM is expected to "shepherd" technologies from its earliest availability through early market introduction. The previously used terms "technology development support", "technology assessment" and "technology introduction support" will instead refer to projects across the different stages of the technology's measure development lifecycle.

³⁶⁹ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 63, footnote 23.

for public schools. In the near term, ETP plans to develop TPMs to address two priorities. ETP will dedicate one TPM to identifying which technologies hold the most promise for market transformation programs. This may include an assessment of market (achievable) potential for the highest ranking technologies, a market characterization that identifies key market actors and key market barriers, and a plan for moving forward in developing an appropriate market transformation program. ETP will also dedicate one TPM to high-risk technologies, with the proviso that this can only be done if this TPM is exempt from cost-effectiveness calculations. The TPMs will also be designed to be able to respond to changes in priorities or newly-defined needs, such as additional market research. The TPMs will be reviewed annually and, if needed, refreshed in order to stay current and up-to-date with technological advances. This may require that some projects be sunsetted prior to completion if all stakeholders agree that a particular technology is no longer a priority.

Objective 2: Ensure that Program Administrators receive actionable market information to inform program design.

Strategy: Solicit and meet Program Administrator requests for additional market or customer studies on emerging technology measures.

Metric for Objective 2: Percent of TPMs that include delivering actionable information for program designers.

ETP will help Program Administrators understand how the market will respond to new measures, and thus reduce portfolio risk. ETP will achieve this objective by conducting projects and pilots that seek to probe the market's response to emerging technologies. For the rolling portfolio, ETP will refine that strategy to directly meet specific requests from Program Administrators for more market information to inform program design. This allows ETP to pull resources from areas where Program Administrators may already have market information (such as from their separate market research department), while directing resources to those who specifically need such information. While details will be specified in the Implementation Plans, in the past, ETP has used demonstrations, scaled field placements, and showcases as opportunities to gather data from customers on their interest in purchasing similar emerging technologies. ETP has also conducted pilots and technology introduction projects designed to simultaneously seed and gauge market interest in a new product while gathering more in situ data on energy savings.

ETP will measure progress towards this objective by documenting the percentage of TPMs that are designed to deliver actionable information to Program Administrators.

Objective 3: Ensure that technology development partners understand what measures programs need.

Strategy 1: Work with technology developers with products less than one year from commercialization

Strategy 2: Work with technology developers with products less than five years from commercialization

Metrics for Objective 3: Number of outreach events

ETP has chosen the strategy of working with technology developers during early product development stages (approximately less than five years to commercialization) in order to inform them about the needs of California customers early on, and perhaps be able to suggest product specifications to them. ETP defines risk objectively, in terms of time-to-commercialization; cultivating technologies that are in the inception and R&D phases is high risk because of the chance that these technologies may not successfully make it to the market. Working with products that are closer to commercialization decreases that risk. ETP has been able to pursue high risk/high reward measures by working with technology developers during the early stages of the technology product lifecycle. ETP also works with later-stage products that are less than 1 year from commercialization, to find opportunities to support field testing. These two strategies allow ETP to maintain long-term relationships and communications with major manufacturers, and encourage future product development at a relatively low cost to ratepayers. ETP has found success in the past through Technology Resource Innovation Outreach (TRIO) events held in each IOU service territory, as well as a biannual Emerging Technologies Summit, rotating through locations in each service territory. ETP’s tactics are used to support multiple strategies and are to be used in the near- mid- and long-terms. Table 3 below lists ETP’s traditional tactics, with the understanding that new tactics may be added in the Implementation Plans.

Tactics	Existing, Modified, or New Tactic?	Objective Number(s) Addressed	Near-term = 1-2 yr Mid-term = 3-6 yr Long-term = 5-15 yr
Conduct laboratory testing to evaluate performance uncertainties and/or other attributes and potential effectiveness	Existing	1	N, M, L
Conduct paper studies to synthesize existing research and findings from multiple sources	Existing	1,2	N, M, L
Conduct scaled field placements of a number of measures at customer sites as a key step to gain market traction and gain market feedback	Existing	1,2,3	N, M, L
Conduct solicitations for third-party projects to introduce emerging technologies to the market	Existing	1,2	N, M, L
Conduct demonstrations to seed market interest through proof-of-concept installations	Existing	1,2,3	N, M, L
Conduct demonstrations to allow hands-on interactions with solutions to gather customer data and feedback	Existing	1,2,3	N, M, L
Conduct market, customer, and behavioral studies targeted towards specific applications or sectors	Existing	1,2,3	N, M, L

Table 3- ETP Tactics			
Tactics	Existing, Modified, or New Tactic?	Objective Number(s) Addressed	Near-term = 1-2 yr Mid-term = 3-6 yr Long-term = 5-15 yr
Facilitating field evaluations at customer sites	Existing	1,2,3	N, M, L
Make lab testing facilities such as Southern California Edison's Technology Test Center available to companies without appropriate testing capabilities	Existing	3	N, M, L
Develop standard testing protocols and facilitate widespread use of these protocols	Existing	3	N, M, L
Develop tools to facilitate assessment of emerging solutions, such as holistic solutions	Existing	1,3	N, M, L
Fund college and university competitions on high risk, high reward technologies	Mod	3	N, M, L
Cultivate and maintain relationships with industry partners	Existing	3	N, M, L
Conduct outreach events to facilitate ability of entrepreneurs to widen network of business contacts	Existing	3	N, M, L
Help technology developers learn utility business practices and procurement requirements	Existing	3	N, M, L

E. Metrics and Targets

Measuring ETP performance is challenging;³⁷⁰ ETP has established metrics to gauge the effectiveness of the strategies put forth in this Business Plan. However, over time and through discussions with evaluators and stakeholders, ETP has learned that a distinction needs to be made between metrics that track progress towards ETP’s quantitative objectives and targets, which are within ETP’s control, versus metrics that track variables of interest to stakeholders, but are outside of ETP’s control.

To apply these lessons learned, ETP metrics are directly associated with ETP’s objectives and strategies, within the Joint Utilities Metrics Framework.^{371,372} These “goal metrics” allow stakeholders to track ETP progress towards quantitative objectives for the aspects of program

³⁷⁰ United States General Accounting Office (1997, March). *Report to congressional requesters: Measuring performance, strengths and limitations of research indicators*. Retrieved from <http://govinfo.library.unt.edu/npr/library/gao/rced9791.pdf>

³⁷¹ California Energy Efficiency Coordinating Committee. (2016). *Business plan guidance, metrics framework*. Retrieved from <http://www.caeec.org/metrics>

³⁷² Because ETP is non-resource and is the only PA program that does not intervene in the market, “Desired Market Effects” was changed to “Desired Effects”, “Intervention Strategies” was changed to “Implementation Strategies”, and “Market Effect Metrics” was changed to “Metrics”.

performance over which ETP has control. ETP metrics framework in Table 3 shows ETP's objectives, strategies, and metrics associated with the objectives ("goal metrics"). Over time, metrics and targets may be adjusted and improved to more accurately reflect program progress.

Cross-cutting: Emerging Technologies Program

Table 4 - Emerging Technologies Program Metric Table

Problem Statement	Desired Effects	Implementation Strategies	Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Program Administrators (PA) need to identify measures that enable them to meet ambitious energy reduction goals.	Programs have a comprehensive set of suitable technology options for new measures.	Strategy 1: Develop and execute Technology Priority Maps (TPMs).	Number of TPMs initiated Number of TPMs updated ---- Number of projects initiated	Year 2018 TPMs --- 2013-2014 Program Database	Program Tracking Data	6 TPMs initiated (including 1 TPM on MT and 1 TPM on high-risk tech, subject to CE exemption) 3 TPMs updated ---- ~183 Projects Initiated	3 TPMs initiated 3 TPMs updated ---- ~244 Projects Initiated	3 TPMs initiated 3 TPMs updated ---- ~183 Projects Initiated
PAs need to know how the market will respond to new measures.	PAs receive actionable market information to inform program design.	Strategy 2: Solicit and meet PA requests for additional market or customer research on emerging technology measures.	% of TPMs that deliver actionable market information	Year 2018 TPMs	Program Tracking Data	100%	100%	100%

Cross-cutting: Emerging Technologies Program

Table 4 - Emerging Technologies Program Metric Table

Problem Statement	Desired Effects	Implementation Strategies	Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Technology manufacturers are interested in utility incentive programs, but may not develop technology that suits PA needs.	Technology development partners understand what measures PAs need.	Strategy 3: Work with technology developers with products <1 year from commercialization, including new technology vendors, manufacturers, and entrepreneurs.	Number of outreach events	Year 2018 Program Tracking Data	Program Tracking Data	15 outreach events	20 outreach events	15 outreach events
		Strategy 4: Work technology developers with products <5 years from commercialization, including CEC, universities and colleges.	Number of outreach events	Year 2018 Program Tracking Data	Program Tracking Data	6 outreach events	8 outreach events	6 outreach events

In addition to the metrics above, ETP also proposes to track those outcomes that are outside of ETP's control, but still provide useful information for understanding ETP's value and for tracking long-term trends in technologies that may inform future TPMs. Please see ETP Appendix B for more details about "these tracking metrics."

F. Coordination with Other Programs

ETP Support of Market Transformation

D.16-08-019 requires statewide programs to be designed to achieve market transformation.³⁷³ Because ETP does not intervene in the market, it must rely on Program Administrators to carry out market transformation programs. However, it can provide critical support to programs that do focus on market transformation initiatives. In the Implementation Plan, ETP will work with program implementers to identify measures that may be suitable for market transformation programs (see discussion of Technology Priority Maps).³⁷⁴

ETP is ideally suited to support market transformation in four specific ways:

- By working with technology developers and manufacturers to design specifications for new products;
- Through technology introduction support on a small scale to gather critical data to inform program designers about a technology's market viability;
- By collaborating on studies with the C&S program so that technologies can be researched before adopting into codes and standards. ETP is a long-standing partner to the C&S program in their efforts to gather data for Codes and Standards Enhancement (CASE) reports. Please see the section describing ETP's support for cross-cutting programs for more details on the C&S program; and
- By continuing to support building industry market actors in designing and constructing ZNE residential and nonresidential new and existing buildings.

ETP and the Codes & Standards Program

ETP has a history of close collaboration with the C&S program. This collaboration can help advance mutual goals, such as understanding motivations and barriers among home buyers and builders in order to meet ZNE policy goals, which will continue to be a key area of research (see the C&S chapter).

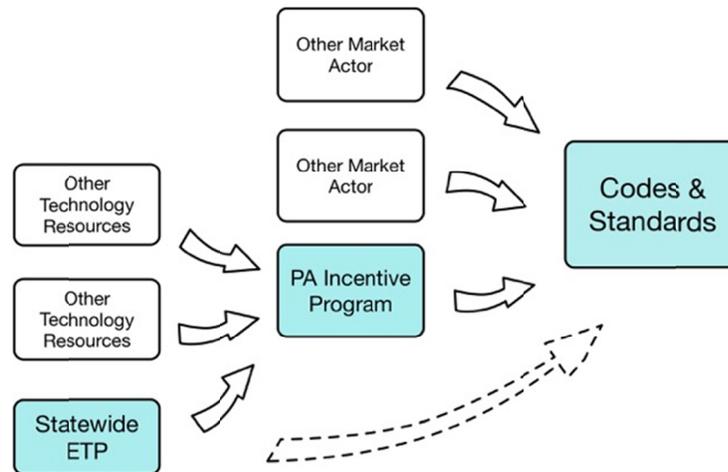
³⁷³ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 62.

³⁷⁴ See Section D. ETP Strategies, p. 10 under Objective 1 for discussion on TPMs.

Cross-cutting: Emerging Technologies Program

An ETP technology assessment can be the first step in initiating market transformation for efficient technologies, which can eventually end up with the higher efficiency technologies becoming a codified baseline. Figure 2 below shows that Program Administrator incentive programs can draw from many sources for new measure ideas, ETP being one source. Likewise, the C&S Program can draw from multiple sources for new potential codes, with Program Administrator incentive programs being one source. In some cases C&S can bypass the process of vetting the technology in the market, which accelerates code development, but may increase the risk that the technology is not viable in the market.

**Figure 2 - Programs Use Multiple Sources of Ideas for New Measures;
C&S Uses Multiple Sources of Ideas for New Codes**



Additional collaborative efforts between ETP and C&S may include:

- Joint memberships in organizations such as the American Society of Heating, Refrigeration, and Air Conditioning Engineers, which brings together emerging technology experts, leaders from the HVAC industry, and C&S specialists to advance new equipment, building, and testing standards.
- Seeking out and evaluating emerging "code-ready"³⁷⁵ and ZNE-preparedness technologies that present such rapid adoption potential that they can become baseline much sooner than most other technologies. Because these efforts affect both groups, they work closely to share data and ideas for achieving maximum internal efficiencies and streamlining the adoption process. Because code-ready

³⁷⁵ CPUC approved a new Code Readiness for PG&E local C&S subprogram for 2016. California Public Utility Commission, Energy Division. (2016, January 5). *Advice 3656-G/4752-E, Pacific Gas and Electric Company's request for approval of a new codes and standards energy efficiency subprogram*. Retrieved from https://www.pge.com/nots/rates/tariffs/tm2/pdf/GAS_3656-G.pdf

technologies vary in their impacts and applicability, there is no linear template that can be used for this process.

ETP and the Workforce, Education and Training Program

There is significant collaboration between ETP and the WE&T Program. ETP shares data, identifies barriers, and provides technical information to supplement WE&T outreach and education efforts.

The collaboration between ETP and WE&T also includes helping raise awareness and advance understanding of California's ZNE efforts. As utilities turn to more integrated and whole-building energy efficiency solutions, ETP and WE&T will collaborate by examining barriers to and drivers toward adopting integrated solutions. The information gathered will be useful for future education and training programs for homebuilders, commercial architects, facility operators, and trade allies.

Zero Net Energy (ZNE)

ETP provides core support to ZNE efforts and also collaborates closely with Codes & Standards on ZNE on projects: California's aggressive ZNE goals are intended to build new, resilient, and improved existing and new buildings and communities so that they not only provide comfort and low operational costs to occupants, but also support enhanced grid reliability.³⁷⁶

To prepare the market for upcoming ZNE-related code changes, ETP has worked closely with the building and design community to construct residential communities and retrofit commercial and public sector buildings that demonstrate value to both the owners and occupants and the capabilities to reduce electricity and natural gas usage and dispatch electric loads in real-time to address grid constraints and needs. The results from those initial efforts have demonstrated the feasibility of achieving ZNE and the benefits to the grid, while attracting the attention of the building and design community.

Other Programs

In the vision of IDSM, Program Administrators can combine different types of BTM technologies into one incentive program for end customers. In such a scenario, energy efficiency technologies would combine on-site solar, battery storage, and/or traditional and new demand-response technologies. Such a system would provide the ability to dispatch certain loads (e.g., lighting, HVAC) and the battery systems for both the utility and the wholesale markets.

One way to align those efforts would be to place the IDSM-capable technologies into the ETP TPM and run joint technology assessments, scaled projects, and demonstration showcases

³⁷⁶ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan January 2011 Update*. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>.

together with other BTM teams, when applicable. ETP will continue to coordinate with IDSM in the future, including:

- Collaborating with DR and EM&T programs to discover and validate technologies that provide value in terms of reduced energy consumption during peak hours. One of many examples of such a technology is Energy Management Systems (EMS).
- Researching the potential of combined building EMS, solar, storage, and DG for the small- and mid-sized commercial segment. This research not only validates energy savings, but may also help to better understand the customer value of these combined systems and highlight potential barriers to adoption.
- ETP has collaborated with Electric Vehicle (EV) research teams to understand the EV charging infrastructure with the eventual goal of delivering effective energy management options using advanced controls that will facilitate time-of-need charging.
- ETP collaborates with the C&S program to support the State's ZNE goals by demonstrating how the building industry can, with some key support, design and construct and renovate new and existing buildings to achieve ZNE or near-ZNE performance.

TDSM or Locational / Preferred Resources

In the future, IDSM efforts could be targeted to specific physical locations on the grid, through efforts known as targeted demand-side management (TDSM). TDSM's greatest value is in allowing for the deferral of capital investments on the grid through targeted load reduction specifically at the place where grid investment is needed (e.g., substations, feeders, transformers, etc.).

Working closely with both BTM and grid-side teams, ETP brings an energy efficiency element to locational targets on the grid. This can be achieved through joint pilots in targeted locations, as well as projects to determine which energy efficiency technologies are applicable based on load shapes, customer segments, and operational processes.

ETP also helps enable "Locational DSM" endeavors to increase grid reliability and/or defer infrastructure upgrades by:

- Collaborating with internal groups and other programs, such as the DR and DG programs to identify how demand-side energy management systems interact with the grid, and
- Running field deployments that evaluate relevant technologies such as residential battery storage, combined heat and power (CHP), solar, and building energy efficiency technologies.

G. ETP’s Key Collaborators

ETP coordinates and/or co-funds a wide variety of projects with collaborators. The primary avenue for collaboration among ETP members is through the Emerging Technology Coordinating Committee (ETCC), which brings together member utilities (including their ET and ET-related departments, such as energy efficiency, DG, and DR), national and international ET groups, and technology stakeholders, in order to provide a common framework for assessment, reporting, and program development. Through ETCC, ETP collaborates across the IOUs, SMUD, Los Angeles Department of Water and Power (LADWP), and with the California Energy Commission (CEC). These collaborations reduce duplication of efforts and can help achieve the "critical mass" that encourages developers and manufacturers to develop California-appropriate technologies.

ETCC activities include a number of outreach components to ensure that ETP works as transparently and effectively as possible. This includes quarterly meetings around the state that are aimed at particular customer segments (commercial, residential, industrial, agricultural, and integrated systems) with the goal of highlighting innovation in each sector. The ETCC also holds a major conference — the ET Summit — every two years that brings together over 500 ET stakeholders, including leading experts, product developers, entrepreneurs, regulators, investors, delegates from government agencies, gas and electric utilities, and academia. Other ETCC events include symposia that educate third-parties on doing business with utilities, open forums that serve as platforms for technology companies to introduce their products to utilities, and regular ETCC Advisory Council activities that bring North American utility and industry ET voices to the ETCC.

Other Collaborations

Though ETCC is the largest collaborative effort across ETP, the constituent utilities are highly active in a number of additional consortia, initiatives, and groups, as shown in Table 5.

Category	Partners
ETCC Members	SCE, PG&E, SDG&E, SCG, CEC, SMUD, LADWP
Utility stakeholders	Electric vehicles (EVs) Energy storage Distributed generation

Table 4 - ETP Collaborations	
Category	Partners
Research entities	California Energy Commission (CEC) <ul style="list-style-type: none"> • Electric Program Investment Charge (EPIC) • Public Interest Energy Research (PIER) programs UCD Center for Energy Efficiency <ul style="list-style-type: none"> • California Lighting Technology Center • Western Cooling Efficiency Center Lawrence Berkeley National Laboratories Advanced Projects Agency-Energy (ARPA-E) Department of Energy
Technology commercialization/ entrepreneurship actors	Technology developers Technology financiers Clean tech accelerators DOE's First Look West (FLow) Cleantech Open CalSEED (California Sustainable Energy Entrepreneur Development)
Strategic organizations	Consortium for Energy Efficiency (CEE) E Source New Buildings Institute (NBI) American Council for an Energy-Efficient Economy (ACEEE) California Institute of Technology (Caltech) Electric Power Research Institute (EPRI) Gas Technology Institute (GTI)
Technology adopters and ET demonstration hosts	Owners Tenants Property Managers Third-party vendors (through TRIP)

H. Evaluation, Measurement & Verification (EM&V) Considerations

ETP’s efforts help assume many of the business risks associated with maintaining a highly-effective energy efficiency portfolio even if energy savings from ET measures only fully materialize years after the projects end. Because of this, ETP considers itself successful in the short term if it both identifies potential new measures as well as filters out inappropriate technologies.

As a supply-side program, a resource-based impact evaluation can be problematic when applied to ET. Tying ET to such a model of only counting technologies that are adopted into the measure portfolio discourages the calculated risk-taking upon which ETP has built a credible, long-term track record. Counting only adopted technologies sets faulty incentives for ETP to only focus on low-risk measures with high likelihood to become IOU program measures. ETP

fulfills several functions for the energy efficiency portfolio, including identifying and supporting measures with high value-add for the portfolio, but also pursuing some high risk/high reward measures. ETP's program metrics need to track both adopted technologies and filtered technologies to accurately reflect ETP's value in preventing ineffective technologies from being offered by energy efficiency programs.

While ETP is in favor of tracking the impacts of its work in terms of energy efficiency program outcomes, there are additional indicators that should also be considered to accurately gauge its success. Tracking the number of new measures recommended by ETP, as well as their market uptake, is an interesting exercise, yet neither the number of new measures nor their market uptake rate is under ETP's sphere of influence. ETP evaluations should also take into consideration nationwide trends and challenges, such as the difficulty in finding cost-effective measures for the residential sector.

To track these additional indicators, the IOUs are currently updating the ETP tracking database to include data on both factors under ETP control and factors not under ETP control. See ETP Appendix B for a list of factors not under ETP's control. The ETP database will be designed to track information that can be gathered during the course of program implementation.

ETP's evaluation needs in the longer term require significant development of additional infrastructure to track coordination and optimization according to the TPMs, as well as window-of-opportunity projects that may not be on the TPM. Evaluation preparedness will be discussed in detail in the Implementation Plans.

At the sector level, ETP should be considered a success if it meets its three objectives described in Table 1. Process evaluations of ETP will be the most informative if they consider what ETP can and cannot control.

Appendices to ETP

Appendix A to ETP: ETP Achievements

ETP's efforts touch nearly every technological advance that has been incorporated into program offerings over the past decade: ETP staff have served as in-house subject matter experts, giving utilities the ability to do everything from rapidly gauging whether a new technology may be viable and warrants further assessment, to coordinating and funding large-scale strategic collaborations with outside organizations in order to transform the market. Over the last decade of ETP's history, ETP has claimed several notable achievements.

AutoDR and OpenADR: ETP contributed to the development of AutoDR beginning in 2005, partnering with Lawrence Berkeley National Laboratories. This resulted in the development of customer incentives for OpenADR-compliant technologies across the three electric utilities, and eventual adoption of OpenADR 2.0 as an international Publicly Available Specification by the International Electrical Committee (IEC) in February of 2014.³⁷⁷

LEDs: ETP conducted one of the first US-based assessments of LED-based streetlights in 2007, the results of which were used by manufacturers to develop the next generation product line that was 34% less expensive and 25% more efficient than before. Within just PG&E territory, this has resulted in 27.8 GWh of savings since 2010. ETP projects have also advanced LED use in applications such as retail lighting and refrigerator displays, showing that use of LEDs can achieve 67% overall energy savings.³⁷⁸

Food Service: ETP has looked for opportunities to induce changes in market adoption for new and/or existing high-efficiency technologies through methods such as scaled field demonstrations. One such example is within the Food Service segment through the EnergyStar deep fryer demonstration. This demonstration across 17 different restaurants in Southern California validated energy savings claims as well as identify the available operational and maintenance savings to help overcome the high initial cost of the equipment, the main barrier to EnergyStar fryer installation.³⁷⁹

ZNE: ETP has participated actively in applicable CEC, PIER and EPIC solicitations and has partnered with respected lead investigators such as GTI, EPRI, LINC, Dettson, and Enerx in

³⁷⁷ Hornquist, E., & Ahmed, J., Southern California Edison et al. (2014). The power of ten: A decade of growth for emerging technologies programs in California. *2014 ACEEE Summer Study on Energy Efficiency in Buildings*. Retrieved from <http://aceee.org/files/proceedings/2014/data/papers/5-1143.pdf>

³⁷⁸ *Id.*

³⁷⁹ Lincus Inc. (2015, February 24). *EnergyStar® Gas-Fired Fryer Field Evaluation Study*, ETP Project ID# ET13SCG0002, p. 1 & 35. Retrieved from <http://www.etcc-ca.com/reports/energy-star-gas-fired-fryers-field-evaluation-report?dl=1483479751>.

near-ZNE demonstrations for multi-family and low income housing communities. One such example is the commercial, near-ZNE demonstration at the community center at Playa Vista, which showcases an ultra-clean gas CHP integrated with solar PV and other technologies to serve a LEED Platinum building, contributing to a significant reduction in energy intensity and total air emissions.³⁸⁰

Gas ET: Since 2009, SoCalGas ETP has completed or engaged in over 70 various technology scans, assessments, laboratory tests, and scaled field demonstrations. Five technologies are currently in the final workpaper stage of the new measure development pipeline, including for example, a combination service boiler dual-set point controller for multi-family housing, a hot water variable speed circulator controller for multi-family housing and commercial applications, and advanced/smart thermostats.

Workforce, Education, and Training: ETP has provided critical support in developing the California Advanced Lighting Controls Training Program (CALCTP), which in 2013 was incorporated in the Title 24 Building Code as a requirement for State Certified General Electricians. This training inspired the National ALCTP, in which ETP involvement continues to this day.

West Coast Utility Lighting Team (WCULT): In 2007, ETP, along with Sacramento Municipal Utility District (SMUD), together founded a forum specifically to develop collaborations to accelerate the adoption of advanced lighting technologies. This team has grown to include Bonneville Power Administration, BC Hydro, the California Institute for Energy and the Environment, UC Davis's California Lighting Technology Center, Pacific Northwest National Laboratory, and the Design Lights Consortium (DLC).³⁸¹ This team addresses both program acceleration of market uptake as well as testing innovations that will drive the next generation of advanced lighting technologies.

Western HVAC Performance Alliance: ETP helped form a regional advisory group whose objective is to support the big, bold goals in the CLTEESP. In collaboration with the Alliance, ETP developed a new Fault Detection and Diagnostic (FDD) laboratory test method to help quantify savings from residential split systems and commercial packaged units. These efforts have led to ongoing efforts and successes in adoption of the FDD test method within codes at the state and national level.³⁸² By developing the FDD test method, ETP and the FDD committee has provided

³⁸⁰ Southern California Gas (SoCalGas) Company. (2016). *The resort at Playa Vista, approaching Zero Net Energy with sustainable design and emerging technology*. Retrieved from https://www.socalgas.com/1443739831642/N16J0080A_Playa-Vista-Web-Redesign-v3.pdf

³⁸¹ Hornquist, E., & Ahmed, J., Southern California Edison et al. (2014). The power of ten: A decade of growth for emerging technologies programs in California. *2014 ACEEE Summer Study on Energy Efficiency in Buildings*. Retrieved from <http://aceee.org/files/proceedings/2014/data/papers/5-1143.pdf>

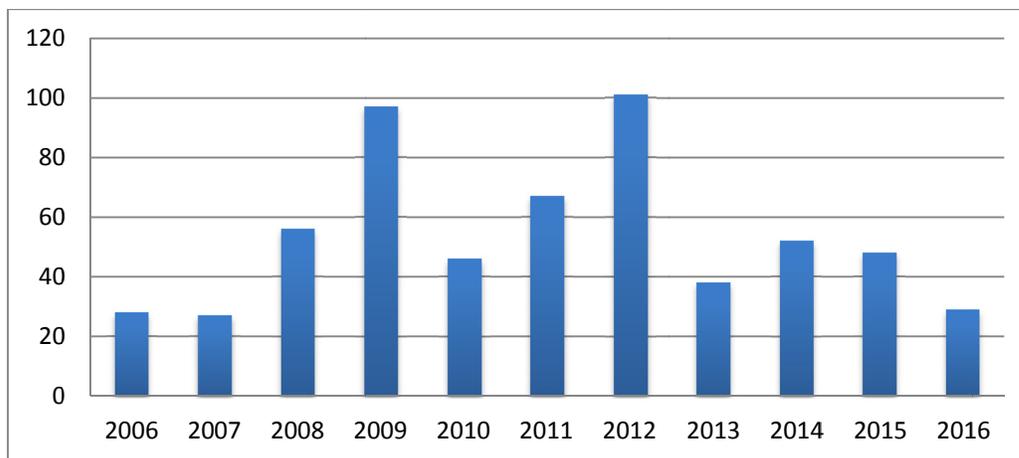
³⁸² *Id.*

the industry with a common methodology by which technological advances in FDD could be quantified.

ETP Published Reports (Gas and Electric)

Since 2006, over 500 ETP projects reports have been completed and published³⁸³ for use by program administrators and other energy efficiency professionals across California as well as the United States.³⁸⁴ Figure 3 illustrates the uncertain timing of research results: Although ETP can control the rate at which projects are initiated, it cannot control the rate at which projects are completed, particularly for in situ studies that may face challenges from the field. Since 2006, ETP has completed anywhere between 7 to 103 projects per year.³⁸⁵ Although the number of reports generated over the years by ETP is impressive, they under-represent ETP’s efforts, for they only represent those projects that result in verification of savings. Furthermore, a good percentage of the studies have found the tested measures did not have sufficient savings, has practical flaws, or has to be kept confidential for various reasons, and would not be promoted to the next stage gate process.

Figure 3 - ETP Project Completions by Year (2006-2016)



Over the years, ETP has addressed a comprehensive range of energy efficiency technologies. Note that more than one technology may be addressed within an ETP project. Similarly, each

³⁸³ Reports are available online. Emerging Technologies Coordinating Council. (2016). *Project reports*. Retrieved from <http://www.etcc-ca.com/reports>

³⁸⁴ Opinion Dynamics Corp., & Energy and Resource Solutions. (2015, November). *PY2013-2014 Emerging Technologies Program Targeted Effectiveness Study Report, CALMAC Study ID CPU0112.01*. Retrieved from http://www.calmac.org/publications/PY2013-2014_ETP_Targeted_Effectiveness_Evaluation_Volume_I_FINAL.pdf

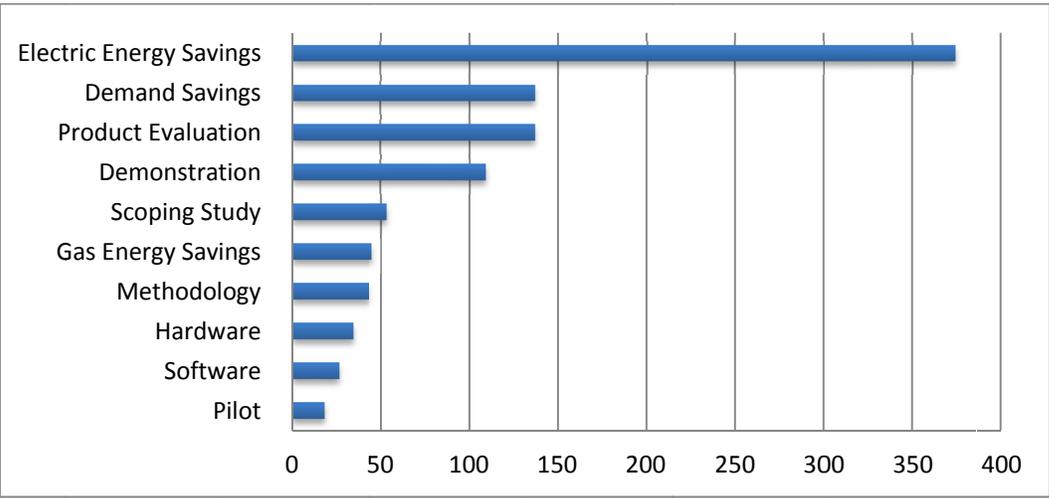
³⁸⁵ ETP program tracking data.

Cross-cutting: Emerging Technologies Program

ET project report may address more than one project type. Table 4 below shows the technology types addressed by ETP reports from 2006-2016, while Figure 5 shows the types of projects ETP has conducted.

Table 5 -Types of Emerging Technologies 2006-2016			
Lighting, Commercial	146	Daylighting-Residential	10
HVAC, Commercial	98	Wastewater Treatment	10
Building Controls	78	Integrated Design Process	9
Daylighting-Commercial	77	Refrigeration, Commercial	9
Commercial Cooking	49	Distributive Generation	7
Building Envelope	45	Water Pumping	7
HVAC, Residential	41	Optical Sensors	5
Evaporative Cooling	30	Compressed Air Systems	4
Design Tools	25	Dry cleaning Technologies	4
Electronics & Process Controls	25	Motors, small	4
Lighting, Residential	22	Desiccant Systems	3
Hot Water, Commercial	19	Heat Treatment	3
Hot Water, Residential	18	Motors, Industrial	3
industrial-processes-other	16	Steam Boilers	3
Industrial Refrigeration	12	Swimming Pool Pumps, Residential	3
Heat Recovery	11	Other	174

Figure 4 - ETP Project Types (2006-2016)



Energy Savings from ETs

Although energy savings from ET measures are not under ETP's control, Energy Division has conducted estimates of energy savings from emerging technologies transferred into the energy efficiency portfolio for the 2006-2008 cycle and the 2013-2014 cycle.

For the 2006-2008 cycle, only PG&E and SCE electric savings were estimated. PG&E's transferred ETP technologies had generated approximately 59 GWh of ex ante expected first year gross savings³⁸⁶, constituting 2.08% of PG&E's 2006-2008 savings goals of 2826 GWh.³⁸⁷ SCE's transferred ETP technologies had generated approximately 196 GWh of ex ante expected first year gross savings, constituting 6.25% of SCE's 2006-2008 savings goals of 3135 GWh.

For the 2013-2014 period, across all electric utilities, emerging technologies transferred into the energy efficiency portfolio provided 94 GWh of savings, constituting 1.7% of energy efficiency first-year gross savings claims of 5648 GWh. This represents the low end of savings, due to evaluators not being able to successfully to match ET measure codes in the savings database. These types of estimates also under-report first-year savings due to the fact that the measure development process takes time, so ETs that were more recently recommended may not have been fully deployed at the time of these estimates.

³⁸⁶ Summit Blue Consulting, LLC et al. (2010, February 3). *Final Report: Evaluation of the California Statewide Emerging Technologies Program, CALMAC Study ID CPU0031.01*, p. E-5. Retrieved from http://www.calmac.org/publications/Final_Comprehensive_ETP_Final_Report_02-04-10_R7_3.pdf

³⁸⁷ Itron, Inc. and KEMA, Inc. (2008, May 12). *California Energy Efficiency Potential Study*, p. ES-7. Retrieved from www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5300.

Appendix B to ETP: ETP Tracking Metrics

As a non-resource program whose strategies may take years to realize, ETP has limited options when it comes to developing performance metrics: 1) ETP relies on others for R&D, and it is the R&E entities who determine the number of products that enter the program “funnel”, 2) ETP relies on Program Administrators intervene in the market with resource programs, thus the Program Administrators control the rate at which customers adopt emerging technologies, 3) due to the uncertainty inherent in all research, ETP is unable to guarantee findings, and thus deliverables have variable completion schedules, 4) and the long duration of some of ETPs’ most successful technology collaborations (examples given in ETP Appendix A) mean that they usually fall outside the funding-cycle-based evaluation studies.

However, ETP proposes to track some outcomes that are outside of ETP’s control, because they still provide useful information for understanding ETP’s value, and may reveal long-term trends in technologies that may inform future TPMs. These “tracking metrics” are for information only, due to the uncertainty of their outcome. Figure 4 below illustrates tracking metrics that show the value provided when ETP filters out inappropriate technologies. Once a technology is commercially available and enters the ETP innovation “funnel”, ETP considers that technology against key criteria for suitability. While each TPM may have different criteria depending on their design and activities, common criteria include the following criteria depicted in Figure 4:

- A. Does a (high-level) estimate yield large enough potential savings?
- B. Is this technology in alignment with policy objectives?
- C. Is this suitable for the intended climate zones?
- D. Has ETP verified the savings?
- E. Are customers interested in this?

If a technology passes through all the filters and has verified performance, ETP recommends that technology for adoption in a ratepayer-funded program. The data for these and other metrics can all be found in the data that are tracked and reported as part of ETP’s quarterly program reporting to the CPUC. Table 5 shows the metrics associated with the filters above.

Figure 5 - ETP Technology Funnel

ETP filters ensure that only technologies with verifiable savings are recommended as measures.



Table 6 - ETP Tracking Metrics to be reported at the sector level as part of regular program reporting		
Technology or Project Characteristic	Tracking Metrics	Metric Source
Tech has acceptable technical/market potential (estimated)	# Technologies passed # technologies filtered out	Program Tracking Data
Tech is in alignment with policy objectives	# Technologies passed # technologies filtered out	Program Tracking Data
Tech is suitable for intended climate zones	# Technologies passed # technologies filtered out	Program Tracking Data
Tech has verified savings performance	# Technologies passed # technologies filtered out	Program Tracking Data
Tech receives sufficient customer interest	# Technologies passed # technologies filtered out	Program Tracking Data
Tech was adopted into a program	# Of adoptions into RA # Of adoptions in MT # Of adoptions into C&S # Of WE&T programs created around this tech	Program Tracking Data
(Desired) Estimated energy savings	Gross first-year kWh and kW saved	Program Tracking Data

FINANCE CHAPTER

A. Finance Chapter Summary

This chapter focuses on the New Finance Offerings (i.e., the new Pilots approved in D. 13-09-044) and the infrastructure being developed to implement them. Other finance offerings, like On-Bill Financing (OBF), are noted here, but are discussed in more detail within the relevant Business Plan sector chapters.

In response to California’s goal to double energy efficiency levels by 2030, the new energy efficiency finance offerings will promote greater levels of adoption for more comprehensive energy efficiency solutions for customers. The new energy efficiency finance offerings will consist of a variety of financing options for single-family and multi-family residential customers as well as for small business and broader non-residential customers. These new offerings will support all types of demand-side investments, including energy efficiency, demand response, distributed generation, and energy storage.

Finance Vision

Customer adoption of deep, comprehensive energy efficient-related solutions for their homes and businesses through innovative and affordable financing options promoted by the contractor community and supported by the financial industry.

Energy Efficiency Finance will be seamlessly integrated with other energy efficiency programs to provide customers with comprehensive solutions in a simple, easy approach through innovative online and handheld technologies that will enable greater levels of customer participation throughout the program portfolio. Customers will be eligible to receive financing as well as program rebates or go through the finance-only path. Overall, the new energy efficiency finance offerings are designed to:

- Encourage customers to invest in projects that will achieve deeper energy savings;
- Overcome the “first cost” barrier of energy efficiency upgrades;
- Leverage ratepayer funds by bringing in private capital to improve on the overall program portfolio cost-effectiveness;
- Increase sales and installation of energy-efficient products and services; and
- Reach a broader set of customer groups (e.g., disadvantaged communities, historically low energy efficiency adoption rates) and market segments.

B. Approach to Achieve Finance Vision

Energy efficiency finance offerings are designed to facilitate the adoption of energy efficiency by addressing one of the major barriers to participation: up-front costs. Additionally, finance enables customers to take a holistic approach to projects and acts as a catalyst to implement

improvements regardless of capital budgets or schedule constraints. The offerings are designed to help customers produce deeper energy savings. The following are challenges related to energy efficiency finance and the perceived market barriers identified during the business planning process. Specific examples related to each market barrier are provided.

Challenge 1: High first cost in adopting energy efficiency

High costs associated with more comprehensive energy efficiency projects. The combination of financing and rebates is more effective than either method alone in both the residential and non-residential sectors in achieving California's energy efficiency goals.³⁸⁸

Interest rates are too high. About two-thirds of the homeowners (62%) felt that the interest rates available to them through the market are too high. This percentage increases for low-income homeowners (72%) and for low-FICO-score customers (69% with FICO below 640). About 41% of customers feel that it would be difficult to obtain a loan. These barriers are larger among customers with low incomes or low credit scores.

Shorter loan tenors create low participation. Increases in loan tenors (e.g., 24 to 48 months) can improve an energy efficiency project payback, thereby creating more demand for energy efficiency financing products in the non-residential sector.

Challenge 2: Hassle factor

Financing offerings can be complicated and overwhelming to residential customers. Western Riverside Council of Governments sponsored the HERO (Home Energy Renovation Opportunity) program to finance energy projects through property assessment primarily to achieve economic goals. These programs are known as property assessed clean energy (PACE) financing programs where homeowners can finance up to 15% of the value of their homes, pay through property tax, and extend lending periods to up to 20 years. Homeowners obtain approval quickly, at times, when the contract is in the home. On the negative side, HERO interest and fees are high compared to other options such as home equity lines of credit.³⁸⁹ Such goals appear to carry fewer policy requirements than conservation goals, and the absence of ratepayer or significant taxpayer subsidies avoids the need for extensive regulatory oversight on spending or program outcomes. As a result, HERO has been able to offer a simple application process and minimal restrictions on eligible measures, which have been key factors in its growth. In contrast, when

³⁸⁸ The Cadmus Group. (2014, April 22). *California Joint Utilities Financing Research: Existing Programs Review*, CALMAC Study ID PGE0338.01, p. 4. Retrieved at http://www.calmac.org/publications/Existing_Programs_Review_FINAL.pdf

³⁸⁹ The Cadmus Group. (2016, October 3). *HERO Program Savings Allocation Methodology Study, Final Report*, CALMAC Study ID PGE0388.02, p. 2. Retrieved at http://www.calmac.org/publications/HERO_Program_Study_Final_Report.pdf

the Sonoma County Energy Independence Program (SCEIP) PACE program sought to enforce a policy-driven project loading order, requiring efficiency measures before renewables, participation dropped sharply.³⁹⁰

Complicated loan processes reduce participation in the non-residential sector. Similar to the residential sector, a need for very simple, streamlined financing processes is necessary to promote greater participation among customers.

Challenge 3: Asymmetric information

Lack of contractor support at point of sale. As demonstrated by the three PACE programs, administered by third-parties and most active in California (HERO, California FIRST, and Ygrene), the key to driving participation in a financing program is to meet the needs of contractors. All three programs have dedicated significant resources to providing an easy and reliable tool that can help contractors grow their businesses.³⁹¹

Lack of consistent definition for “energy-efficient upgrades.” The requirements and definitions for what qualifies as “energy-efficient upgrades” are not consistent among financing products. Many financing products that specifically fund energy efficiency do not have strict requirements or standards for energy efficiency levels. Some products may use very liberal definitions of what constitutes energy efficiency and some may have more conservative definitions. How strictly the products define what qualifies as energy efficiency will likely have an impact on the outcomes from various products.

Financial institutions are not positioned to promote energy efficiency financing. The point-of-sale-financing origination model has the potential to drive business compared to bank originated financing, regardless of which offers lower interest rates. Financial institutions are not necessarily in a position to sell energy efficiency financing successfully, instead it is the contractors who perceive the Energy Efficiency Financing Program (EEFP) as a useful tool to sell home improvement projects that facilitate the lending. In many big-ticket industries (e.g., automobiles) financing is often marketed and originated at the point of sale. Since contractors are selling the energy efficiency upgrades to customers, this channel has great potential to introduce and originate financing, if needed.

Goals

The energy efficiency finance vision, goals and corresponding key objectives set the tone and direction for the next generation of energy efficiency finance offerings. It is vitally important that they are clear, concise, and connected to California’s overall energy efficiency vision. The

³⁹⁰ *Id.* at 7.

³⁹¹ *Id.* at 6.

financing offerings rely, in part, on the current California Long-Term Energy Efficiency Strategic Plan (CLTEESP) as a touchstone to help shape its vision, but more importantly, the development work that went into issuing California Public Utilities Commission (Commission) Decision (D.) 13-09-044, which set the foundation for the current platform to administer the new finance pilots. The Business Plan has other influences including: Commission policies, legislative directives, evaluation studies, industry trends, customer needs, stakeholder input, and program experience. The following are the longer-term goals for the energy efficiency finance programs along with key sector strategies. Finance sector strategies were borne from the energy efficiency business planning efforts and reflect the areas of focus needed to achieve its vision. The sector strategies are provided to set clear and tangible direction. Over time, the vision, goals and/or the corresponding strategies may be reset to adapt to changes in the financing industry, contractor community, regulatory policies, laws, and customer response to program offerings.

Goal 1: Help contractors to encourage customers to finance energy efficiency equipment.

Sector Strategy:

- Create program participation processes that are easy for contractors to integrate into their sales process and business operations, achieving the following: port seamlessly into their proposals; offer customers a compelling proposition; accept a broad array of eligible measures; approve the majority of customers; confirm approval quickly while the contractor is “at the kitchen table”; support fast and easy closings; and pay the contractor promptly.
- Coordinate energy efficiency financing programs with energy efficiency incentive programs to support immediate rebates to facilitate the contractor point of sale with the customer.

Goal 2: Create offerings that will appeal to customer groups that have low participation in energy efficiency financing programs.

Sector Strategy:

- Create simple, streamlined program processes for the non-residential sectors to promote ease of entry into the program.
- Target customers who do not want or are unable to use the HERO programs. The Program Administrators can still offer attractive options outside of HERO such as:
 - Reduced interest rates and fees.
 - Projects under \$5,000.
 - Finance non-eligible measures along with eligible measures, especially when non-eligible measures are a necessary part of an energy improvement project.
- Provide financing options for homeowners with less than 10% equity or for homeowners who prefer traditional financing that does not place a lien and/or affect resale-ability of their homes.

- Launch new finance offerings and convert successful programs into long term programs for customers that do not qualify for OBF, or where OBF can be leveraged to do more.
- Offer affordable energy efficiency lending options for low- and moderate-income and poor creditworthy borrowers.

Goal 3: Transition to private lending to support loans currently funded by energy efficiency ratepayers for applicable customers.

Sector Strategy:

- Create education and outreach partnerships with lenders focused on financing whole building, whole solutions, and major energy efficiency equipment installations. This also includes creating relationships with government agencies, the real estate industry, energy service companies, third-party implementers, and trade professionals.
- Coordinate implementation of the “finance-only” path being developed for the new energy efficiency financing offerings.

Goal 4: Rely on qualified contractor community to exclusively promote energy efficiency financing products during the point of sale with customer.

Sector Strategy:

- Emphasize contractor training and marketing outreach.

Sector Budget

SoCalGas’ Business Plan budget provides general information on the expected levels of annual spending for 2018-2025, along with 2016 and 2017 approved budgets for reference.

Sector	2016*	2017*	2018	2019	2020	2021	2022	2023	2024	2025
Cross-cutting: Finance	\$2,264	\$2,264	\$2,264	\$2,316	\$2,369	\$2,423	\$2,478	\$2,535	\$2,593	\$2,652
New Finance Offerings**	\$-	\$5,134	\$1,798	\$1,749	\$1,701	\$-	\$-	\$-	\$-	\$-

*2016 and 2017 are shown for historical purposes.

**New Finance Offerings budgets were authorized in D.12-11-015, D.13-09-044, and extended in D.15-06-008. The pilot programs are funded outside of the Business Plan and budgets allocated based on anticipated spend through 2020.

C. Market Characterization

Customer Landscape

SoCalGas customer profiles include residential, commercial, public, industrial, and agricultural customers of all sizes. The following are key characteristics of the energy efficiency financing market:

Non-residential Customers

- **Commercial and Industrial Customers lack understanding of financing options.** Small and medium commercial and industrial customers lack the resources to study and research financing options available to them.
- **Public sector customers' adoption of energy efficiency financing products varies.** Public sector customers especially in the local government segment, have different legal perspectives on whether energy efficiency financing products, such as OBF, are considered an increase in debt for the local government.
- **Customer adoption of OBF continues to grow.** OBF continues to attract participation among all sectors, especially the public sector.

Homeowner

- **An energy efficiency finance customer is primarily a single-family homeowner.** Residential single-family is typically defined as buildings that contain no more than four units. There are approximately 8.8 million homes in California under this definition.³⁹² Multi-family buildings are treated as non-residential properties.
- **Three common types of energy efficiency financing products.** The following are the primary financing products available to homeowners: (1) *home equity loans*, (2) *term loans* (i.e., term loans from financial institutions that can be either secured or unsecured against equipment), and (3) *Property Assessed Clean Energy (PACE) loans*.
- **The PACE program is by far the most popular among potential customers.** PACE represents 90% of the volume of total energy efficiency financing, or \$196 million, while energy efficiency term loans represent 8% and energy efficiency home equity loans represent 2%.
- **One in six homeowners considers making energy efficiency upgrades.** Among homeowners who did not complete any energy-related upgrades in the past two years, one in six homeowners (16%) considered making an energy-related upgrade but did not, primarily due to the high upfront costs of the upgrades.

³⁹² U.S. Census Bureau. (2011, October 31). *Census of housing*. Retrieved at <https://www.census.gov/hhes/www/housing/census/historic/units.html>

- **About 25% of customers energy-related finance home improvements.** About one-third of homeowners completed energy-related upgrades in the last two years, but only a small fraction of them (one-quarter) used any type of financing.³⁹³
- **Significant opportunity for financing to assist “willing” customers.** The opportunity for financing to help fund and grow energy-related projects in the near future is significant. Four in ten homeowners said that they are likely to make an energy-related upgrade in the next two years, and 27% are at least somewhat likely to use financing, which is similar to the portion of homeowners who reported using financing for energy-related upgrades in the past two years (25%).

Home Contractor

- **There are approximately 55,000 contractors qualified to work on residential properties.** These contractors hold an active General Contractor (Class B) and/or HVAC (Class C-20) licenses in California and perform work on residential properties. Most of these contractors are aware of energy efficiency financing products available to their customers, but few are aware that contractors can promote and offer directly to their customers.
- **Contractor size and marketing capacity indicate support for energy efficiency financing products.** Of the contractors who do promote financing to their customers, the vast majority are medium and large-sized contractors likely because they have better developed sales and marketing capacities. Large contractors are also three times more likely than small contractors to offer solar photovoltaic (PV) equipment financing, which may contribute to their higher rates of financing promotion.
- **More contractors promote PACE than any other energy efficiency financing product.** One in ten contractors are promoting PACE financing. Amongst the few contractors promoting any type of energy efficiency financing, the majority of them are promoting PACE. PACE appears to dominate amongst contractors.
- **Perceived lack of capacity among contractors to promote financing.** Contractors reported that that they had limited capacity to promote financing.
- **Lack of awareness of financing options available.** Some contractors indicate that they are not sufficiently aware of financing options available (38%).³⁹⁴
- **Some contractors are not interested in promoting financing.** One in seven contractors indicate that they are not interested in promoting financing to their customers, largely because they do not believe they should be involved in how a customer chooses to fund projects.

³⁹³ Opinion Dynamics Corp., & Dunsy Energy Consulting. (2016, March). *PY 2014 Finance Residential Market Baseline Study Report, Volume I of II, CALMAC Study Id CPU0131.01*. Retrieved from http://www.calmac.org/publications/PY2014_Residential_Finance_Market_Baseline_Volume_1_FINAL.pdf

³⁹⁴ *Id.*

Trends

Key trends in financing within California which help shape the market characteristics include:

- **About 25% of customers finance home improvements.** As noted previously, roughly one third of homeowners completed energy-related upgrades in the last two years.³⁹⁵ Amongst these homeowners who purchased an energy-related upgrade in 2012-2013, the vast majority (75%) did not use any form of external financing. Only 25% of customers used external financing at all and even fewer (20%) used conventional financing.
- **PACE loans dominate residential energy efficiency loan market.** PACE financing dominates energy efficiency financing volume, so far. In 2014, customers borrowed \$218 million in energy efficiency financing. PACE represents 90% of that volume, or \$196 million, while energy efficiency term loans represent 8% and energy efficiency home equity loans represent 2%. However, homeowner survey results suggest that the conventional financing market for energy-related upgrades is likely four times greater than the 2014 Energy Efficiency Financing Program (EEFP) loan volume³⁹⁶ resulting in an estimated \$850M-\$1B of energy-related upgrades being supported by conventional financing in 2014.
- **Contractors complete energy efficiency program applications on behalf of the customer.** Several contractors reported that they offer utility rebates to their customers, and most of these contractors complete the paperwork and submit it on the customer's behalf. If the financing program and the rebate programs are coordinated such that participating in the financing program can result in faster rebate processing, this may be a very attractive feature to contractors.
- **Very low customer interest in energy efficiency-specific term loans.** The volume of energy efficiency-specific term loans is low compared to the volume of PACE lending, accounting for only 8% of EEFP lending volume. Moreover, the vast majority of energy efficiency-specific term loans are delivered by credit unions, with banks generally doing very little with this type of product. Instead, customers typically used conventional financing rather than energy efficiency-specific financing. Among survey respondents who used financing for energy-related upgrades to their home, 81% used conventional financing options that have no energy efficiency requirements. These most often included credit cards and bank loans. In comparison, 14% used energy efficiency financing options like PACE or energy-efficient terms loans.
- **Energy efficiency home equity loans are rarely used to fund energy efficiency improvements.** Home equity loans account for only 2% of EEFP loans. Energy efficiency equity loans have not gained much traction in the market in comparison to PACE and term loans, despite the large number of financial institutions registered with the Federal

³⁹⁵ *Id.*

³⁹⁶ *Id.*

Housing Administration (FHA) to offer PowerSaver and Energy Efficient Mortgage (EEM) loans. This indicates that the market opportunity for these loans is limited (perhaps due to qualification criteria), the loans lack sufficient marketing support, or the current design characteristics of these loans are not attractive to customers.

- **Growth in energy efficiency-related financing products.** Financing energy efficiency upgrades is not necessarily new as homeowners have, for many years, financed home renovations, including energy efficiency measures, through conventional term loans and home equity loans, or short term lending through credit cards. However, only in the last five years have financing products developed specifically to encourage homeowners to invest in energy efficiency.

D. Program Strategies and Delivery

On-Bill Financing

On-Bill Financing (OBF) offers interest-free, unsecured, on-the-utility-bill loans that work in conjunction with utility energy efficiency programs. It is designed primarily to facilitate the purchase and installation of qualified energy efficiency measures by non-residential customers who may lack up-front capital to invest in real and sustainable long-term energy cost reductions. Loan terms range from up to five years for commercial customers and up to ten years for government agency customers. The eligible loan amount is based on the project cost, less incentives or rebates, up to the loan maximum of the OBF product and within the loan term thresholds. Customer loans are repaid through a fixed monthly installment on their utility bills. There is no pre-payment penalty and loans are not transferable. Additionally, partial or non-payment of loans could result in shut-off of utility service.

Implementation barriers for natural gas-only OBF continue to be the long payback periods for natural gas equipment. Project payback periods for most gas projects tend to be much longer than the five year maximum required for business projects to qualify. Customers and contractors will be encouraged to seek out deeper retrofits that will meet the program requirements.

Finance Pilots

The lack of financing to overcome the first cost barrier continues to be a central challenge to implement energy efficiency improvements. Many existing financial products were not created to encourage energy efficiency improvements and thus not effective or attractive for consumers to invest in energy efficiency.

With the use of ratepayer supported credit enhancements and IOU on-bill repayment, the Commission has authorized the IOUs to launch new financing pilots in an effort to broaden market eligibility and participation with enhanced financing options for energy efficiency improvements for ratepayers and lenders. The financing pilots are intended to leverage private

capital from third-party lenders to expand the access of attractive financing through innovative financing programs. Key pilot design elements include:

- On-Bill Repayment (OBR): Allows customers to repay third-party energy loans and leases on the utility bill.
- Credit enhancements: Minimize risk of capital losses for third-party lenders, thereby resulting in increased consumer access to enhanced financing terms

In September 2013, the Commission approved D.13-09-044 to implement statewide residential and non-residential finance pilot programs to address the first cost barrier to support energy efficiency improvement projects. These pilots are intended to serve multiple segments including single family, multi-family, small business, and other non-residential sectors.

As part of the implementation of the financing pilots, D.13-09-044 established the California Hub for Energy Efficiency Financing (CHEEF). The CHEEF's role includes coordinating among various market participants and managing funds and data. In July 2014, the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) received legislative authority to administer the pilots as the CHEEF manager. To assist with program implementation, CAEATFA awarded the Master Servicer (MS) contract to Concord Servicing in April 2015. Each pilot is expected to run for 24-months starting from the time the first loan is enrolled in the program.

Goals and Objectives

Goals of the finance pilots include the following:

- Attract private capital to support energy efficiency investments by leveraging the additional security created through use of the utility bill as well as ratepayer-supported credit enhancements.
- Improve interest rates and other terms under which financial institutions offer energy efficiency financing to customers.
- Enable customers to undertake larger and more in-depth energy efficiency projects.
- Expand successful pilots and features as full programs.

Table 2 provides a list of the program types with a brief description. The Residential Energy Efficiency Loan Assistance Program (REEL) launched in the third quarter of 2016. The IOUs and CAEATFA will focus on the launch of the remaining pilots, including the OBR feature.

Table 2 - Finance Pilots	
Program Type	Description
Residential Energy Efficiency Loan (REEL)	Single family residential loan program without on-bill repayment feature.
Energy Efficiency Line Item Charge (EFLIC)	On-bill repayment sub-program of REEL (PG&E only).
Master-metered Multi-family	Available for property owners of affordable housing buildings with 20 or more units with on-bill repayment feature.
Small Business Loan	On-bill loan program for small businesses as defined by the United States Small Business Administration (SBA).
Small Business Lease	On-bill and off-bill lease program for small business as defined by SBA.
Non-residential without Credit Enhancement	On-bill repayment program for all non-residential customers. Distributed generation is allowed.

E. Program/Program Administrator Coordination

A key to successful program administration is having an open, positive collaboration among program implementers and other Program Administrators. SoCalGas is committed to a coordinated and collaborative, on-going relationship among all implementers and Program Administrators.

The financing pilots will be implemented the same statewide in the four IOU service territories. SoCalGas will work with the statewide Lead Program Administrator in coordination of efforts with CAEATFA and the IOUs ranging from regulatory compliance to information technology (IT) data exchange protocols/system integration testing to contracting. The pilots are expected to run through at least the fourth quarter of 2019.

F. Evaluation, Measurement, & Verification (EM&V) Considerations

IOU-managed EM&V activities will focus on three major activities: 1) direct support of business plan goal achievement; 2) operational support of CAEATFA pilot operations; and 3) provision of data to support Energy Division impact assessment efforts. The IOUs recognize that Program Administrator EM&V efforts must be closely coordinated with Energy Division impact evaluation efforts while, at the same time supporting CAEATFA pilot program delivery.

Business Plan Goal Achievement

IOU-led process evaluation efforts will first and foremost focus on assessing and enhancing the effectiveness of contractor engagement with financing pilots. Longitudinal surveys of

contractor groups serving residential and non-residential customer groups will be employed to track contractor interest in the pilots and effectiveness in delivering energy savings. Particular attention will be given to assessing IOU-sponsored contractor education/training and marketing outreach efforts. If individual pilot programs do not meet performance expectations, specific assessments will be conducted to determine root causes and possible courses of corrective action or be terminated.

CAEATFA Operational Support

The IOUs will also lend evaluation support for CAEATFA operational efforts on an as needed and as requested basis. SoCalGas anticipates the need for ad hoc assessments of operational problems as they arise with pilot roll-out and scaling. IOU EM&V staff and consultants will provide needed assistance as issues arise.

Impact Assessment Support

The IOUs will, to the extent feasible given their particular role in the finance pilots, support required Energy Division impact assessment activities. This will include provision of billing data, rebate program data, and other customer data that may be available to them. Said information will be provided to the Commission and their consultants subject to adopted customer confidentiality requirements. Since all finance programs are considered a resource program, the intent of the impact assessment support will be to determine the true incremental savings of individual finance program efforts and their related cost-effectiveness. It is important to note that cost-effectiveness is evaluated at the portfolio level and different methods than currently approved by the Commission will need to be developed to truly value financing programs.

WORKFORCE EDUCATION AND TRAINING CHAPTER

A. Workforce Education and Training Chapter Summary

The Workforce Education and Training Program (WE&T) was established to support individual energy efficiency programs by providing practical and effective energy efficiency-related education and training activities. The WE&T Business Plan chapter identifies a clear vision, purpose, and objectives while establishing how it will operate in conjunction with other energy efficiency programs.

The Statewide WE&T Vision is to “Be an innovative statewide advisor and leader of workforce education and training to help meet the State’s energy efficiency goals, leverage the collective strength of the four investor-owned utilities to become more effective, and activate a strategic network of partners.” This vision aligns with the overall SoCalGas Energy Efficiency Vision— “To offer a suite of solutions that incorporates the best available technologies and services valued by our customers, contributes to achievement of energy efficiency goals, and that ultimately aligns with the State’s overarching energy and environmental goals.” WE&T supports this vision by teaching and providing customers with necessary skills and tools to act on energy savings opportunities. SoCalGas foresees education and training offerings that span a myriad of industry sectors and audiences.

The California Energy Efficiency Strategic Plan’s Vision for the Workforce Education and Training Sector

“By 2020, California’s workforce is trained and fully engaged to provide the human capital necessary to achieve California’s economic energy efficiency and demand-side management potential.”

The California Long-Term Energy Efficiency Strategic Plan (CLTEESP) serves as a cornerstone for WE&T, proposing that “by 2020, California’s workforce is trained and fully engaged to provide the human capital necessary to achieve California’s economic energy efficiency and demand-side management potential.”³⁹⁷ The CLTEESP envisioned the investor-owned utilities (IOUs) “as a catalyst to action by sponsoring several foundational activities to review their existing programs and better align them within the context of a comprehensive WE&T strategy,” working collaboratively with stakeholders, other training organizations, and workforce-development agencies to collectively realize this goal.³⁹⁸ Evaluation, Measurement & Verification (EM&V) studies broadly indicate that people who participate in WE&T initiatives

³⁹⁷ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 70. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

³⁹⁸ *Id.* at 72.

take action and save energy in multiple projects.³⁹⁹ Over the next ten years, SoCalGas will continue to build upon past successes and implement new approaches to strengthen the ability of customers to act on energy efficiency project opportunities, supporting the development of a thriving energy efficiency market.⁴⁰⁰

WE&T is a sub-sector among a complex matrix of stakeholders, collaborators, and other service providers. SoCalGas will work in conjunction with key stakeholders, both from the public and private sectors to find new approaches, or advance existing means to provide increased value as an important resource to energy efficiency portfolio efforts. To accomplish the WE&T mission, SoCalGas has collaborated with the other IOUs to establish the following five statewide sub-sector goals:

Statewide WE&T Goals

1. Implement joint IOU WE&T initiatives locally to support the state's goals.
2. Target value-added collaborations with stakeholders and other education and training providers statewide.
3. Establish a comprehensive engagement and feedback process to ensure delivery of the right services to the right audience through the right channels.⁴⁰¹
4. Improve and expand access and reach, build awareness, and make it easier to participate in WE&T programs.
5. Ensure joint WE&T efforts are managed and implemented to be efficient, adaptable, and accountable.

SoCalGas WE&T Goals

³⁹⁹ Opinion Dynamics Corp. (2010, March 23). *Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program*, CALMAC Study ID CPU0014.01, p.2. Retrieved from http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf; See also Wirtshafter Associates, Inc. (2005, June 3). *Evaluation of the 2003 Statewide Education and Training Services Program Final Report*, CALMAC Study ID SCE0211.01, p. E-5. Retrieved from http://www.calmac.org/publications/STE_Final_Report.pdf

⁴⁰⁰ University of California, Berkeley School of Law's Center for Law, Energy and the Environment and UCLA School of Law's Emmett Institute on Climate Change and the Environment. (2016, March). *Powering the savings: How California can tap the energy efficiency potential in existing commercial buildings*. Retrieved from <https://www.law.berkeley.edu/wp-content/uploads/2016/03/Powering-the-Savings.pdf>

⁴⁰¹ University of California, Berkeley Donald Vial Center on Employment in the Green Economy. (2014, May). *Workforce issues and energy efficiency programs: A plan for California's utilities*, p. 93. Retrieved from <http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf>

Using the Statewide WE&T goals as a reference point, SoCalGas identified two comprehensive WE&T goals to address WE&T needs in the SoCalGas territory. SoCalGas' two comprehensive goals will: build on the five statewide WE&T overarching goals; address barriers and challenges associated with its problem statements; and offer an efficient approach to supporting the objectives of its specific portfolio and core sector goals.

Goal 1: Facilitate the development of energy efficiency career pathways through improved training and curriculum offered by Southern California's education and workforce training institutions.

Goal 2: Increase training participation and skilled workforce by making Energy Center offerings more available, accessible, and specifically adapted to improve customer adoption of energy efficiency and achievement of savings.

B. Approach to Achieve WE&T Sector Goals

SoCalGas envisions the WE&T sub-sector as a complementary component of each of the five customer sectors (residential, commercial, industrial, agricultural, and public). WE&T will enhance program offerings and facilitate greater customer reach and access by educating and training customers and market actors, both regionally and statewide.

WE&T is well positioned to facilitate skills training and workforce standards needed to perform the type, level, and quality of work that will deliver energy savings. The target audience of these trainings range from residential customers to large industrial decision-makers, making WE&T a critical element in providing support across all customer sectors. This is further supported by the CLTEESP, which stresses the importance of WE&T's role in meeting energy efficiency goals.⁴⁰² As the energy efficiency portfolio transitions to the sector-based approach, WE&T will be incorporated across all five of the main customer sectors as well as be in alignment with the other cross-cutting sectors.

WE&T reaches critical high-potential customers in an effective manner with field-applicable training and end-user appropriate education. WE&T also works to develop relationships with key partners to support the vision of WE&T as well as the SoCalGas energy efficiency portfolio. These key partners include: training providers, trade associations, Kindergarten-12th grade (K-12) and post-secondary educational institutions, industry, local government agencies, unions, community based organizations (CBOs), and regional and state governments.

There are various barriers that limit the effectiveness of individual WE&T efforts in meeting program goals and making significant contributions to customer sector program efforts in achieving energy savings goals. The magnitude, breadth, and depth of audiences that require

⁴⁰² California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 70. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

training and education to meet State energy goals create a substantial and overarching challenge. In overcoming the challenge, WE&T is only one part of the solution focused exclusively on energy efficiency. To have long-term impacts, WE&T cannot do this alone. Participants and stakeholders face three significant barriers in the WE&T market:

- California energy efficiency education and training can be better aligned on the knowledge, skills and abilities needed to effectively achieve full energy efficiency potential from opportunities;
- California's goals are aggressive and require significant engagement by a diverse and broad mix of stakeholder and workforce participants;⁴⁰³ and
- Maintaining operational efficiency and pace with market/industry change is challenging and complex, requiring continuous monitoring and adjustment.

These market barriers are embodied into two key challenges:

Challenge 1: Energy efficiency is not a priority for education and training providers compared to academic, financial, safety, and operational issues; this creates a lack of momentum around energy efficiency career paths.

- **Competing priorities among education and training providers.** The wide range of key priorities among building design, construction, operations, and training organizations such as life safety, soft skills, job placement, and financial competitiveness— often supersede energy efficiency as a priority.⁴⁰⁴
- **Training curriculums exclude or limit training on energy efficiency.** Existing approaches, such as the Apprenticeship training model, are predicated on pre-employment and employer-specific training curricula that may not fully explore energy efficiency opportunities.⁴⁰⁵
- **Recognizing the pathways through all levels of education is critical to tapping the full potential from energy efficiency training.** The Task Force on Workforce, Job Creation, and a Strong Economy identified that while more funds are needed for Career Technical

⁴⁰³ *Id.*

⁴⁰⁴ Opinion Dynamics Corp. (2016, June 25). *PY2013-2014 California Statewide Workforce Education and Training Program Contractor Training Market Characterization, CALMAC Study ID CPU0134.01*, pp. 9, 21-22. Retrieved from http://www.calmac.org/publications/CPUC_WET_Contractor_Training_Market_Characterization_FINAL.docx

⁴⁰⁵ Interagency Working Group on Earn and Learn Job Training Strategies and Apprenticeship in California. (2012, December). *White paper apprenticeship as a critical component of an "Earn and Learn" job training strategy in California*. California Department of Industrial Relations. Retrieved from <https://www.dir.ca.gov/DAS/reports/WhitePaperApprenticeship.pdf>

Education (CTE) programs, colleges must make sure that existing resources are deployed to the most valuable programs.⁴⁰⁶

Challenge 2: Education and training materials are not adaptable enough for expanded reach and accessibility as well as to be useful to broader customer audiences.⁴⁰⁷

- **Diffused target audience.** The WE&T audience spans diverse professionals with varying skill sets, ranging from entry-level apprentices to seasoned professionals.
- **Standardization creates lost training opportunities.** The WE&T team designs, builds, operates, and maintains facilities across all sectors. A “one-size-size-fits-all” approach to course delivery fails to account for these diverse audience needs; instead, WE&T must offer multiple delivery mechanisms.
- **Greater focus on disadvantaged workers may create more energy efficiency within disadvantaged communities.** WE&T efforts need to reach underserved customers and disadvantaged workers.
- **Low awareness of energy efficiency training opportunities among contractor community.** A recent contractor training market characterization EM&V study identified relatively minimal awareness which creates a significant barrier to participation in WE&T offerings.⁴⁰⁸ The study also concluded that hands-on training is preferred by many industry stakeholders.⁴⁰⁹

Desired Outcome

The sector business plan identifies key milestones in the advancement towards a permanent market effect⁴¹⁰ through a set of desired sector outcomes. In many cases, the desired outcome

⁴⁰⁶ California Department of Education. (2015, November 10). *Profile of the California partnership academies*. Retrieved from <http://www.cde.ca.gov/ci/gs/hs/cpareport09.asp>.

⁴⁰⁷ Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies, CALMAC Study ID PGE0317.01*, p. 81. Retrieved from http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf

⁴⁰⁸ Opinion Dynamics Corp. (2016, June 25). *PY2013-2014 California Statewide Workforce Education and Training Program Contractor Training Market Characterization, CALMAC Study ID CPU0134.01*, p. 9. Retrieved from http://www.calmac.org/publications/CPUC_WET_Contractor_Training_Market_Characterization_FINAL.docx

⁴⁰⁹ Opinion Dynamics Corp. (2016, June 25). *PY2013-2014 California Statewide Workforce Education and Training Program Contractor Training Market Characterization, CALMAC Study ID CPU0134.01*, p. 8. Retrieved from http://www.calmac.org/publications/CPUC_WET_Contractor_Training_Market_Characterization_FINAL.docx

⁴¹⁰ "A market effect is a [permanent] change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficiency products, services, or practices and is causally related to market interventions [i.e., program or government]." Eto, J., Prael, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Ernest Orlando Lawrence Berkeley National*

is expected well beyond the near and mid-term planning horizon, and ties to the 10-year vision for the sector. Table 1 provides the connection between the 10-year vision, challenges (i.e., problem statement), and the desired outcome.

Table 1 - Desired Outcome	
10-year Vision WE&T curriculum and implementation supports SoCalGas sectors and California’s educational and training network in achieving the doubling of energy efficiency savings by 2030.	
Challenges	Desired Outcome
Energy efficiency is not a priority for education and training providers compared to academic, financial, safety, and operational issues; this creates a lack of momentum around energy-efficiency career paths.	Facilitate the development of energy efficiency career pathways through improved training and curriculum offered by Southern California’s education and workforce training institutions.
Education and training materials are not adaptable enough for expanded reach and accessibility as well as to be useful to broader customer audiences.	Increase training participation by making Energy Center offerings more available, accessible, and specifically adapted to improve customer adoption of energy efficiency and achievement of savings.

The following metric targets allow SoCalGas to continuously track the WE&T sector progress towards achieving these goals:

Goal 1: Metric Target – Increase the number of collaborations with educational and training partners (to incorporate energy efficiency into other their training curriculum) by 10% over 2015 levels by 2025.

Goal 2: Metric Target – Increase number of trainees by 10% over 2015 levels by 2025.

WE&T Sector Budget

To facilitate the achievement of the WE&T sector goals, SoCalGas will rely on a coordinated set of program offerings. The WE&T budget needed to fund these for the 2018-2025 timeframe is presented in Table 2.

Table 2 – Sector Budget (\$000s)										
Sector	2016**	2017**	2018	2019	2020	2021	2022	2023	2024	2025
Cross-cutting: WE&T	\$3,819	\$3,744	\$3,744	\$3,839	\$3,937	\$4,037	\$4,140	\$4,246	\$4,354	\$4,466

**2016 and 2017 are shown for historical purposes

Laboratory, University of Berkeley, p. xii. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

C. WE&T Sector Market Characterization

The WE&T program provides foundational benefits to the overall energy efficiency portfolio in several different capacities:

- Market awareness of energy efficiency program opportunities
- Education on key energy efficiency policies, codes, and standards
- Training and opportunities to develop knowledge, skills, and abilities that can indirectly impact energy savings outcomes
- Support for changing, new and innovative technologies

As a component of the SoCalGas energy efficiency portfolio, WE&T implements training and educational solutions to meet statewide policy, industry, and workforce demands. As such, WE&T also provides customer education, outreach, and hands-on engagement across various audience types, including:

- Workforce (e.g., professionals, tradespersons, employed/unemployed)
- Industry group members
- Educational institutions (e.g., public post-secondary, vocational, and adult education)
- End-users (e.g., business owners as well as building and property owners)
- Public service personnel

The WE&T Program, in helping to build skills needed in the workforce offers: a series and/or certification classes to increase skills and knowledge; expanded certifications and/or continuing education unit (CEU) credit classes formed from joint relationships; and increased participation in WE&T training by disadvantaged workers initiated from strategic collaborations.⁴¹¹

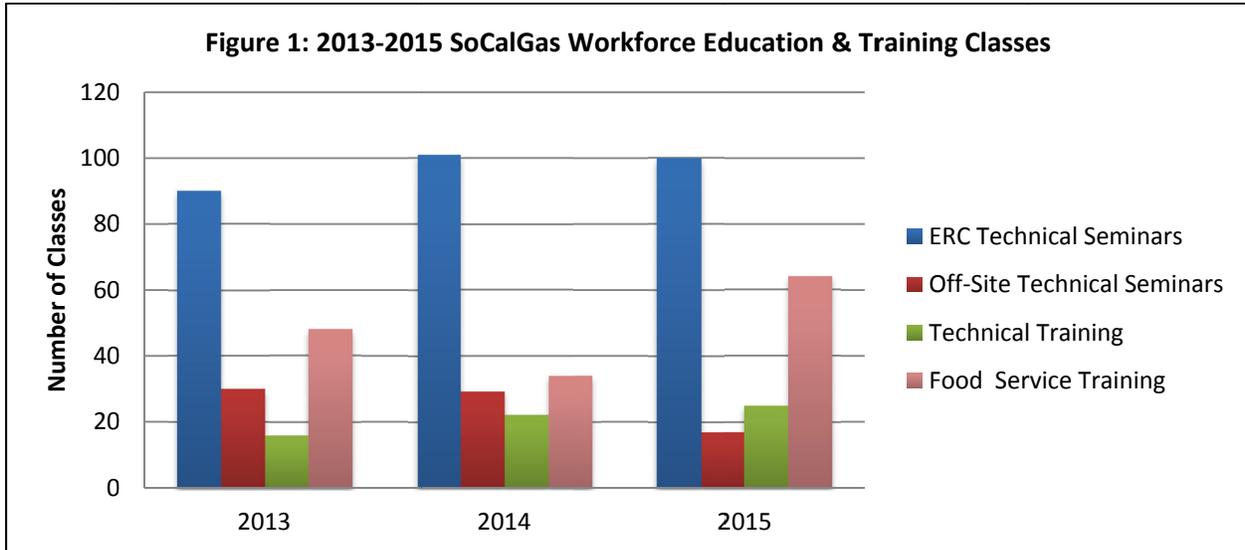
In its role, WE&T will develop and maintain a broad-based network “map” of potential collaborators and education providers that contains pre-requisite qualifications and capabilities about providers. It will be used as a guide for filling market gaps in training infrastructure and/or sector-specific program activities.

Customers by Class Participation

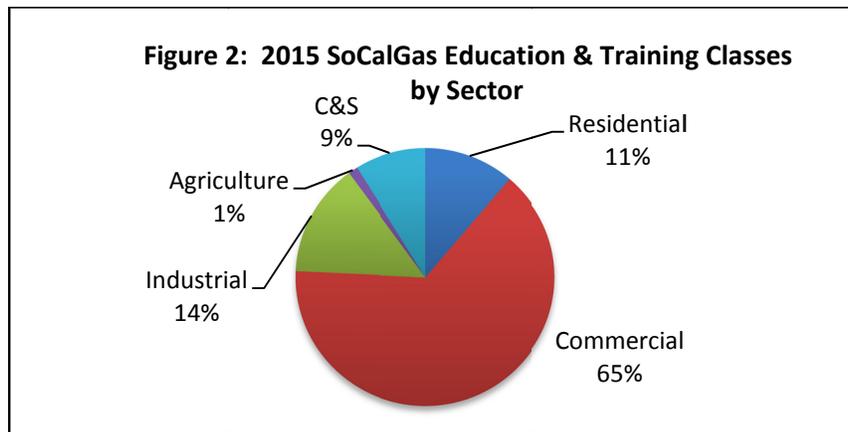
SoCalGas sets annual targets for classes that are appropriate to meeting statewide program objectives, cross-cutting portfolio responsibilities, and customer needs. There is built-in

⁴¹¹ Opinion Dynamics Corp. (2014, June 6). *2013-2014 Statewide WE&T Program Program Theory and Logic Model Update; Centergies Data Needs; and Critical WE&T Data Needs, CALMAC Study ID SDG0278.01*. Retrieved from http://www.calmac.org/publications/2013-2014_WET_PTLM_and_Critical_Data_Gap_Assessment.pdf

flexibility to modify the calendar in response to new market demands, policy decisions, and market data requiring new program strategies. This approach has allowed SoCalGas WE&T to achieve high attendance for classes at the Energy Resource Center (ERC), averaging more than 55 attendees per class.⁴¹² Overall, the type and number of SoCalGas classes offered has remained consistent over the preceding years, as illustrated in Figure 1.⁴¹³



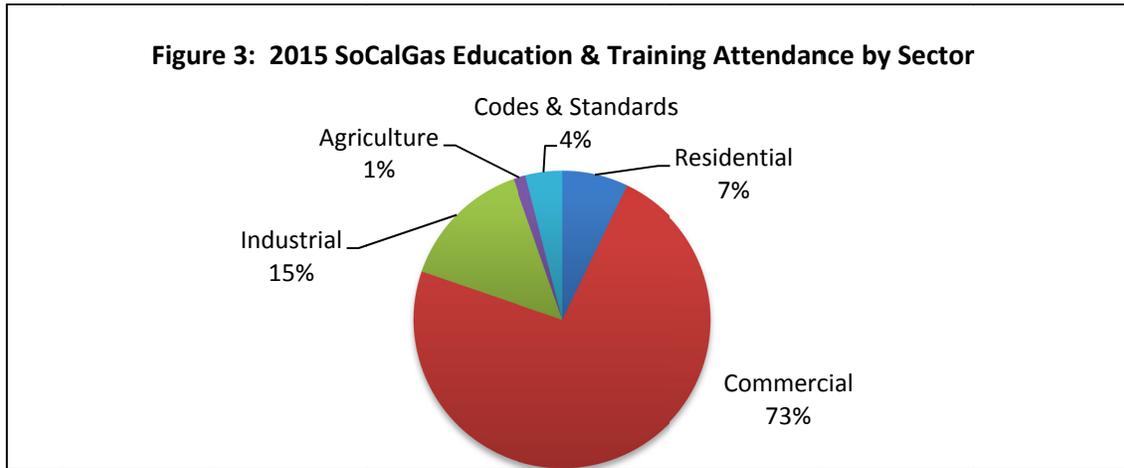
Each target audience has different needs and requirements depending on the sector they are engaged in: residential – single family, residential – multi-family, public, commercial, industrial or agriculture. The WE&T program offerings provide these customers educational and outreach opportunities as well as hands-on engagement to support achievement of energy efficiency. The technical training and seminars offered by WE&T are attended by participants from all market sectors, as reflected in Figure 2, with almost two-thirds of the classes offered for commercial sector customers.



⁴¹² SoCalGas Event Business Management System Database, (2013-2015).

⁴¹³ SoCalGas Event Business Management System Database, (2013-2015).

The total 2015 attendance of classes, by sector, is provided in Figure 3 and demonstrates the strong attendance from the commercial sector.⁴¹⁴ It demonstrates that the attendee distribution aligns with the distribution of classes offered by sector - a result of SoCalGas WE&T staff monitoring past attendance, current customer demand, and emerging industry and market trends.



Customers by Role

The Statewide WE&T program addresses two major audience types: customers and their agents/employees, and market actors who influence and serve customers (as shown in Table 3).

Table 3 - WE&T Audience Types	
Customers Customers and in-house staff/decision makers	Market Actors Market actors who influence and serve customers
<ul style="list-style-type: none"> - Building owners - Homeowners - Facility managers - Chief Executive Officers - Business owners - Developers 	<ul style="list-style-type: none"> - Designers - Architects - Contractors - Builders - Engineers - Educators - Future market actors (students)

In a study of WE&T program participants, 29% identified themselves as owners or partial-owners, while 26% of the participants identified as managers or supervisors (Figure 4).⁴¹⁵ A

⁴¹⁴ SoCalGas Event Business Management System Database, (2015).

⁴¹⁵ Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies, CALMAC Study ID PGE0317.01*, p. 49, Figure 6. Retrieved from

look at SoCalGas participants, in Figure 5, shows that only 7% designated themselves as owners in evaluation data for training received in 2015.⁴¹⁶

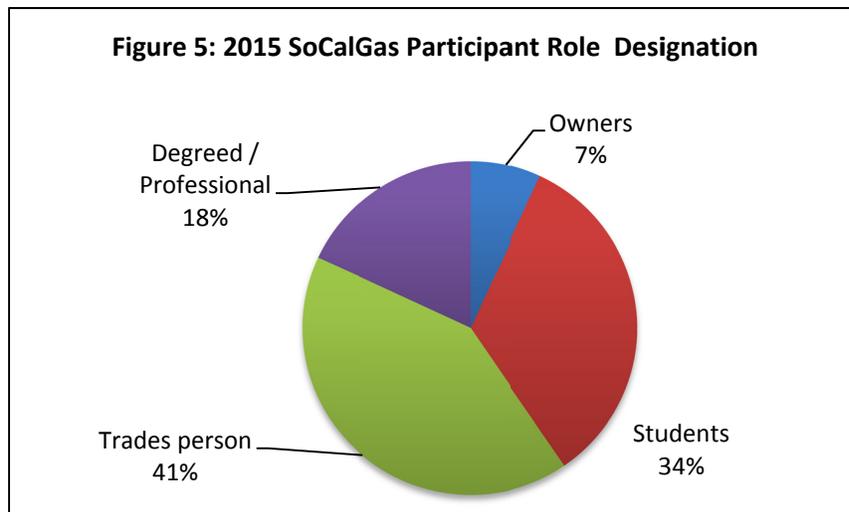
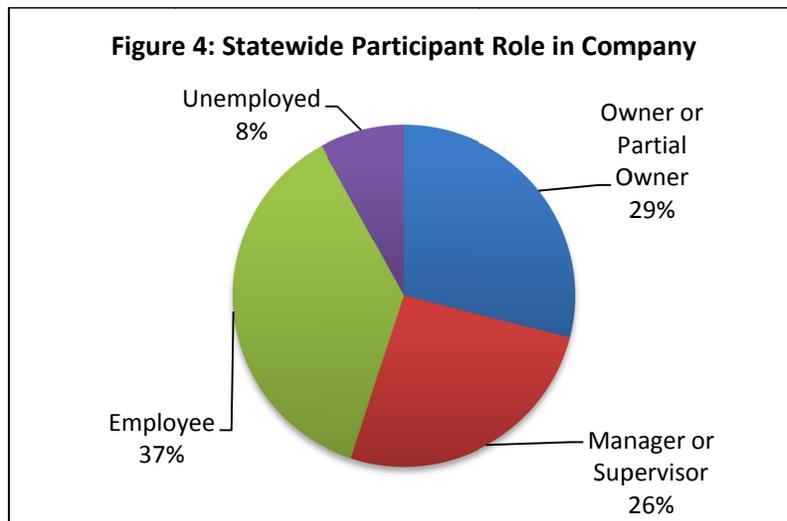


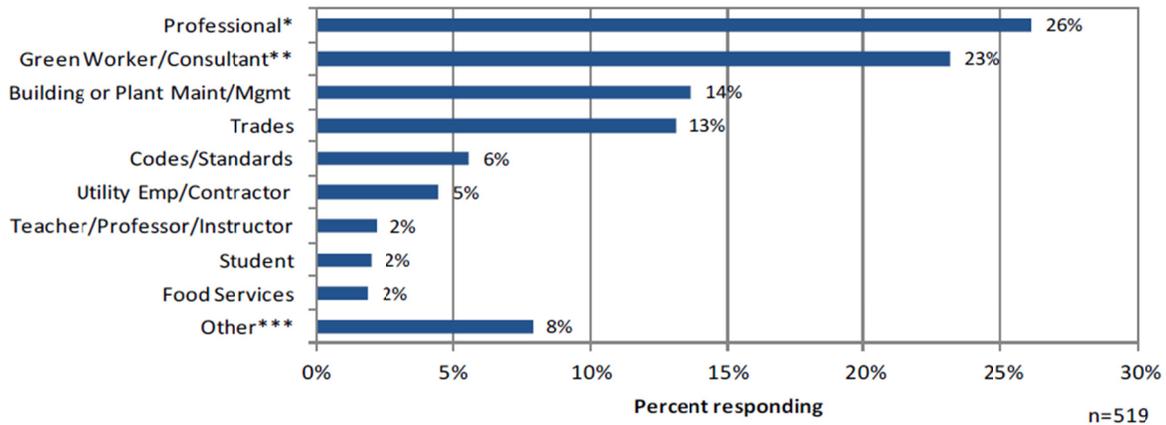
Figure 6 provides a closer look at statewide training participants. The statewide program primarily reached professional/white-collar workers, employed workers, and those in management, supervisory, or owner positions, while only 13% of respondents represent the trade segment.⁴¹⁷

http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf

⁴¹⁶ SoCalGas Event Business Management System Database, (2015)

⁴¹⁷ Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies*, CALMAC Study ID PGE0317.01, p. 48, Figure 4. Retrieved from

Figure 6: Position or Job as It Relates to Energy Issues



*"Professional" category includes architects, engineers, and designers

**"Green Worker/Consultant" category includes energy auditor (for commercial or food industry), energy efficiency consultant or manager, energy manager, environmental preservation, HERS Rater/inspector, Home Performance auditor, low-income weatherization contractor, solar consultant or technician, sustainability consultant, and commissioning agent.

***"Other" category includes Gas or electric utility employee or contractor; Teacher, professor, instructor, trainer; student; real estate; research; manufacturing or automation worker; water utility employee, consultant, technician; and business, management, marketing consultant.

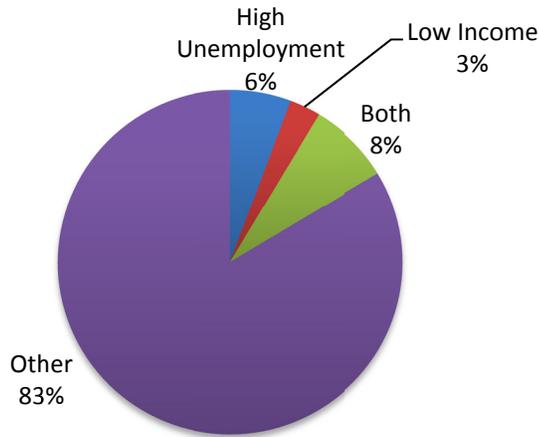
Customers by Geographic Location

SoCalGas class participants have identified themselves as representing between 200-250 cities, primarily concentrated in Los Angeles, Orange, Riverside, and San Bernardino counties, the portions of the service area where the majority of SoCalGas customers are located. Data from 2015 ERC class demographics show that participants from low-income or high unemployment areas (as identified by ZIP codes) had lower participation rates in ERC training classes, as shown in Figure 7. The results suggest an opportunity to improve reach and/or access to these specific disadvantaged communities.⁴¹⁸

http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf

⁴¹⁸ SoCalGas Event Business Management System Database, (2015)

Figure 7: 2015 Participants in Training Programs from Low-Income or High Unemployment Areas



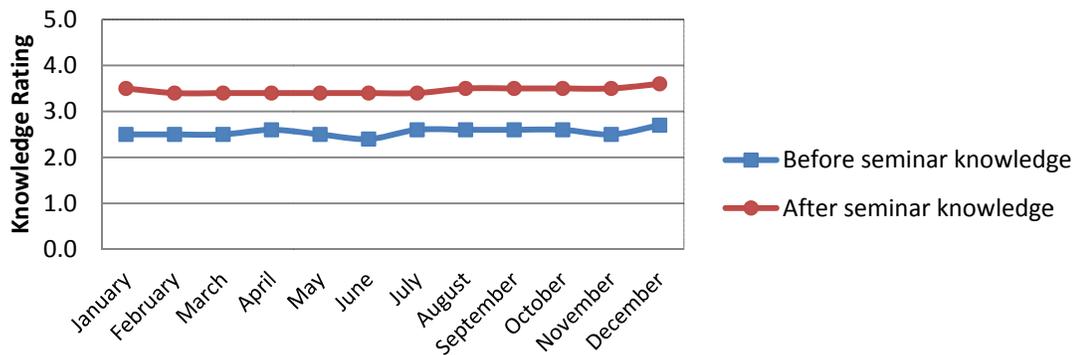
Program Participation

There is limited information regarding customer participation rates in WE&T program offerings. Because the range of potential participants spans beyond customers and into builders, workforce, and students, there is no clear understanding of how many potential participants there are and what percentage of potential participants SoCalGas is reaching.

Customer Knowledge Gain

Figure 8 shows the SoCalGas-specific feedback averaged across a sampling of 2015 post-training survey results, where participants rated their knowledge level on a scale from 0 to 5 (with 0 = “Poor”, and 5 = “Excellent”). Attendees reported a solid increase in knowledge after participation in SoCalGas WE&T courses.⁴¹⁹

Figure 8: 2015 Seminar Survey Results Regarding Knowledge Gain



⁴¹⁹ SoCalGas Event Post Evaluation Data, (2015)

Background

The CLTEESP directed a WE&T Needs Assessment to study critical workforce needs and to pinpoint opportunities to help identify and fulfill those needs through collaborations and “funding streams other than ratepayer funding.”⁴²⁰ The Needs Assessment was completed in March 2011. Following the Needs Assessment, the IOUs sought and received California Public Utilities Commission (Commission or CPUC) approval for key program changes in response to the report recommendations.⁴²¹ These changes are summarized below in Table 4:

	Needs Assessment Topic	IOU Proposal
1.	Support Sector Strategies	Develop and initiate Sector Strategies, test some proven concepts and refine as needed
2.	Collaborate with Construction Trades	Engage with workforce organizations
3.	Support Credentials and Certifications	Seek best comprehension and retention strategy
4.	Restructure Classes	Assess feasibility of longer courses and series
5.	Support Curricula Development	IOUs have an advisory role; can advise on how best to make curricula accessible
6.	Inclusion of Disadvantaged Workers	Facilitate relationships with Disadvantaged groups
7.	Evaluation of Workforce Outcomes	Seek feasible metrics
8.	Collaborate with Education	This is an existing aspect of the program’s strategy
9.	Career Education	Incorporate career exploration into programs
10.	Evaluation of K-12 Programs	Collect non-specific student data from schools

Additional information on the recommendations of the Needs Assessment proposals is provided in the EM&V Considerations section.

Additional regulatory drivers for program modifications have impacted WE&T program design over the years. In May 2012, the Commission provided guidance on possible improvements to WE&T activities. The IOUs were directed to implement specific program design and implementation activities to address sector-specific concerns for lighting, HVAC and other industries. Subsequently, in the low-income proceeding, the Commission separately outlined the need to collect program contractor-specific information. To support the data needs of both CPUC directives, the WE&T program focused on a few very specific and complex data collection and analysis needs.

⁴²⁰ California Public Utilities Commission. (2011, January). *Energy Efficiency Strategic Plan, January 2011 Update*, p. 71. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

⁴²¹ Southern California Gas (SoCalGas) Company. (2011, October 24). *Advice Letter 4249-B Additional Supplemental Joint Filing: 2010-2012 Statewide Workforce Education and Training (WE&T) Program Modifications based on Findings of WE&T Needs Assessment*. Retrieved from <https://www.socalgas.com/regulatory/tariffs/tm2/pdf/4249-B.pdf>

For 2015-2016, WE&T sought to explore ways to further support disadvantaged workers in response to facilitating inclusion efforts. The work is expected to provide additional information on the implications of some of the recommendations from previous studies.

Future Trends

There are number of trends that will require WE&T to be agile and flexible to respond to the dynamic environment and be innovative in the future. The following are list of key trends and actions by key market actors:

- There is a strong movement towards collaborative, digital, and online learning as well as interest-driven content.
- WE&T participants receive education and training elsewhere, “including conferences, universities, community colleges and trade/tech schools, and online courses, but no one source stood out.”⁴²²
- The Task Force on Workforce, Job Creation, and a Strong Economy identified that while more funds are needed for Career Technical Education (CTE) programs,⁴²³ colleges must make sure that existing resources are deployed to the most valuable programs.⁴²⁴ In public and private sector organizations, discontinuing low-value activities can be as difficult as initiating high-value activities. The same is true for community college offerings and those within the CTE domain in particular.
- The California Community Colleges Task Force on Workforce, Job Creation, and a Strong Economy has offered recommendations to the community colleges to overcome barriers affecting technical education at the community college level.⁴²⁵
- The number of California Partnership Academies (CPAs) available to high school students, particularly the ‘Utilities and Energy’ academies, has fallen since 2010. Funding for CPA development has dwindled with most provided in 2015 from Proposition 98 and Senate Bill 1070 sources.
- Current WE&T activities do not address the scale of training needed to meet the CLTEESP goal of a qualified workforce by 2020. Extrapolating data from a 2014

⁴²² Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies*, CALMAC Study ID PGE0317.01, p. 57. Retrieved from http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf

⁴²³ California Department of Education. (2015, November 10). *Profile of the California partnership academies*. Retrieved from <http://www.cde.ca.gov/ci/gs/hs/cpareport09.asp>

⁴²⁴ *Id.*

⁴²⁵ California Community Colleges. (2015). *Board of Governors task force on workforce, job creation, and a strong economy report and recommendations*, p.8-11. Retrieved from http://doingwhatmatters.cccco.edu/Portals/6/docs/SW/BOG_TaskForce_Report_v12_web.pdf

workforce study, 9,000 new energy efficiency workers are needed every year to achieve that goal.⁴²⁶

- WE&T stakeholders have stated that the many offerings among education and training providers are vast and often subtly different. Consistency on technical skills and market requirements around building, equipment, and design practices is desired.
- SoCalGas courses held in 2013 were about 3-to-1 on-site versus off-site. By 2015, attendance at on-site versus off-site classes was 6-to-1, suggesting a need to increase engagement with customers off-site.
- In student evaluations on WE&T, instructor knowledge is rated highest and technical difficulty of the course is rated lowest.⁴²⁷ This could facilitate course adaptation to less technical end-users.
- Advanced building practices are becoming requirements, but market actors are not receiving the training to be able implement them. “Builders reported that many subcontractors and builders of code-compliant homes do not have the knowledge needed to execute advanced building practices (i.e., zero-net energy qualified buildings) successfully. Building officials reported challenges in the code compliance process, both with homes built to code and those built above code.”⁴²⁸

Future Opportunities

In the coming years, there are several opportunities to promote energy efficiency by the WE&T program including:

- The California Community Colleges Task Force on Workforce, Job Creation, and a Strong Economy made recommendations to the California Community Colleges to overcome barriers effecting technical education at the community college level.⁴²⁹ The recommendations include: creating common workforce metrics for all state-funded CTE programs; revising the curriculum development process to ensure alignment from education to employment; and improving the CTE student progress and outcomes.

⁴²⁶ Caldwell, J. (2016, April 1) *Email to WE&T taskforce: Community college perspective on IOU business plans*. Retrieved from http://media.wix.com/ugd/0c9650_3bad27cdbe714d97a6943bafa5a9c858.pdf

⁴²⁷ Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies, CALMAC Study ID PGE0317.01*, p. 147, Table 45. Retrieved from http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf

⁴²⁸ TRC Energy Services. (2015, February 27). *Residential ZNE Market Characterization, CALMAC Study ID PGE0351.01*, pp. 104-105. Retrieved from http://www.calmac.org/publications/TRC_Res_ZNE_MC_Final_Report_CALMAC_PGE0351.01.pdf

⁴²⁹ California Community Colleges. (2015). *Board of Governors task force on workforce, job creation, and a strong economy report and recommendations*, p.11-12. Retrieved from http://doingwhatmatters.cccco.edu/Portals/6/docs/SW/BOG_TaskForce_Report_v12_web.pdf

- Collaboration is necessary to impact new entrants and most of the 220,000 incumbent workforce needing upgraded skills for the green economy.⁴³⁰
- Work with impacted sectors on new and complex concepts intended as transformational to the market, such as ZNE, and moving toward consistent agreement on a common concept, definition, and application.
- A common definition of what the green economy entails or what makes a job green does not seem to exist. In numerous reports published on the subject, the definitions can vary widely, primarily due to differences in the purpose and scope of the studies. “Consider the learnings from [the current Workforce Conditions] study when determining how to best collect demographic information from Energy Savings Assistance (ESA) contractors or other program contractors in the future.”⁴³¹

Legislative Impacts on Strategy

The energy efficiency landscape is evolving in a rapid manner in California as goals are more aggressive and new approaches for meeting those goals are pursued. At the state and regulatory levels, new concepts are being deliberated and addressed that will impact WE&T implementation and program delivery, as well as define its role as a cross-cutting program.

Table 5 outlines major pieces of legislation that are influencing WE&T in its coordination with IOU core industry sectors. Other efforts oriented at benchmarking and market transformation will likely be adopted in some form, further influencing WE&T focus in the coming years. WE&T will need to be agile and flexible to respond to this dynamic environment and be innovative in the future.

Table 5 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the WE&T Sub-sector Customer

Policy Driver	Specific Requirement / Guidance	Business Plan Response
SB 350 – Clean Energy and Pollution Reduction Act of 2015	Achieve a cumulative doubling of energy savings by 2030. Workforce development and job training for residents in disadvantaged	WE&T offerings will provide technical training, continuing education, and certifications in assisting the workforce with exposure to new energy efficiency technologies and

⁴³⁰ Caldwell, J. (2016, April 1) *Email to WE&T taskforce: Community college perspective on IOU Business plans*. Retrieved from

http://media.wix.com/ugd/0c9650_3bad27cdbe714d97a6943bafa5a9c858.pdf

⁴³¹ Opinion Dynamics Corp. (2016, December). *PY2013-2014 California Statewide Workforce Education and Training Program Workforce Conditions Data Investigation, CALMAC Study ID CPU0133.01*, pp. 39-40. Retrieved from

http://www.calmac.org/publications/CPUC_Workforce_Conditions_Data_Report_Final_12-17-2015.docx

Table 5 - Summary of California Legislative and Executive Branch Energy Efficiency Related Guidance Impacting the WE&T Sub-sector Customer		
Policy Driver	Specific Requirement / Guidance	Business Plan Response
	communities, including veterans, at-risk youth, and members of the state and local community conservation corps.	energy efficiency practices. WE&T will continue its connection with participants from disadvantaged communities, including the proposal of a new Statewide Career & Workforce Readiness program.
AB 793 - Energy Management Technology Incentive Offering	Must develop programs by 2017 that provide incentives to help residential and small/medium business customers acquire energy management technology and educate them about these programs.	WE&T will be positioned to facilitate market interventions for home energy management technology. Example tactics may include “how-to” videos or manuals.
AB758 - Existing Buildings Energy Efficiency Action Plan	<p>3.3 - Implement WE&T strategies that integrate Knowledge, Skills & Abilities with WE&T curriculum; update training to include best practice building science and code requirements.</p> <p>3.3.4 - Train contractors and other market actors to sell energy efficiency.</p> <p>3.3.6 - Include special skills training in core WE&T activities to help meet demand, spur innovation, and increase the body of knowledgeable building professionals.</p>	<p>WE&T is positioned to provide specialized skills training (i.e., retro-commissioning, facility management) to help meet demand and increase the body of knowledgeable building professionals.</p> <p>WE&T offerings have and will continue to train contractors on selling energy efficiency.</p> <p>WE&T will provide education and training on code changes, new technologies, and skills needed to meet legislative mandates (i.e., ZNE design, benchmarking and retro-commissioning)</p>
AB 802 - Benchmarking and Changes to Energy Efficiency Baselines	<p>Benchmarking – By 2017, for multi-unit buildings, utilities must provide aggregated energy usage data to its owner, its agent, or building operator. Commission will set requirements for public disclosure of information for benchmarking purposes.</p> <p>Baselines - Authorizes utilities to provide incentives to customers for energy efficiency projects based on normalized metered energy consumption as a measure of energy savings.</p>	<p>WE&T will provide education and training on code changes, new technologies, and skills needed to meet legislative mandates (i.e., ZNE design, benchmarking and retro-commissioning)</p> <p>WE&T will offer contractors and building operators benchmarking energy usage and software. Includes valuation techniques of a benchmarking investment.</p>

Additional initiatives and drivers that may impact WE&T include:

- New Residential Zero Net Energy (ZNE) Action Plan
- New Residential Buildings ZNE by 2020
- New Commercial Buildings ZNE by 2030
- All Major Renovations of Existing Commercial Buildings ZNE by 2030
- Low Income Program Proceeding
- Water-Energy Nexus Proceeding
- Codes & Standards emphasis on training for building departments

D. Goals, Strategies and Tactics for the WE&T Sector

To achieve the sector goals, SoCalGas' WE&T efforts embrace the following four core intervention strategies:

- Collaborate with key stakeholders on energy efficiency education to enhance and develop energy efficiency content for greater uniformity;
- Coordinate on an energy efficiency education pathway for students and the energy efficiency workforce that promotes career awareness, core energy education and career enhancement and technical skills advancement;
- Adapt training courses, curriculum and related materials to extend reach, expand use, availability and access to specific technical content; and
- Align, adapt, and target WE&T offerings to support market-based energy efficiency potential data and emerging workforce trends and/or needs.

Goal 1: Facilitate the development of energy efficiency career pathways through improved training and curriculum offered by California's education and workforce training institutions.

Sector Strategy: WE&T will collaborate with key stakeholders on energy efficiency education to enhance and exchange energy efficiency content and curriculum for greater uniformity. SoCalGas will also coordinate on an energy efficiency education pathway for students and the energy efficiency workforce that promotes career awareness, core energy education and career enhancement and technical skills advancement. The Career Connection program offering will expand collaboration between SoCalGas WE&T and local trade and industry affiliations to provide training pathway relationships, and options to students and workers. WE&T will continuously gauge the relevancy and value of classes to students and workers. WE&T will collaborate with strategic partners to extend reach and access of energy efficiency-specific education and training.

Goal 2: Increase training participation by making Energy Center offerings more available, accessible, and specifically adapted to improve customer adoption of energy efficiency and achievement of savings.

Sector Strategy: WE&T will adapt training course, curriculum and related materials to extend reach, expand use, availability, and access to specific, and needed technical content. SoCalGas will offer a Career Workforce Readiness Program to promote energy efficiency applications. SoCalGas will also align and target WE&T offerings to support market based energy efficiency potential data and emerging workforce trends. WE&T will implement new delivery methods to attract and encourage program participants. WE&T will also collaborate with strategic partners to extend reach and access of energy efficiency-specific education and training. SoCalGas will enhance WE&T presence on alternative media platforms, adapting curriculum for easier customer comprehension. WE&T will also continue to gauge the effectiveness of training to fulfill other portfolio objectives and goals.

Proposed WE&T Program Structure

Historically, WE&T promotes energy efficiency to a variety of customer segments and trade allies. The Energy Centers, while continuing their traditional activities and goals, are much more cognizant of ally relationships and how they can be leveraged to emphasize work quality and its role in attaining long-term savings goals. In the new program structure, WE&T will:

- Facilitate and contribute to worker certification;
- Reach audiences that are deemed disadvantaged and/or underserved;
- Increase connections with the trades and professions at seminars and training; and
- Increase the number of market actors, emphasis on work quality, and skill levels in the green workforce.

In prior program cycles, WE&T was structured as three sub-programs: WE&T Centergies, Connections, and Planning.

WE&T Centergies: Currently, the four IOUs provide a range of education and training offerings at Energy Centers and off-site locations throughout the state. These offerings include informational classes, technical outreach, technical education, technical consultations, tool lending libraries, and demonstration tours. The seven IOU Energy Centers are located in the San Francisco Bay Area, Los Angeles area, San Diego, and the Central Valley. They are generally organized around market sectors and cross-cutting segments to facilitate workforce education and training appropriate for achieving the energy savings, demand reductions, and related energy initiatives. Influencing this target audience with specialized educational materials, interventions, and tactics to understand and act on available energy efficiency opportunities represent a type of strategy for WE&T.

WE&T Connections: The Connections sub-program focuses on K-12 and post-secondary institutions. WE&T Connections sub-program is designed to raise awareness about energy efficiency in the K-12 sector, and increase access and understanding about green career opportunities and educational pathways into green careers. The target audience for WE&T

Connections includes K-12 students and teachers, community college students, and adult learners.

WE&T Planning: The Planning sub-program has mainly encompassed activities specific to WE&T as called out in support of the CLTEESP.

With the transition to the portfolio sector approach, WE&T will be restructured to more accurately reflect actual activities and to ensure that the program offerings are aligned, coordinated, and effective. The current WE&T Planning sub-program will be integrated into the Centergies sub-program, to be renamed as the Integrated Energy Education & Training (IEET) Program. The Connections sub-program, renamed as Career Connections, will become a statewide program under the statewide implementation approach. The emphasis and focus of these two sub-programs will be complementary while reducing redundancy and gaps.

In addition to the sub-program and statewide program described above, WE&T proposes a new Career & Workforce Readiness (CWR) offering. The new CWR program will have a primary focus on helping to reduce barriers to worker participation in the energy efficiency sector. Specifically, CWR will provide its primary target audience with energy education and workforce development resources through collaborations with organizations that serve disadvantaged workers and communities, such as workforce investment boards, community-based organizations, and workforce development agencies. CWR will pair the IOUs' energy efficiency expertise with the expertise of organizations that serve disadvantaged workers and communities to bridge disadvantaged communities into energy education and training pathways in California.⁴³²

Table 6 describes the proposed WE&T sub-programs, statewide programs, and their relation to each other.

⁴³² ICF International. (2016, March 31). *Draft final report workforce education and training inclusive consultant*, p. 43.

Table 6 - WE&T Sub-Programs

Program Component	A. Career Connections: Career Awareness & Exploration and Energy & Sustainability Education	B. Career & Workforce Readiness (CWR): Job and Career Readiness	C. Integrated Energy Education & Training (IET)	
			Core Post-Secondary Energy Education	Technical Upskill
Primary Audience	People needing energy and sustainability fundamentals resources, and energy jobs and career awareness resources: <ul style="list-style-type: none"> - K-12 students - K-12 instructors - Energy job/career seekers - Job/career transitional 	People not prepared to enter a traditional energy job/career higher education path: <ul style="list-style-type: none"> - Disadvantaged communities - Disadvantaged workers 	People on a chosen post-secondary educational track toward an energy job/career <ul style="list-style-type: none"> - Students - Apprentices 	People in a job/career seeking energy-focused upskilling: <ul style="list-style-type: none"> - Engineering & design professionals - Technical trades / journeymen
Possible Offerings and Resources	<ul style="list-style-type: none"> - Career awareness and exploration resources - Energy and sustainability teaching materials - Teacher training 	<ul style="list-style-type: none"> - Curriculum materials - Technical training and advice - Train-the-Trainer - Tools and Resources - Career prep/job readiness services (via partnerships) - Job placement (via partnerships) 	<ul style="list-style-type: none"> - Technical education and training - Support for curriculum materials development - Train-the-Trainer - “Kick-Start / early stage” initiatives support - Building performance measurement tools 	<ul style="list-style-type: none"> - Technical training and advice - Energy tools and resources - Certification program support
Primary Organizations for Strategic Partnerships	<ul style="list-style-type: none"> - K-12 schools - Workforce Investment Boards, Community-based Organizations 	<ul style="list-style-type: none"> - Workforce Investment Boards - Workforce Development Agencies - Community-based organizations - Job-training organizations 	<ul style="list-style-type: none"> - Community colleges - 4-year Colleges - Job-training organizations - Vocational Schools - Labor/Unions - Trade Associations - Apprenticeship & Pre-apprenticeship - Community-based organizations 	<ul style="list-style-type: none"> - University Extension Programs - Certification agencies & programs - Professional and Trade Associations and Agencies
Outcomes	Knowledge gain, utilizing knowledge and skills on the job, expanding/enhancing other organizations’ curricula.			

WE&T will coordinate with all sectors, to provide training and introduce critical energy efficiency concepts to key market actors in a segment for their help in ushering transformation among targeted constituents. Such collaboration could resolve ambiguity experienced from general “one-size-fits-all” programs. SoCalGas will assist sector segments with solutions that complement segment business priorities as well as education and training intervention to

sustain commitment.⁴³³ The following is a list of sector-specific opportunities for the WE&T offerings:

- Many segments of the commercial sector require specialized services, offer high-energy savings potential, and show low participation rates in energy efficiency.
- Contractors serving the residential sector indicate a need for training to address increasingly new opportunities arising in the multi-family markets, such as mixed-use property equipment infrastructure.
- For industrial underserved accounts, cost-effective incentive based offerings are difficult to identify, creating a potential need similar to that in the public sector—training content that can be applied on a small scale.
- Much like the Commercial Building Owner Certification needs, multi-family owners and operators need training, specifically, how Building Operator Certification (BOC) training⁴³⁴ may help contractors engaged in programs involving multi-family buildings.⁴³⁵
- Industrial sector customers could benefit from education and training to address the varied and complex energy efficiency opportunities.

The following describes how WE&T will address these opportunities as well as provide sector-specific WE&T solutions:

1. **Commercial Sector:** WE&T will provide classes, seminars, consultations, and demonstrations to commercial customers, particularly emphasizing the options available to the food services segment. Commercial sector education and training offerings will focus on mechanical equipment for existing buildings, whole building, and integrated design approaches, as well as Title 24 for new construction. WE&T will collaborate with the commercial sector to expand relationships with building owners and manager association, United States Green Building Council, ASHRAE, American Institute of Architects, International Facility Managers Association, and the Association of Energy Engineers. WE&T will assist the commercial sector in delivering technical education and demonstration to

⁴³³ American Council for an Energy-Efficient Economy. (2013, March). Executive summary, overcoming market barriers and using market forces to advance energy efficiency, *American Council for an Energy-Efficient Economy*, pp. 10-11. Retrieved from <http://aceee.org/files/pdf/summary/e136-summary.pdf>

⁴³⁴ Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies, CALMAC Study ID PGE0317.01*, pp. 34-35. Retrieved from http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf

⁴³⁵ Through their evaluator, Evergreen Economics Inc., SoCalGas, SDG&E, and SCE are currently evaluating the relationship of how training offerings like the Building Operator Certification (BOC) training may or may not fit into the IOU's energy efficiency programs for multi-family buildings.

help convert interest into energy efficiency actions in achieving the following commercial sector goals:

- a. Enable new construction to achieve the highest natural gas energy efficiency levels in conjunction with achieving zero net energy (ZNE) performance.
- b. 50% of existing buildings will be ZNE-ready buildings by 2030 through achievement of deep levels of natural gas energy efficiency.

2. Public Sector: WE&T is positioned to perform the type and level of training to provide classes, seminars, consultations, and demonstrations to support local government training for code compliance. WE&T will collaborate with the public sector to expand relationships with local government departments and agencies. Public sector education and training offerings will align with energy savings potential data and focus primarily on large public facility equipment such as boilers, and steam plants assisting to help convert interest into energy efficiency actions. Education and training will be targeting disadvantaged communities in coordination with the public sector in achieving the following public sector goals:

- a. Achieve comprehensive, deep energy efficiency levels among all facilities to support the achievement of ZNE buildings.
- b. Increase energy efficiency levels among public sector customers in disadvantaged communities.

3. Industrial Sector: Training programs will be targeted at facility managers, energy managers, small facilities owners and process engineers who are designing, building, analyzing, and maintaining food processing, manufacturing, and petroleum facilities. Industrial education and training offerings will focus on large-scale manufacturing, processing and refining plant workers to encourage equipment, process, and whole system-related energy efficiency projects, assisting to help convert interest into energy efficiency actions in achieving the following industrial sector goals:

- a. Increase adoption of energy efficiency solutions by micro/small industrial group.
- b. Reshape industrial organizational practices to enable adoption of energy efficiency solutions as part of customer's industrial processes.
- c. Increase energy efficiency adoption levels across all industrial segments with customer awareness of energy efficiency practices and retrofits.

4. Residential Sector: Residential sector education and training offerings will align with energy savings potential data and focus on existing buildings, and building shell measures. For new buildings, education and training programs will focus on cost-effectively realizing ZNE, high performance walls and attics, and Title 20 and Title 24 code awareness. WE&T will collaborate with the residential sector to expand relationships with building industry, plumbing and mechanical trades, as well as realtor associations to develop approaches and technical materials to achieve deeper energy savings for the residential sector. These

approaches can assist the residential sector in delivering technical education to help convert interest into energy efficiency actions in achieving the following residential sector goals:

- a. Achieve comprehensive, deep energy efficiency levels through a whole house approach.
- b. Increase energy efficiency adoption levels for all residential customers with a focus on multi-family through efficient and effective training outreach.
- c. Through the promotion of gas efficiency, enable new construction to achieve ZNE performance levels.

5. Agricultural Sector: Training programs will be targeted at facility managers, energy managers, business owners who are designing, building, and maintaining facilities such as dairies, breweries, distilleries, wineries, and green houses. WE&T will collaborate with the sector to expand relationships with universities and community colleges, regional water districts, and relevant trade associations to develop approaches to assist in achieving the following agricultural sector goals:

- a. Substantial increase in deeper, comprehensive natural gas energy efficiency in the small customer groups.
- b. Increase customer acceptance of the natural gas energy efficiency value proposition.
- c. Increase in natural gas energy efficiency among all agricultural customer segments.

E. Performance Sector Metrics

To gauge sector progress towards the achievement of the desired sector outcomes, the Business Plan proposes key sector metrics. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the Program Administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels. The sector-specific metrics are presented Table 7 below. Over time, metrics and targets may be adjusted and improved to more accurately reflect sector progress.

Table 7 – WE&T Program Metric Table

10-year Vision

WE&T curriculum and implementation support SoCalGas sectors and California’s educational and training network on the goal of doubling energy efficiency savings by 2030.

Problem Statement	Desired Sector Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Energy efficiency is not a priority for education and training providers compared to academic, financial, safety, and operational issues; this creates a lack of momentum around energy-efficiency career paths.	1. Facilitate the development of energy efficiency career pathways through improved training and curriculum offered by California’s education and workforce training institutions.	Collaborate with key stakeholders on energy efficiency education to extend and expand energy efficiency content and curriculum. Coordinate energy efficiency education pathway that involves career awareness, core energy education, career enhancement, and technical skills advancement.	Number of collaborations with key stakeholders to enhance organizations’ energy efficiency career pathway training curriculum	2015 Collaboration Participation Levels	Program tracking data	Increase the number of collaborations by 5% over 2015 levels by year 3	Increase the number of collaborations by 10% over 2015 levels by year 7	Increase the number of collaborations by 15% over 2015 levels by year 10

Table 7 – WE&T Program Metric Table

10-year Vision

WE&T curriculum and implementation support SoCalGas sectors and California’s educational and training network on the goal of doubling energy efficiency savings by 2030.

Problem Statement	Desired Sector Outcome	Intervention Strategies	Sector Metric	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Education and training materials are not adaptable enough for expanded reach and accessibility as well as to be useful to broader customer audiences.	2. Increase training participation by making Energy Center offerings more available, accessible, and specifically adapted to improve customer adoption of energy efficiency and achievement of savings.	Expand reach, and access to Energy Center training courses, curriculum and related technical materials Align WE&T offerings to support market based data on energy efficiency potential data and emerging workforce trends and/or needs	Increase number of trainees	2015 Participation Levels	Program tracking data	Increase number of trainees by 5% over 2015 levels by year 3	Increase number of trainees by 10% over 2015 levels by year 7	Increase number of trainees by 20% over 2015 levels by year 10

Key Partners

The success of WE&T will rely on a positive, collaborative relationship with several market actors, Program Administrators, regulators and other government entities. Table 8 provides a list of prominent training entities that will help to successfully achieve the ambitious vision for the WE&T sector.

Key Partners	Support Activity
Program Administrators	<ul style="list-style-type: none"> • Leverage all available best practices and promote statewide consistency, where appropriate. • Simplify program engagement.
K-12 and post-secondary educational institutions	<ul style="list-style-type: none"> • Overall goal is to work with educational institutions to promote the need/demand for complementary energy efficiency education. • Work with K-12 school districts to continue to emphasize energy efficiency education in their coursework and help create the path to green careers. • Maintain and expand community college accreditation efforts. • Continue to work to integrate energy efficiency curriculum into post-secondary program implementation to engage students and faculty. • Identify innovative ways to engage faculty, students, and industry partners in collaborative learning opportunities. • Support course implementation, curriculum development, and Learning Communities on California State University campuses.⁴³⁶
Rural Hard to Reach Working Group	<ul style="list-style-type: none"> • SoCalGas will leverage its existing relationship with the Rural Hard to Reach Working group to develop off-site training opportunities to improve access and reach.
Trade Associations	<ul style="list-style-type: none"> • SoCalGas will partner with trade associations to identify additional careers and/or jobs that could benefit from WE&T offerings.
Local, State and Federal agencies	<ul style="list-style-type: none"> • SoCalGas will leverage its existing partnerships with local and state government to assist in the development and implementation of program strategies to provide WE&T services to rural and disadvantaged communities.
Unions	<ul style="list-style-type: none"> • SoCalGas will work with local unions to provide technical courses to union members.
Community Based Organizations (CBOs)	<ul style="list-style-type: none"> • Partner with CBO's to identify potential energy efficiency job training opportunities and participants.

⁴³⁶ Cobblestone Applied Research & Evaluation, Inc. (2014, September). *Service learning transforming educational models in science, technology, engineering, and mathematics (STEM) 2 year three evaluation final report*, pp. 38-39. Retrieved from <https://www.calstate.edu/cce/stem/documents/STEM-Year-Three-Evaluation-Final-Report.pdf>

Table 8 - Key Partners	
Key Partners	Support Activity
Training Providers	<ul style="list-style-type: none"> • Collaborations will look to identify additional training locations to widen WE&T's reach and add convenient locations. • Invite other training providers to present additional topics to diversify WE&T offerings. • Share best practices.
Industry Associations	<ul style="list-style-type: none"> • Leverage partnership with trade associations to increase outreach to targeted WE&T audience and to increase participation from working trades and professionals.
Equipment Vendor and Manufacturers	<ul style="list-style-type: none"> • Work with manufacturers to develop hands-on training as well as to expand reach to potential class participants.

F. Cross-cutting Sector Coordination

WE&T offerings support the other cross-cutting sectors with technical education and training assistance for different key market actors and decision makers.

Codes and Standards

WE&T will support the Codes and Standards efforts with education and training, particularly in code compliance awareness and improvement.

Emerging Technologies Program (ETP)

WE&T will continue to be a conduit to the Gas and Electric ETPs in forging awareness and workforce skills training around emerging technologies, while including information about emerging technologies projects as part of WE&T education programs. SoCalGas WE&T will make its Energy Resource Center available for demonstrations and presentations of new product and program launch events.

Finance

WE&T historically offers courses to high-potential market actors and decision makers, providing data for making a business case for energy efficiency projects. Where appropriate, WE&T will help with ways to promote awareness, availability, and applicability of energy efficiency financing offerings.

Statewide Coordination

A key to successful program administration is having an open, positive collaboration among program implementers and other Program Administrators. SoCalGas is committed to a coordinated and collaborative, on-going relationship among all implementers and Program Administrators. The WE&T team is well integrated and works cohesively as a statewide team, with regularly scheduled meetings among Program Administrators to address common issues and share best practices. The development of a WE&T strategic plan and Stakeholder Engagement Forum has further strengthened working relationships with the other utilities and other external stakeholders. The WE&T team will continue to leverage the Stakeholder

Engagement Forum to foster an open and transparent environment that encourages dialogue and fosters innovation.

At the local level, it would be beneficial to develop and maintain relationships with businesses and building management, content and curriculum design, community-based workforce development agencies, secondary and post-secondary education institutions, labor and apprenticeship groups, industry, and labor-specific member groups, private and other public agencies, local governments, and local chamber agencies.

G. Evaluation, Measurement & Verification (EM&V) Considerations

Analysis of Prior EM&V Studies and Response to Recommendations

For over a decade, the WE&T program has developed and evolved with the assistance of the various EM&V impact, market and process evaluation studies. These studies provided insights in the WE&T program's successes as well as ways the WE&T program could be improved.

In its inaugural program years of 2006-2008, the EM&V studies aided in molding the program design and delivery⁴³⁷ of the WE&T program to better achieve its program goals. For example, because of the indirect impact evaluation, the IOUs refined its program design and refined its performance metrics to better serve its WE&T program. Additionally, the EM&V study provided insights on enhancing the WE&T program's data tracking mechanism.

Subsequent EM&V studies conducted in 2010-2012 provided beneficial information on how the WE&T programs can be aligned with the CLTEESP and how to strengthen its program effectiveness.⁴³⁸ Consequently, the IOUs have revisited and revised its logic model and program theory to refocus on the activities and goals of the WE&T program. As a consequence of the changes to the logic model and program theory, the 2013-2014 EM&V studies focused on updating the program theory and logic model to reflect the program changes in light of the Strategic Plan and Needs Assessment.⁴³⁹

⁴³⁷ Opinion Dynamics Corp. (2010, March 23). *Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program*, CALMAC Study ID CPU0014.01, p. 123. Retrieved from [http://www.calmac.org/publications/06-](http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf)

[08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf](http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf)

⁴³⁸ Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies*, CALMAC Study ID PGE0317.01, p. 19. Retrieved from [http://www.calmac.org/publications/2010-](http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf)

[2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf](http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf); *See also* Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume II: Connections*, CALMAC Study ID PGE0317.02, p. 11. Retrieved from [http://www.calmac.org/publications/2010-](http://www.calmac.org/publications/2010-2012_WE%26T_Connections_Process_Eval_Report_FINAL-volume_II.pdf)

[2012_WE%26T_Connections_Process_Eval_Report_FINAL-volume_II.pdf](http://www.calmac.org/publications/2010-2012_WE%26T_Connections_Process_Eval_Report_FINAL-volume_II.pdf)

⁴³⁹ Opinion Dynamics Corp. (2014, June 6). *2013-2014 Statewide WE&T Program Program Theory and Logic Model Update; Centergies Data Needs; And Critical WE&T Data Needs*, CALMAC Study ID

In addition to EM&V studies, there have been research that focused on the WE&T program and provided findings and recommendations. In 2014, the Donald Vial Center on Employment in the Green Economy issued a Guidance Plan for the WE&T Programs.⁴⁴⁰ For 2015-2016, the IOUs sought to explore ways in which the WE&T program may further support “disadvantaged” workers in response to facilitating inclusion efforts. The work is expected to provide additional information on the implications of some of the recommendations from the Guidance Plan to enable the IOUs to make more informed decisions related to implementing specific Guidance Plan recommendations. The Inclusion Research focused on the following work scopes:

- a. Examining the relationship between existing federal and state job classifications and the job descriptions of workers implementing the Energy Savings Assistance Program (i.e., Installation Technician/Specialists; Natural Gas Appliance Test (NGAT) Technicians; Energy Specialist/Program Representative/Residential Outreach Specialists; Inspectors)
- b. Identifying promising energy efficiency career pathways for disadvantaged workers, which provide entry-level employment on-ramps as well as ongoing opportunities for advancement.⁴⁴¹
- c. Examining the functionality, reporting features, security and privacy features of two electronic certified payroll reporting and labor compliance systems (LCP Tracker and Elation) that may be considered as a resource to collect job and workforce data relevant to the implementation of select energy efficiency programs administered by the IOUs.
- d. Identifying viable inclusion implementers working in the IOUs’ service territories who may be appropriate partners for inclusion work.

For Work Scope A, detailed job descriptions for ESA field workers were created but only two of the four job descriptions could be mapped directly to the identified job classifications.⁴⁴² Specifically, ICF International provided that “a new trade classification may or may not need to be developed for the Energy Specialist/Program Representative/Residential Outreach Specialist

SDG0278.01, p. 7. Retrieved from http://www.calmac.org/publications/2013-2014_WET_PTLM_and_Critical_Data_Gap_Assessment.pdf

⁴⁴⁰ University of California, Berkeley Donald Vial Center on Employment in the Green Economy. (2014, May). *Workforce issues and energy efficiency programs: A plan for california’s utilities*, p. 20. Retrieved from <http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf>

⁴⁴¹ The Joint IOUs decided not to pursue Work scope B, which the Energy Division accepted in the justification process. However, since the Work Scopes are interconnected and interrelated, ICF International was able to discuss Work Scope B.

⁴⁴² ICF International. (2016, March 31). *Draft final report workforce education and training inclusive consultant*, p. 22-24.

and Inspector ESA program field worker positions.”⁴⁴³ ICF further explained that more research should be performed to find a match for those positions.⁴⁴⁴

For Work Scope B, a study was conducted to determine whether there were existing career pathways within Energy Efficiency for disadvantaged workers. ICF International determined that there were “four career pathways comprised of five occupations: an entry-level occupation (“Construction Laborer”) that requires minimal preparation and four skilled trades that require higher levels of training and certifications.”⁴⁴⁵

For Work Scope C, an in-depth feasibility study was conducted to examine two payroll systems for collecting job and workforce data.⁴⁴⁶ Two prior studies⁴⁴⁷ provided high-level benefits and challenges of adopting the online data reporting system, but this study provided additional background information for the IOUs to better understand the technical aspects of adopting an online data reporting system.⁴⁴⁸

For Work Scope D, the WE&T inclusion in the IOUs’ service territory was assessed to find potential partners for the IOUs to advance its inclusion goals. Two methodologies were developed for the IOUs to “assess inclusion implementers’ program alignment with the goals and priorities of the IOU. Both methodologies have limitations and need additional discussion on the indicators or metrics. A stated theory of change will assist in ensuring any inclusion implementer is aligned with the IOU WE&T’s priorities.”⁴⁴⁹

Thus far, these studies continue to guide the WE&T program to allow it to continue to educate current workers and prepare future works to be better able to successfully perform the jobs

⁴⁴³ *Id.* at 24.

⁴⁴⁴ *Id.*

⁴⁴⁵ *Id.* at 35.

⁴⁴⁶ Emerald Cities Collaborative. (2016, July 7). *Online data reporting systems evaluation report*. Retrieved from <http://www.energydataweb.com/cpucFiles/pdaDocs/1570/061316-Online%20Data%20Reporting%20Systems%20Final%20Report.pdf>

⁴⁴⁷ University of California, Berkeley Donald Vial Center on Employment in the Green Economy. (2014, May). *Workforce issues and energy efficiency programs: A plan for California’s utilities*. Retrieved from <http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf>; See also Opinion Dynamics Corp. (2014, June 6). *2013-2014 Statewide WE&T Program Program Theory and Logic Model Update; Centergies Data Needs; And Critical WE&T Data Needs, CALMAC Study ID SDG0278.01*.

Retrieved from http://www.calmac.org/publications/2013-2014_WET_PTLM_and_Critical_Data_Gap_Assessment.pdf

⁴⁴⁸ Emerald Cities Collaborative. (2016, July 7). *Online data reporting systems evaluation report*. Retrieved from <http://www.energydataweb.com/cpucFiles/pdaDocs/1570/061316-Online%20Data%20Reporting%20Systems%20Final%20Report.pdf>

⁴⁴⁹ ICF International. (2016, March 31). *Draft final report workforce education and training inclusive consultant*, p. 53.

needed to help achieve increased energy saving targets for the IOUs and California's clean energy goals.

Anticipated Study Needs

Moving forward, there is interest by the IOUs in better understanding the impacts of WE&T. Currently, there is a need to update these past evaluations to build upon the foundation of the WE&T program. Currently, most statewide WE&T Centergies courses gather post course evaluation information in the form of brief surveys that gather information about how students perceived the quality of the class, materials, and instructor(s). WE&T has previous studies showing the impact of their educational offerings, yet those studies are outdated. The IOUs are interested in updating these studies to better understand how the material or course impacted or were relevant to jobs following WE&T coursework, and aligning the results in concert with the Business Plan. This study will examine more about if and how course participation impacts and relates to energy efficiency practices within the participants' job responsibilities. It is anticipated that this study will provide insights on outcomes, that may include if and how students apply the skills and use the energy efficiency information they receive in WE&T courses. Knowing if students are applying the skills and/or using the information they received would be very useful in assessing course content and in designing future courses.

The IOUs will consider the WE&T program direction as outlined in the Business Plan in conjunction with the 2013-2014 WE&T Statewide Program Theory and Logic Model Study to provide insights into the design of this study. Relevant studies (including the SCE 2006-2008 Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program and 2009-2010 Education and Training and Outreach M&E study, and the 2000 PG&E Report on the Market Effects of the Energy Training Center Stockton), as well as some of the more recent 2013-2015 studies, will serve as resources for the development of the specific direction and potential key questions for this study.

Additionally, there is a need for data collection. Specifically, the IOUs want to track the WE&T Connections sub-program to find if there is awareness in the course participants and nonparticipants about the IOUs seminars and trainings. In addition, the IOUs want to collect data on its pilot Career Workforce Readiness (CWR) program to see if the target audience (e.g., contractors, tradespeople or repairmen) can work, will work or have worked on energy efficiency programs or efforts.

Appendix A: Legislation

Applicable Legislation	
Applicable Legislation	Program Intervention Strategies
SB 350	
<p>§399.4 (c) The commission, in evaluating energy efficiency investments under its existing statutory authority, shall also ensure that local and regional interests, multifamily dwellings, and energy service industry capabilities are incorporated into program portfolio design and that local governments, community-based organizations, and energy efficiency service providers are encouraged to participate in program implementation where appropriate.</p>	<p>The business plan allows program adaptations to respond to local and regional interest through targeted program delivery, modified incentive structures, and regional promotions.</p> <p>The residential sector chapter addresses the unique barriers of the multi-family segment through dedicated program tactics to achieve deeper energy savings.</p> <p>The energy service industry will be relied upon to promote energy efficiency programs and install customer projects across each of the nonresidential customer sectors.</p> <p>Local governments and community-based organizations will be leveraged to promote energy efficiency programs, where appropriate.</p>
<p>§399.4 (d) In updating its policies, the commission shall, at a minimum, do all of the following:</p> <p>(1) Authorize market transformation programs with appropriate levels of funding to achieve deeper energy efficiency savings.</p>	<p>The midstream energy efficiency program intervention strategy looks to permanently modify the stocking habits of distributors of energy-efficient equipment to achieve deeper energy savings through greater customer adoption of energy-efficient equipment. The midstream intervention strategy will be offered in the residential, commercial, industrial, and agricultural sectors.</p>

Applicable Legislation	
Applicable Legislation	Program Intervention Strategies
(2) Authorize pay for performance programs that link incentives directly to measured energy savings. As part of pay for performance programs authorized by the commission, customers should be reasonably compensated for developing and implementing an energy efficiency plan, with a portion of their incentive reserved pending post project measurement results.	Through the customer incentive and strategic energy management (SEM) strategies offered in each sector, a pay-for-performance offering will link customer incentives, in part, to energy savings based on post project measurement results.
(3) Authorize programs to achieve deeper savings through operational, behavioral, and retrocommissioning activities.	Both the SEM and pay-for-performance program intervention strategies will achieve deeper energy savings by providing customer incentives for energy savings related to customer operational, behavioral, and retro-commissioning activities.
(4) Ensure that customers have certainty in the values and methodology used to determine energy efficiency incentives by basing the amount of any incentives provided by gas and electrical corporations on the values and methodology contained in the executed customer agreement. Incentive payments shall be based on measured results.	In support of simplified customer engagement, energy efficiency offerings (including strategic energy management, pay-for-performance, deemed, and calculated) in the customer agreement will include the expected energy efficiency incentives based on the values and methodology contained in the executed agreement. For performance-type of program offerings, incentives payments will be based on measured results.
AB 793	
§717(3)(b) “Energy Management Technology” may include a product, service, or software that allows a customer to better understand and manage electricity or gas use in the customer’s home or place of business.	Under the intelligent outreach program intervention strategy, energy management technologies (EMTs) products and services will be promoted to allow customers to better understand and manage gas usage in the residential and nonresidential customer sectors. EMTs will leverage AMI usage data, where practicable. EMTs will also communicate with appliances and other equipment to achieve optimal efficiency. Partnering with electric utilities and water agencies will enable the shared customer to better manage their overall energy and water usage.

Appendix A: Legislative Directives	
Applicable Legislation	Program Intervention Strategies
AB 802	
<p>"(c) Effective January 1, 2016, electrical corporations and gas corporations are authorized to implement the provisions of subdivision (b) for high opportunity projects or programs. The commission shall provide expedited authorization of high opportunity projects and programs to apply the savings baseline provisions in subdivision (b).</p> <p>(d) In furtherance of subdivision (b), the commission, in consultation with the Energy Commission, shall consider all of the following:</p> <p>(1) The results of any interagency baseline assessment.</p> <p>(2) Any available results from investor-owned utility baseline pilot studies ordered in D.14-10-046.</p> <p>(3) Information necessary to ensure consistency with the energy forecast and planning functions of the Energy Commission and the Independent System Operator.</p> <p>(e) The commission may direct electrical corporations and gas corporations to make filings that are necessary to ensure coordination with the energy forecast and planning functions of the Energy Commission and the Independent System Operator."</p>	<p>There are several program pilots, identified within each sector chapter, that support the identification and implementation of high opportunity customer energy efficiency projects.</p>
SB 1414	
<p>§399.4 (b) (1) Any rebates or incentives offered by a public utility for an energy efficiency improvement or installation of energy efficient components, equipment, or appliances in buildings shall be provided only if the recipient of the rebate or incentive provides proof of permit closure and certifies that the improvement or installation has complied with any applicable permitting requirements and any specifications or requirements set forth in the California Building Standards Code (Title 24 of the California Code of Regulations), and, if a contractor performed the installation or improvement, that the contractor holds the appropriate license for the work performed.</p>	<p>Any of the customer incentive energy efficiency programs require proof of necessary permits associated with energy efficiency improvements or installations. Additionally, work is required to be performed by an appropriate licensed contractor.</p>
<p>"(d) The commission, in a new or existing proceeding, shall review and update its policies governing energy efficiency programs funded by utility customers to facilitate achieving the targets established pursuant to subdivision (c) of Section 25310 of the Public Resources Code. In updating its policies, the commission shall, at a minimum, do all of the following:</p> <p>(1) Authorize market transformation programs with appropriate levels of funding to achieve deeper energy efficiency savings.</p>	<p>The midstream energy efficiency program intervention strategy looks to permanently modify the stocking habits of distributors of energy-efficient equipment to achieve deeper energy savings through greater customer adoption of energy-efficient equipment.</p>

Appendix A: Legislative Directives	
Applicable Legislation	Program Intervention Strategies
(2) Authorize pay for performance programs that link incentives directly to measured energy savings. As part of pay for performance programs authorized by the commission, customers should be reasonably compensated for developing and implementing an energy efficiency plan, with a portion of their incentive reserved pending post project measurement results.	Through the customer incentive and SEM strategies, a pay-for-performance offering will link customer incentives, in part, to energy savings based on post project measurement results.
(3) Authorize programs to achieve deeper savings through operational, behavioral, and retrocommissioning activities.	Both the SEM and pay-for-performance program intervention strategies will achieve deeper energy savings by providing customer incentives for energy savings related to customer operational, behavioral, and retrocommissioning activities.
(4) Ensure that customers have certainty in the values and methodology used to determine energy efficiency incentives by basing the amount of any incentives provided by gas and electrical corporations on the values and methodology contained in the executed customer agreement. Incentive payments shall be based on measured results."	In support of simplified customer engagement, energy efficiency offerings, including SEM, pay-for-performance, deemed, and calculated, will include the methodology in the customer agreement used to determine the expected energy efficiency incentives basing the amount on values and methodology contained in executed agreement. For performance-type of program offerings, incentives payments will be based on measured results.

Appendix B: Evaluation, Measurement, & Verification (EM&V)

EM&V Activities

Introduction

Decision (D.) 16-08-019 continues to support the current EM&V administration framework with some updates to account for changes resulting from Senate Bill (SB) 350 and Assembly Bill (AB) 802; and necessary updates to accommodate the change in program portfolio implementation, i.e., the Rolling Portfolio together with the Business Plan model. The overall EM&V administration framework has the Commission Staff as the EM&V administrator, with the program administrators (PAs) and Commission staff overseeing various required and or approved evaluation studies and other stakeholders engaged in a transparent and collaborative process.⁴⁵⁰

In D.16-08-019, the Commission acknowledges that some shifts in responsibilities are necessary between Commission Staff and PA, with ultimate accountability for savings verification remaining with Commission Staff. With the increased emphasis on (1) net-metered energy consumption (NMEC) and Pay for Performance; (2) up front planning and market assessment associated with associated with the market transformation and other programmatic emphasis in SB 350 and AB 802, the Commission authorized an increase of the PA's portion of the EM&V funding from 27.5% to up a maximum of 40% after the business plan is approved.⁴⁵¹

This appendix outlines EM&V considerations, methods, and approaches that apply to the business plan across sectors. The first section of this appendix outlines approaches to measuring energy savings associated with energy efficiency interventions including net-metered energy consumption. This section also provides a brief outline of the International Performance Measurement and Verification (IPMVP)⁴⁵². Additionally, this section outlines metric tracking and updating.

NMEC and Pay for Performance Measurement and Verification (M&V) Activities

SoCalGas considers whole building NMEC evaluation approaches the “gold standard” of energy efficiency evaluation. While NMEC encompasses various methodologies and research designs, SoCalGas views NMEC as any approach that uses quantified metered data to measure energy usage pre- and post-energy efficiency interventions to determine energy savings. Because NMEC is the “gold standard” of energy efficiency evaluation, other approaches must be justified out of necessity. That is, deviations from whole-building metered energy consumption evaluation approaches such as retrofit isolation approaches (sub-metered), or simulation

⁴⁵⁰ California Public Utilities Commission. (2010, April 21). D.10-04-029.

⁴⁵¹ California Public Utilities Commission. (2016, August 25). D.16-08-019, p. 80.

⁴⁵² The IPMVP is available through the Efficiency Valuation Organization website at <http://evoworld.org/en>

methods, must be justified and considered after NMEC. In SoCalGas' analysis this approach is consistent with requirements of AB 802.

The December 30, 2015 "Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Program or Projects" provides guidance on various methods for measuring savings based on NMEC. One of Ruling's cited reference and most widely used M&V methods for verifying savings that incorporates NMEC is the International Performance Measurement and Verification Protocols (IPMVP). The IPMVP has four high-level M&V options:

- Option A: Retrofit Isolation: Key Parameter Measurement;
- Option B: Retrofit Isolation: All Parameter Measurement;
- Option C: Whole-Building; and
- Option D: Calibrated Simulation.

Options A and B isolate individual systems or equipment, Option C and D generally consider the whole building. SoCalGas' preference is to employ Option C as the default M&V method so long as savings register at the whole building level. However, in the event that savings cannot be isolated, SoCalGas will employ Options A, B, or D. SoCalGas looks forward to participating in continuing discussions and workshops regarding establishing appropriate baselines and M&V techniques that will increase the reliability of measuring and verifying energy efficiency savings.⁴⁵³

Option C – Whole-Building

As stated above Option C is the preferred M&V methodology, and would be considered the NMEC methodology of preference, using AMI or billing data to produce net metered consumption data across time, and to establish a "baseline" consumption case.

IPMVP Option C entails creating energy use models for each metered utility entering a building using whole-building total demand data. In order to create accurate energy models, at least twelve consecutive months of baseline and post-implementation whole-building energy trends shall be collected. The purpose of this requirement is to ensure that energy use is trended over a period which captures a range of independent variables (IVs -- typically outside air temperature) representative of most of the annual operating conditions.

Options A and B – Retrofit Isolation

Options A or B can be used if energy savings are expected to be very small compared to whole-building energy use and discrete measures are being implemented which can easily be calculated and supported by baseline and post-project sub-metered or spot measured data.

⁴⁵³ "Assigned Commissioner and Administrative Law Judge's Ruling and Amended Scoping Memorandum (Regarding Phase III of R.13-11-005)," November 2, 2016.

Measurement periods for these Options should attempt to follow the requirements detailed in the Option C section; however shorter trending periods may be warranted depending on the equipment and measures being modeled.

Option D – Calibrated Simulation

Option D should be used only if either baseline or post-project whole-building trend data is unavailable. Use of Option D entails creating a whole-building energy use model and calibrating it to either baseline or post-project energy use. Depending on which data set the model is calibrated to, energy efficiency measures will then be implemented or un-implemented in the model to represent the actual project scope.

There exists considerable uncertainty regarding implementation, measurement, and reporting of NMEC as mandated by AB 802. Until such time the regulatory requirements of AB 802 are implemented, SoCalGas will prepare by engaging both internal and external experts in preparing systems, defining, testing, and validating models, and reviewing both existing studies and research additional approaches where necessary.

Metric Tracking and Measurement

Immediately upon implementation of the Business Plan, EM&V will be engaged in collecting data and measuring sector and implementation level metrics proposed in each chapter. SoCalGas EM&V suggests two types of analysis related to metrics. The first capitalizes on the objective of the metric as a quick indicator of programmatic success or direction, without the necessity of an evaluation study. This first type of analysis will use summary statistics of metrics to understand how the sector, program, and individual interventions are changing, operating, or succeeding over time.

Over time, SoCalGas will engage in testing the validation of the metrics themselves, whether they can be used as indicators of programmatic success; in other words, determining if the metrics are correlated to programmatic goals. This analysis requires significant savings and metrics data, thus the timeline will need to be determined at a future point. This analysis will likely be a regression, or simple correlation to test for effects between metrics and savings, or other goals. Where evaluators identify metrics that are correlated with goals, SoCalGas will continue to track these metrics. Where individual metrics lack statistically significant correlation, SoCalGas will terminate tracking these and determine new metrics.

Other Research and Analysis

In addition, to various SoCalGas-specific program process evaluations, several opportunities arise each year for the IOUs to participate in multi-client studies dealing with energy efficiency program issues. Multi-client studies (could involve several California IOUs and POUs or national studies, e.g., ACEEE studies) typically address a subject of broad, often strategic, interest within an industry or discipline. The costs of these studies are shared across multiple study subscribers enabling large, often very expensive research, to be acquired very cost-effectively. IOU-specific costs for these studies typically range from \$10,000 to \$50,000 which is a small fraction of the total study cost. These studies are a relatively low-cost option for gathering data. Typically regional or state-level breakdowns are available that are reasonably

representative of IOU service territories. At times, the regional or state-level data available through these multi-client studies are the only data available regarding certain subject areas. In many cases, over-sampling within a specific area can be provided for an additional nominal cost, so that the client can compare local results with national or regional results.

Additional important research and analysis projects may be identified during the program cycle that do not fit clearly into any of the categories of EM&V work described in previous sections. The IOUs propose that if the Energy Division and the IOUs concur on a need for a study, that this additional study could be undertaken with EM&V funds. Further, the IOUs recommend continuing the existing small project authority that permits IOUs to perform studies that cost no more than \$30,000 after advising Commission Staff via Basecamp.

EM&V Budget

SoCalGas' proposed EM&V budget is 4% of SoCalGas' energy efficiency portfolio budget, provided in the Executive Summary, Table 2. This budget is consistent with the 2015 adopted EM&V budget and SoCalGas' most recently filed 2017 Energy Efficiency Annual Budget Advice Letter 5023-A. This budget funds both SoCalGas' own EM&V staffing and activities, and would include M&V for high opportunity programs and projects, baseline reporting and analysis, Business Plan metric tracking and on-site equipment/facility surveys, measurement, and process evaluations; and Commission Staff-led EM&V work, which include impact evaluations, statewide potential and goal study, and reporting. The Commission has authorized the utilities to increase their share of the EM&V budget up to 40% once the business plans are approved, for additional purposes outlined in D.16-08-019 for evaluation priorities. SoCalGas will work collaboratively with Commission Staff, other PAs and stakeholders in developing the EM&V roadmap plans that will provide specific details on various EM&V activities, study plans, and budgets.

EM&V Studies

American Council for an Energy-Efficient Economy. (2013, March). Executive Summary, Overcoming Market Barriers and Using Market Forces to Advance Energy Efficiency. *American Council for an Energy-Efficient Economy*. Retrieved from <http://aceee.org/files/pdf/summary/e136-summary.pdf>

“While substantial progress has been made toward reducing the nation’s overall consumption of energy resources, much more can be done to take advantage of existing untapped efficiency potential and to save consumers money on their annual energy bills. This report has provided recommendations to overcome the barriers in the market for efficient technologies and programs that lead to underinvestment in energy efficiency. **Spanning all key economic sectors, the included policies target information barriers that may cause consumers to invest in inefficient technologies or not to invest in efficient ones, externalities that result from the undervaluation of energy savings and regulatory and financial barriers that prevent the spread of efficient technologies and efficiency programs.** These policies also use market forces to help drive future energy-efficiency savings.” pp. 10-11.

Arup, et al. (2012, December). *The Technical Feasibility of Zero Net Energy Buildings in California, CALMAC Study ID PGE0326.01*. Retrieved from http://www.calmac.org/publications/California_ZNE_Technical_Feasibility_Report_CALMAC_PGE0326.01.pdf

Abstract: This study is a forward-looking “stress test” of the Zero Net Energy (ZNE) new construction goals set forth by California’s Energy agencies. The California Public Utility Commission established ZNE new construction goals in its Long Term Energy Efficiency Strategic Plan (CPUC, 2008). The California Energy Commission’s 2011 integrated Energy Policy Report creates parallel Zero Net Energy new construction goals (CEC, 2011). This report refers to the CPUC and Energy Commission goals collectively as the “ZNE goals”. Those goals establish a 2020 target for all residential new construction to reach Zero Net Energy and a 2030 target for all commercial new construction to reach ZNE. This study assesses the potential performance of best-in-class building designs in 2020 for both residential and commercial structures. The analysis refined and simulated an integrated package of efficiency features and on-site renewable Energy systems that could move each of twelve prototype Buildings as close as is reasonably possible to ZNE. The study’s central finding is that ZNE Buildings will be technically feasible for much of California’s new construction market in 2020. Results: There are a few challenging building types and the dependency of ZNE on solar Energy will make many sites impractical; however, this research suggests that a wide portion of California’s new construction can move to Zero Net Energy by 2020 for homes and by 2030 for commercial Buildings. Moreover, with only a few exceptions, most of the technologies modeled in this study are available and being utilized today, demonstrating the applicability of this analysis to today’s new construction market. Recommendations: The design packages outlined in this study represent one potential approach to reach ZNE goals. This research identified certain systems and design strategies that are likely to create the big system

efficiency gains necessary to reach ZNE goals. Lastly, technologies and strategies that can be applied across a significant subset of the building volume will also show significant overall gains in moving the state toward its ZNE goals. These “universal” improvements include LED lighting efficiency, equipment integrated “auto-off” functions, PV panel efficiency improvements and PV panel optimizers. Research Priorities: Future policy-related cost effectiveness analyses could better address the ZNE goals by analyzing integrated packages of efficiency strategies, rather than the present methodology that often completes such analyses on a measure-by-measure basis. Accelerate whole building design incentives, focusing where possible on ZNE and near ZNE projects. Match “whole building” design incentives with ever-greater training efforts in the area of integrated design and construction. State Energy regulators and the investor Owned Utilities (IOUs) should continue to investigate creative ways to achieve the regulated Energy efficiency levels that the State needs to reach its ZNE goals without violating federal law. Future research should assess the variables that could impact PV sizing requirements for a ZNE building, such as ZNE metric choice and alternate valuation scenarios for electricity exports. (This assumes that PV is the primary on-site generation resource.) The level of distributed generation implicated by the State’s ZNE goals could have significant impacts on the electricity grid. Statewide research should seek to estimate those impacts.

Cadmus, Energy Services Division, & DNV GL. (2014, August). *Statewide Codes and Standards Program Impact Evaluation Report for Program Years 2010-2012, CALMAC Study ID CPU0070.03*. Retrieved from http://calmac.org/publications/CS_Evaluation_Report_FINAL_10052014-2.pdf

California Public Utilities Commission. (2011). *Energy Efficiency Strategic Plan, January 2011 Update*. Retrieved from <http://www.cpuc.ca.gov/general.aspx?id=4125>

“9.1 Vision

By 2020, California’s workforce is trained and fully engaged to provide the human capital necessary to achieve California’s economic energy efficiency and demand-side management potential.” p. 70

“9.5 Implementation Plan

Goal 1. Establish energy efficiency education and training at all levels of California’s educational system. **This Plan envisions that the IOUs will act as a catalyst to action by sponsoring several foundational activities that are necessary to accurately identify specific WE&T needs and recommendations for action. These activities will also enable the IOUs to review their existing programs and better align them within the context of a comprehensive WE&T strategy.”** p. 71

“WE&T Needs Assessment. An in-depth formal statewide training and education resource inventory and needs assessment is necessary for long-range strategic planning and delivery.

The needs assessment and resource inventory will be structured to produce short, near- and long-term workforce strategies to support each sector defined in the Plan. Information in the WE&T Convener Report provides an excellent start for the assessment. The assessment will be completed by a third-party with its process managed by the CPUC and IOUs, in collaboration with the California Department of Education.” p. 71

Cobblestone Applied Research & Evaluation, Inc. (2014, September). *Service learning transforming educational models in science, technology, engineering, and mathematics (STEM)2 year three evaluation final report*. Retrieved from <https://www.calstate.edu/cce/stem/documents/STEM-Year-Three-Evaluation-Final-Report.pdf>

“An analysis of the outcomes from each funded project reveals some collective outcomes to highlight.

- Increased Student Learning: All grantees that implemented a course during the grant period reported an increase in student engagement and learning.
- Increased Visibility: This opportunity allowed for more system-wide visibility and resulted in **additional collaborations. Some of these projects include: the Campus as a Living Lab for Sustainability initiative; a presentation at the CSU Board of Trustees’ Meeting; and meetings between the CSU Chancellor’s Office and investor-owned utilities about energy efficiency, education, and workforce development.**
- Resource Development: A variety of resources were developed as a result of this initiative. New syllabi and curriculum units were created (53) in addition to videos summarizing the grant activities.
- **New Partnerships: People who had not worked together in the past, despite their common goals for sustainability and energy efficiency, were now working together. The partnerships were very productive and enriching. All those who reported new partnerships also reported that they are planning to continue to partner in future years.**
- Challenges: The greatest challenge of all grantees revolved around the logistics of finding time for meetings. The most common resource to address that challenge was technology, both for meeting online and also for finding times when everyone could meet. Additionally, all grantees reported that the administration of the funds through the CSU Foundation was difficult to manage from their campus.” pp. 38-39.

DNV GL. (2016, April 1). *Impact Evaluation of 2013-14 HVAC3 Commercial Quality Maintenance Programs (HVAC3), CALMAC Study ID CPU0117*. Retrieved from http://www.calmac.org/publications/HVAC3ImpactReport_0401.pdf

Abstract: The California Public Utilities Commission (CPUC) engaged DNV GL to evaluate California investor owned utility (IOU) heating, ventilation, and air conditioning (HVAC) Maintenance program activity under the CPUC 2013-14 HVAC Research Roadmap. This study investigated the energy and demand Impacts of 2013-2014 IOU HVAC Maintenance Programs in California. The study focused on Commercial HVAC Maintenance and the Impact of five measures with the highest ex ante claimed savings across the IOU HVAC Maintenance Programs. The five measures included refrigerant charge adjustment (RCA), economizer repair, evaporator and condenser coil cleaning, thermostat adjustment, and supply fan control. This report estimates ex post gross savings. The study found that gross realization rates (ex post gross savings estimates over ex ante gross savings estimates) were generally low. The highest realization rates were for the SCE Commercial QM program. The high realization rate in this program is due to greater than expected installation frequency of the component Maintenance measures in the SCE program. In general, economizer repair gross kWh savings realization rates were 43% to 56% across the IOU Programs. The economizer realization rates found in this Evaluation, although low, are

actually much improved from the previous (2010-12 program year) Evaluation findings of 23%. Refrigerator adjustment charge gross kWh savings realization rates were low; 29% to 38% across IOU Programs. The primary reason for the low refrigerant charge adjustment (RCA) realization rate is an update to the underlying data used to calculate the savings. The ex post Evaluation used data recently collected in the laboratory under the HVAC Laboratory Testing (HVAC-5) study, where the ex ante estimates were based on older, now-outdated data. Similarly, the evaporator coil cleaning measure also had a low gross kWh savings realization rate of 9% in the SDG&E Programs while the condenser coil cleaning measure had a gross kWh savings realization rate of 69%. The ex post energy savings estimate was based on simulations, laboratory data collected under the HVAC-5 study, and field measurements, whereas the ex ante estimates were based on a deemed fraction of the DEER RCA measure savings. The AirCare Plus program had a surprisingly large realization rate for the coil cleaning measure. This was due to a previous reduction to ex ante savings claims by approximately 90% as directed by the CPUC Energy Division Disposition of the 2013-14 IOU HVAC Commercial Maintenance workpapers issued June 2013. The thermostat and supply fan measures analysis was not reported due to low sample size, high sample variability, and resulting low precision in the ex post savings estimate. Ex ante savings were passed through for these measures across all Programs. We further found that a majority of thermostats did not meet program setback requirements during unoccupied periods. In PG&E's Commercial QM program we found the program implementer-supplied data was inconsistent with the tracking claims. As next steps for this Evaluation, DNV GL will complete net to gross interviews and surveys, complete the net to gross analysis, and collect additional field data to increase sample sizes where current estimates remain uncertain.

DNV GL. (2014, January 28). *HVAC Impact Evaluation Final Report, WO32 HVAC Volume 1 Report, CALMAC Study ID CPU100.01*. Retrieved from http://calmac.org/publications/FINAL_HVAC_Impact_Evaluation_WO32_Report_28Jan2015_Volume1_Report.pdf

Abstract: The 2010-12 IOU energy efficiency program portfolios include a statewide program and various third-party programs targeting commercial and residential unitary HVAC systems. The impact measures for HVAC systems are categorized into three measure groups: Upstream Equipment Incentives, Quality Maintenance, and Quality Installation. Combined, the ex-ante savings for these program claims comprise approximately 177.2 GWh across IOU portfolios adopted for the 2010-12 cycle; and more importantly, they comprise 60.2 MW of claimed electric demand savings. This study is an impact evaluation of these programs and claims. These programs were developed for residential and small commercial facilities that use packaged and split-system air conditioning systems or heat pumps. The programs include a non-residential Upstream incentive program to HVAC distributors to encourage stocking high efficiency units, a continuation from 2004-05 and 2006-08 cycles. The evaluated net to gross for the Upstream incentive program was 0.80 based on interviews with participating distributors. Quality Maintenance (QM) and Quality Installation programs are also included. Both of these promote packages of measures designed to improve the efficiency of HVAC systems by correcting faults resulting from poor installation, wear and tear, and malfunction or damage, and/or by improving system control. The residential QM programs claimed insignificant savings and were not evaluated. Commercial QI packages are still being developed by the IOUs and no claims were made in 2010-12 programs. The evaluation team found that across all sampled units with pre/post monitoring, the gross savings per ton were negative for the statewide package of

measures. The results are from a limited sample and are considered indicative, but not definitive based on the calculated uncertainty in the measured savings. The variability in the per-unit savings was much larger than assumed by workpapers or in evaluation planning. These results indicate there is not a reliable average savings that can be deemed for the 2010-12 statewide package of measures. For economizers, the majority of units the team inspected that reported repairs were not found to be performing their primary function of changing damper position in response to temperature. The overall economizer install rate was estimated at 23% which assumed that due to the claimed three year EUL and timing of inspections, 20% of inspected units should have failed functional tests. Refrigerant charge was evaluated in the field by measuring ex-post diagnostic performance on 66 units where technicians made adjustments. The results of these tests were ultimately not used to assess installation rate as new information was produced in the laboratory on the uncertainty in the accuracy of indirect charge diagnostics. A 79% refrigerant charge install rate was developed by calculating the average achieved benefits across 10 units where charge was measured directly by evacuating and weighting the charge and comparing to factor charge amount. For residential QI the evaluation only modified the sizing, duct leakage, and airflow simulation inputs between ex ante and ex post results. The overall gross realization rates were 35% for electric energy savings and 38% for demand savings. These realization rates were driven by the better-than-assumed sizing and duct leakage for non-participant units, which set the baseline for savings.

DNV GL. (2014, October 31). *Whole House Retrofit Impact Evaluation, Evaluation of Energy Upgrade California Programs, Work Order 46, CALMAC Study ID CPU0093.01*. Retrieved from http://www.calmac.org/publications/CPUC_WO46_Final_Report.pdf

Abstract: This report is the impact evaluation of the 2010-2012 whole house retrofit Program (also known as, Energy Upgrade California - EUC) implemented by the California Investor Owned Utilities (IOUs). The scope of the evaluation included conducting billing analysis to determine gross savings and realization rates and surveys to support estimating program free-ridership. The program provided incentives for whole house retrofits through a set of prescriptive measures (Basic Path) and a custom set of measures (Advanced Path). Based on the billing analysis, the gross savings realizations were lower than anticipated by ex ante estimates. This is caused by a combination of factors that include (a) overestimation of savings in the retrofit planning (building modeling) phase, (b) indications of substantial rebound (take-back), and (c) program deployment in mild weather areas where building shell and HVAC measures are less likely to generate large energy savings. Based on the survey analysis, the majority of the participants scored as partial free-riders. The process evaluations and this impact evaluation provide recommendations to improve gross and net savings. Many of the recommendations require improved energy estimating tools or estimates calibrated to actual consumption. The programs could consider a scenario of improved savings after implementing tool calibration or improvement, targeted marketing to high users, targeted measures based on location (or more specifically the estimated weather-dependent load), and incentives per unit of energy saved. The normalized annual consumption from this evaluation can be used to review whether higher percent savings would then create substantial changes in program cost effectiveness. This program faced some challenge but is a work in progress and program changes will be implemented in 2015 and 2016.

DNV GL. (2015, June 1). *Study of Deemed HVAC Measures, Year 1 Report, HVAC Roadmap 4,*

CALMAC Study ID CPU0145.01. Retrieved from

<http://www.calmac.org/publications/HVAC-4 Year 1 Final Report 2015-06-01.pdf>

Abstract: This Study set out to advance the understanding of the uncertainty associated with ex ante energy savings in California by estimating the corresponding standard deviations for three key HVAC Measures. The Measures studied include three that are not being specifically studied by concurrent impact evaluations of HVAC programs: variable-speed motors (VSM) at residential furnaces, residential quality maintenance (QM) and blower motor replacements, and residential mini-split and variable refrigerant (VRF) systems. By using Monte Carlo simulations, workpaper methods, and data gathered through various studies, the uncertainties of the ex ante savings for a single building type within several climates were estimated for each measure. In addition, the input parameters that were the leading drivers of the uncertainty for the ex ante savings for each of the studied measure cases were determined and reported. For VSMS at residential furnace retrofits in three climate zones, this analysis was used to determine that the standard deviation (SD) of the annual electric savings ranged from 44% to 48% of the mean. The measure components that made the greatest contributions to the variance included: SFMs built prior to 1978 (66%), SFMs built between 1978-1992 (16%), and SFMs built between 1993-2001 (7%). For this analysis, the building vintage bins served as a proxy for many building characteristics. Much of the uncertainty can be traced back to the distribution of savings across the thermostat usage bins and the split between single- and multi-story homes. For residential QM and blower motor replacements in CZ03, the SD of the annual electric savings was a very surprising 970% of the mean; the SD of the peak demand savings was 162% of the mean. For systems with gas furnaces, the SD of the natural gas savings was a shocking 3,581% of the mean. The thermostat offset was the leading driver of annual electric savings uncertainty (83% to 95%), the peak demand savings uncertainty (56% to 66%), and annual natural gas uncertainty (67%). Other drivers included the building shell insulation and the refrigeration impact factor that is associated with air conditioning systems. For residential mini-split systems, only a literature review and data needs assessment was performed. This was in part due to the fact the literature review revealed that the rate at which the savings increase as a function of increasing the SEER of the unit was drawn from commercial data—a poorly defended assumption. Also, for ductless mini-splits, the energy savings were based upon those that would result from sealing ductwork, without any Study of the savings realized by eliminating the ductwork altogether. For VRF systems, the workpaper review showed that there are no known data to support the assumption that there is an equal split between ducted systems and ductless systems. The results of this Study can inform future evaluation designs by 1) making use of the resulting coefficients of variation, and 2) identifying which input parameters need further Study due to their influence on the savings uncertainty. As additional data become available through targeted studies they improve the accuracy of the probability distributions for the input parameters associated with each measure. This allows for a continuous improvement loop whereby the savings estimates and the uncertainty analyses are updated as new data become available.

DNV GL. (2016, January 14). *A White paper: Residential Portfolio Impacts from Whole-Premise Metering, Thought Experiments in Random Assignment and Top-Down Modeling*, CALMAC Study ID SDG0295.02. Retrieved from <http://www.calmac.org/publications/Res Portfolio Impacts White Paper %28Final%29 DNVGL 1-22-2016 .pdf>

DNV GL. (2016, February 29). *2013-2014 Residential Roadmap Multifamily Focused Impact Evaluation, CALMAC Study ID CPU0119.01*. Retrieved from http://www.calmac.org/publications/IOU_MF_Impact_Report_Final_022916.pdf

Abstract: The MFEER program is a statewide core program that serves Multifamily properties throughout the state. In the 2013–2014 program cycle, all four IOUs implemented and claimed savings for this prescriptive rebate program. The MFEER programs rebated more than 500,000 measures during the 2013–2014 program cycle. The SCE program redeemed the largest share of rebates, with more than 300,000 measures incented, followed by PG&E, SDG&E, and SoCalGas. For electric measures, lighting dominated the ex ante energy savings, representing 84% for PG&E, 83% for SCE, and 100% for SDG&E. For gas measures, large domestic hot water (DHW) measures, such as storage water heaters, contributed the most ex ante savings for PG&E and SoCalGas (71% and 94%, respectively). Small DHW measures, such as faucet aerators and low-flow showerheads, contributed the most to the SDG&E gas ex ante savings (59%). As a new addition to the 2013–2014 program cycle, the four IOUs and two Regional Energy Networks (RENs) implemented MF-WB, a whole building program in the Multifamily sector. The MF-WB program is intended to assist property owners who wish to engage in larger retrofit projects. Program savings are calculated through EnergyPro building simulation modeling software. PG&E and SDG&E claimed savings for 11 MF-WB projects in 2013 and 2014, while the RENs claimed savings for 97 projects during the same period. The MFEER program savings far outweighed those from the MF-WB programs: the MF-WB programs represented only 2% of the Multifamily programs electric and gas savings.

DNV GL. (2016, April 1). *Impact Evaluation of 2013-14 Upstream HVAC Programs (HVAC1), CALMAC Study ID CPU0116*. Retrieved from http://www.calmac.org/publications/HVAC1ImpactReportFinal_040116.pdf

Abstract: The 2013-14 IOU energy efficiency program portfolios included an upstream rebate program for non-residential (commercial) HVAC equipment. Specifically, the rebate programs are known as PG&E Commercial HVAC, SCE Commercial HVAC, and SDG&E Deemed Incentives–Commercial HVAC. These programs sought to encourage HVAC distributors to stock and sell the most efficient HVAC units available on the market. Qualifying HVAC system types included chillers, unitary systems, and mini-splits. The ex-ante savings claims for these upstream HVAC programs totaled 118.2 GWh of energy savings and 19.9 MW of demand savings across the IOU portfolios for the 2013-14 cycle. This impact evaluation determined the gross savings of the rebated upstream HVAC measures for the three programs. The evaluation found the overall energy savings (GWh) gross realization rate for chillers across all programs and chiller system types was 47%. There are two types of qualifying chillers in the programs; air-cooled and water-cooled. There have been no significant DEER updates since 2008 ex ante values were developed. Air-cooled chillers accounted for 64% of energy savings claims and had a very low energy savings realization rate of 18%. The differences between the ex-ante and evaluated gross savings (ex post) are due to ex ante values that appear to not agree with the workpapers or underlying DEER models. After further investigation, we found that the air-cooled chiller energy savings estimates developed in workpapers were much higher than are feasible, representing approximately 85% of the cooling end use energy usage estimate from the DEER prototypes. In contrast, the ex post savings were about 10% of the cooling end use energy usage. Water-cooled chillers energy savings realization rate was much higher at 98%. The evaluation found that the

demand savings (MW) realization rates for chillers was higher than the energy savings. The overall demand savings realization rate for chillers across all programs and chiller system types is 129%. The evaluation found the overall energy savings (GWh) realization rate for unitary systems across all programs and unitary system types to be 71%. Large and small unitary systems were evaluated separately. Large systems (systems with greater than 63.3 ton cooling capacity) had a low energy gross savings realization rate of 17% and small systems had a high realization rate of 130%. Similar to the results for air-cooled chillers, the ex ante claimed savings for the largest size, greater than 63.3 tons group appeared to be unrealistically high, representing approximately 70% of the baseline cooling consumption in the prototype models. The DEER savings are more realistic for units between 20 and 63 tons, but some of the units surveyed only met baseline efficiency levels, driving down the realization rate. The demand savings realization rate for unitary systems was 129%. Due to the small volume of claims across the three programs, mini split systems received a pass-through for this evaluation. The ex-ante energy and demand savings estimates will be used for the final savings estimates for the mini-split measures. As next steps for this evaluation, DNV GL will complete net to gross interviews and surveys, and will collect additional field data to increase sample sizes where current estimates remain uncertain.

DNV GL. (2016, April 19). *Codes and Standards Compliance Improvement Program Years 2013-14 Process Evaluation Final Report, CALMAC Study ID CPU0129*. Retrieved from http://calmac.org/publications/ComplianceImprovementImpactEvaluationDraftReport_FINAL-OUT.pdf

DNV GL. (2016, May 3). *Focused Impact Evaluation of the 2013-2014 Home Upgrade Program, CALMAC Study ID CPU0118.01*. Retrieved from http://www.calmac.org/publications/CPUC_HUP_Focused_Evaluation-FINAL_05-03-16atr.pdf

Abstract: The study identifies the energy savings reported by six Program Administrators for Homes that participated in Home Upgrade, measures the actual energy savings and compares these savings values by calculating a realization rate. A realization rate of 100% indicates the reported savings and the measured savings are equal. The study approach consisted of a billing analysis to estimate electric and gas savings, and compare these to the savings reported by Program administrators. For this analysis, we used 60-minute interval meter data to estimate electric savings and monthly gas meter data to estimate gas savings. Results: At the statewide level, our realization rates were 11% of reported kW savings, 44% of reported kWh, and 123% of reported therms. With the exception of PG&E (158%), the realization rates for electric savings were relatively low. For gas, these rates were relatively higher and ranged from 49% for SDG&E to 185% for PG&E. Statewide, we found annual electric energy savings (kWh) averaging 3.1%. Two climate zones showed annual household savings of 5% or more. In descending order from greatest to least savings, these climate zones were 16 and 11. We also found annual gas savings averaging 29.3%. Three climate zones showed annual household savings of 30% or more. In descending order from greatest to least savings, these climate zones were 3, 4, and 9. Finally, we estimated a reduction in demand (kW) of 7.4% between 3pm and 5pm during the hottest days of the year (August and September)

DNV KEMA Energy and Sustainability. (2014, January 14). *Evaluability Assessment of the Statewide Energy Efficiency Collaborative and PG&E's Green Climate Action Planning Programs*, CALMAC Study ID PGE0333.01. Retrieved from <http://www.calmac.org/publications/SEECFINALEVALASSESSMENT.pdf>

Econorthwest. (2010, December 6). *Process Evaluation of the PG&E, SCE, SDG&E and SCG Water Pilot Programs*, CALMAC Study ID SCE0294.01. Retrieved from http://www.calmac.org/publications/FINAL_Water_Pilots_Process_Rpt_12-6-10_wStudy_ID.pdf

Abstract: The CA IOUs were directed by the CPUC to "explore the potential for future Programs to capture Water-related embedded energy savings. PG&E conducted three Pilot studies: 1) PG&E Large Commercial Customers, 2) PG&E Low Income High Efficiency Toilets, 3) PG&E Emerging Technologies. SCE conducted three Pilot studies: 1) SCE Low Income High Efficiency Toilets, 2) SCE Express Water Efficiency, 3) SCE Leak Detection. SDG&E conducted three Pilots 1) SDG&E Managed Landscapes, 2) SDG&E Recycled Water Retrofits, and 3) SDG&E Large Customer Audits. SCG conducted a Gas Pump Testing Pilot program. The delayed approval, in conjunction with the economic downturn and drought conditions, negatively impacted almost all of the Pilots, as the compressed schedule gave little leeway for IOU staff turnover, recruitment challenges, competing Water agency priorities, projects planning and installations, and M&V activities. Collecting Water and energy data from the Water agencies to estimate embedded energy savings was very challenging. Despite the challenges that many of the Programs experienced, there was generally high satisfaction among the participating Water agencies, contractors, and customers. Water agency customers highly valued the energy savings incentives, capital projects funding and other services (e.g., comprehensive Water audits) provided by the IOUs, and the Water agencies were pleased to serve their customers better and forge stronger relationships with IOU staff. Program contractors were able to learn more about available Water conservation incentives, increase their revenues, and strengthen ties with existing and new clients, and IOU program managers. Recommendations were made by the evaluators on how to improve future joint Programs between Water and energy agencies.

Emerging Technologies Coordinating Council. (2016). *Dimensions of energy behavior: Psychometric testing of scales for assessing behavioral interventions in demand side management programs*. Retrieved from <http://www.etcc-ca.com/reports/dimensions-energy-behavior-psychometric-testing-scales-assessing-behavioral-interventions>

EMI Consulting and Tetra Tech. (2016, October 17). *Energy Upgrade California, Home Upgrade Program Process Evaluation 2014-2015*, CALMAC Study ID PGE0389.01. Retrieved from http://www.calmac.org/publications/EUC_Home_Upgrade_Process_Evaluation_Report_Draft_2016.08.24_CLEAN.pdf

Abstract: The Energy Upgrade California – Home Upgrade Program (Home upgrade program) is a single-family residential energy efficiency program operated by PG&E, SCE, SCG, and SDG&E. This report provides the results of the process evaluation of the Home upgrade Program conducted by EMI Consulting and Tetra Tech, an independent team of evaluators. This

evaluation focuses on the programs run by PG&E, SCG, SCE, and SDG&E. SCE and SCG implement their programs together in the areas where their service territories overlap; PG&E and SCG also implement their programs together in areas where their service territories overlap. SCG also independently implements a program elsewhere in its service territory. The IOUs coordinate to ensure key processes are consistent across the state. The Home upgrade Program is a residential retrofit program targeted at improving the energy efficiency of existing, single-family homes. The program offers incentives to residential customers to encourage comprehensive energy efficiency upgrades at the whole house level. Program participation is primarily contractor-driven; contractors conduct the majority of the marketing activities on behalf of the program. Homeowners have two options for participation: Home upgrade and Advanced Home upgrade. The following overarching questions guided research efforts for this evaluation:

- What opportunities exist for streamlining the operational aspects of the program?
- What components are most successful at engaging contractors with the program?
- What marketing messages are most effective at engaging potential participants?
- What aspects of the current training and mentoring opportunities are most effective in terms of increasing participation and improving the quality of installation?
- What is the effectiveness of recent program changes (e.g., increased incentives, increased focus on contractor mentoring)?

The key evaluation findings included:

1. Across IOUs, participants are very satisfied with the Home Upgrade program.
2. The program has improved on many of the issues identified in previous evaluations.
3. Saving money and improving comfort continue to be the primary motivations for completing Home upgrade projects. High project costs were the primary barriers among near-participants, particularly among lower income brackets.
4. Opportunities exist to improve statewide coordination.
5. Opportunities exist to improve the support offered to contractors, particularly in terms of marketing and mentorship.
6. Non-participating contractors do not see energy efficiency as cost-effective and misunderstand program participation requirements.
7. Contractors are an effective method for driving program participation and energy efficiency improvements.
8. More participants are relying on financing options to complete Home Upgrade projects.

Energy & Resource Solutions. (2012, July 2). *Nonresidential Program Assessments: Third-Party Industrial and Agricultural Program Group, Public Draft Report*. Retrieved from <http://www.energydataweb.com/cpucFiles/pdaDocs/859/3P%20Ag%20&%20Industrial%20Draft%20Report.pdf>

Eto, J., Prah, R., & Schlegel, J. (1996, July). A scoping study on energy efficiency market transformation by California utility DSM programs. *Energy & Environment Division, Earnest Orlando Lawrence Berkeley National Laboratory, University of Berkeley*. Retrieved from http://eaei.lbl.gov/sites/all/files/lbnl_-_39058.pdf

“A market effect is a [permanent] change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficiency

products, services, or practices and is causally related to market interventions [i.e. program or government].” p. xii

Evergreen Economics & Willems, P. (2015, August). *Study of the California Utility Internal Measure Development Process, CALMAC Study ID SCE0380.01*. Retrieved from http://www.calmac.org/publications/SCE_Final_UIMD_Report.pdf

Abstract: This Study documents how the four California IOUs and two publicly owned utilities - the Sacramento Municipal Utility District (SMUD) and the Los Angeles Department of Water and Power (LADWP) - develop and approve new energy efficiency and demand response Measures. This is the first Study of the California IOUs that documents the full Utility Internal Measure Development (UIMD) Process – from idea generation to program integration - and is particularly timely since some utilities have recently implemented new Processes that can be studied over time. Key research objectives included: documenting the information sources the utilities use to identify prospective new Measures, describing the Processes and data requirements for developing Measures, and identifying particularly useful/effective information sources and Processes. The research findings were developed from a combination of Utility documents reviews and in-depth interviews with staff that help to develop new Measures (e.g., Emerging Technologies, new products teams, program managers, engineers). Some of the key findings include: 1) the utilities are utilizing a broad range of information sources to find potential new Measures (e.g., academic institutions, peer utilities, industry organizations and publications, manufacturers and governmental organizations). 2) the Emerging Technologies Program (ETP) plays an important role in developing information about potential new Measures, however many other Utility staff are involved in Measure Development and approvals (e.g., engineering, product/technology managers, program managers, Utility executive staff, marketing, strategy and compliance, Processing operations). 3) ETP staff do not independently decide whether a technology is ultimately adopted into the IOU portfolio; rather, a range of IOU staff (using a variety of scoring tools) contributes to a collective final decision whether or not to approve and adopt technologies. 4) Measure Development is not a linear Process. Depending on factors such as the stage of technology maturity and the availability of external information about a technology, ETP may or may not play a role in Measure Development. 5) the utilities are collectively considering a wide range of quantitative and qualitative factors in their Measure adoption decisions.

“A unique feature of SMUD's process is the discrete Technology Introduction Support stage, which has its own budget separate from Research & Development activities and the mainstream rebate programs. This allows SMUD to offer higher incentives for emerging technologies in a pilot incubator program so they gain a foothold in the market, while working with manufacturers to reduce costs, plan capital improvements, improve production capability and develop a marketing strategy. When measures are ultimately introduced into new programs, they do not need to break even for five years (and sometimes later).” PP. 5-6.

Heschong Mahone Group. (2013, July 1). *Lessons Learned through Piloting Energy Upgrade California Multifamily Programs, CALMAC Study ID SDG0271.01*. Retrieved from http://www.calmac.org/publications/Lessons_Learned_Energy_Upgrade_California%99_Multifamily_2013-10-30_%282%29.pdf

Abstract: This report summarizes lessons learned that culminated not only from implementing SDG&E's Energy Upgrade California - Multifamily Pilot, but also represents common themes encountered during the implementation of 11 similar programs over the course of 12 years. It provides an overview of program participation, and summarizes the successes and challenges of SDG&E's program, from an implementer perspective, with hope to influence the development of emerging multifamily whole building programs in California. There is a large opportunity and interest among building owners/asset managers to benchmark multifamily buildings, and measure actual energy savings. The following are the lessons learned:

- For the purpose of providing more useful information to multifamily building owners/managers, building simulation tools developed for California home asset rating should be further developed with the ability to calibrate to actual utility usage and report operational use in addition to an asset rating.
- Longer program timeframes are needed to track post-retrofit energy usage.
- The challenge of collecting tenant-paid utility data is great, but may be overcome if utilities are obligated to release of aggregate data, using the 15/15 data aggregation rule.
- More data is needed of asset and operational energy use of multifamily buildings.

Heschong Mahone Group, & TetraTech. (2012, March 29). *Nonresidential Process Evaluation Study: Main Report, CALMAC Study ID SCG0213.01*. Retrieved from [http://www.calmac.org/publications/SCG NR Process Eval Final Report - Main Report.pdf](http://www.calmac.org/publications/SCG_NR_Process_Eval_Final_Report_-_Main_Report.pdf)

Abstract: On behalf of Southern California Gas Company (SoCalGas), Heschong Mahone Group, Inc. (HMG) led a team of five other firms (Energy Markets Innovation, Evergreen Economics, Navigant Consulting, Research into Action, Tetra Tech) to evaluate 6 nonresidential programs and 5 portfolio level issues, and provide recommendations. Data collection activities included interviewing 39 SoCalGas staff, ~ 12 vendors, and others (third-party implementers); and surveying 401 participating and nonparticipating customers. We structured the report based on intended audiences. This Main Report is intended for all interested stakeholders: all SoCalGas staff, the CPUC, 3P implementers, vendors, and others. It includes: 1. Executive Summary of issues and recommendations; 2. Methodology Overview; 3. Best Practices summary (detailed for each program in Attachment 2); 4. Regulatory and Statewide Initiative evaluation (included here, because this Main Report's intended audience includes the CPUC). Other volumes (not included in this file) are: Attachment 1 - Portfolio-level evaluations (except for Regulatory), Attachment 2 - Program-specific evaluations, Attachment 3 -Data Collection Resources, Attachment 4 -Evaluability Assessment and Work Plan. We evaluated the following portfolio-level issues and provide example recommendations here: Organizational: Develop responsibility matrix (RACI charts) and program resource inventories to clarify roles and responsibilities and reduce vulnerability to staff turnover, reconsider restrictive legal interpretations. IT: Continue transition from customized to standard CRM, develop online applications, reduce duplicative data entry (customer, IOU staff), develop application tracking status. Regulatory: Discuss with CPUC pilot testing new requirements, improve understanding of rationale for CPUC requirements (and CPUC: improve understanding of impact of requirements on SoCalGas program staff). Marketing: Create comprehensive marketing plan across departments, track customer email in main databases, ensure staff consistently and accurately enter key database fields, broaden vendor outreach, prioritize keeping program websites up-to-

date. 3P Program Effectiveness: Increase AE and 3P implementer collaboration, relax co-branding policies, include 3P program content on SoCalGas website. We evaluated the following 6 programs, and overall, customers were satisfied with programs. Example recommendations include: Deemed (EERB): Create incentives for service technicians to promote program, hire additional staff for vendor outreach, integrate 3Ps to recruit large retailers. Calculated (EEBI): Provide vendor participation process and create vendor database, create case studies, cross market OBF. Local Nonresidential Bid: Reduce savings threshold for ET projects, provide vendor participation process, formalize mechanisms for inter-agency collaboration. Nonres Audits: Tie AE incentives to audit conversion rate, devote SoCalGas staff or 3P to program delivery, set timeline for audit follow up. Program for Resource Efficiency in Schools (PREPS): Support 3P with updated list of AEs, increase 3P-AE collaboration. SaveGas: Reduce savings goals, create case studies, require implementer to notify AEs before customer contacts and ask AEs to follow up.

ICF International. (2016, March 31). *Draft final report workforce education and training inclusive consultant.*

“The Energy Specialist/Program Representative/Residential Outreach Specialist and Inspector jobs did not map to any existing classifications. The job descriptions for these two positions developed for this effort provide a strong starting point for the development of new classifications, include an overview of the job, the required tasks, and KSAOs to successfully perform the job.” p. 22.

“Based upon the results of the classification evaluation, a new trade classification may or may not need to be developed for the Energy Specialist/Program Representative/Residential Outreach Specialist and Inspector ESA program field worker positions. **If a match for these positions is desired, the next steps should include:**

- **A review of the feasibility of developing a new classification.**
- **Identification of the stakeholders who need to be engaged in the process.**
- **Anticipation of timing requirements throughout the development period.**
- **Assessment of the likelihood of obtaining necessary stakeholder support.**
- **Interviews and observations to gather additional data on the jobs.”** p. 24.

“The ICF Team has presented four career pathways comprised of five occupations: an entry-level occupation (“Construction Laborer”) that requires minimal preparation and four skilled trades that require higher levels of training and certifications. The IOU WE&T centers currently provide training to infuse energy efficiency education into all four of these skilled trades to varying degrees.⁴⁵⁴ **Selecting these four career pathways for IOU support will require minimal strategic adjustment in terms of IOU WE&T curriculum.**

The career pathways selected have an impact on residential, commercial, and industrial energy efficiency. The ICF Team added entry-level jobs related to occupations in the Lawrence Berkeley

⁴⁵⁴ Validated through a review of IOU training offerings at PG&E Energy Centers, Retrieved from https://www.pge.com/en_US/residential/in-your-community/education-programs/energy-centers/energy-centers.page, SCE Energy Education Centers, Retrieved from <https://www.sce.com/wps/portal/home/business/consulting-services/energy-education-centers>, SDG&E Energy Innovation Center, Retrieved from <http://www.sdge.com/business/learn-and-save>, and SCG Energy Resource Center, Retrieved from <https://www.socalgas.com/for-your-business/education-and-training/energy-resource-center>.

Labs taxonomy to identify opportunities for new job market entrants, and then filtered the taxonomy to consider only O*NET Job Zone 2 or 3 occupations, i.e., those that are suitable for entry- to mid-level career occupations. All occupations fell within the top 6 by projected job openings statewide, further validated by analysis of current job postings.

Each of the career pathways selected have growth potential in terms of job demand and wage advancement. Median wages for recommended pathway occupations compared favorably with the statewide median wage for all (not just energy-related) occupations. Mean advertised salaries were mostly higher than statewide median wages for these occupations, 25% higher in the case of Construction Laborers.

Furthermore, all career pathways have training resources for disadvantaged workers to pursue for higher skilled occupations once employed in the field. An inventory of the California Community College system courses related to these occupations demonstrated ample availability of publicly funded training in most regions for all selected occupations. The Energy, Construction, and Utilities Sector⁴⁵⁵ of the Doing What Matters program in the California Community Colleges Chancellor's Office funds a team to align the educational programs of the Community Colleges with industry needs. The ICF Team recommends this Sector Team as a valuable resource for any engagement between the IOUs and Community College faculty." pp. 35-36.

"A common issue with training programs targeting disadvantaged workers is sustainability, both in terms of participant demand and financing. Since the programs exist to serve disadvantaged worker, a program will not be successful unless it has a steady source of participants. Marketing, recruiting, and worker demand are all important to the success of these training programs. The lack of money to sustain the costs of a training program has also been a problem for both local workforce development boards and community-based organizations. Federal, State, and Foundation grants have been used to build and operate occupational training programs, but grants are not sustainable and too often the training program disappears when the grant expires. Community-based organizations, which are non-profits, obtain their funding through donations, sponsors, and grants, all of which may not be consistently provided to the organization over time as we had a number or program identified a couple of years ago are now defunct." p. 43.

"The ICF Team developed two methodologies the IOUs can use to assess inclusion implementers' program alignment with the goals and priorities of the IOU. Both methodologies have limitations and need additional discussion on the indicators or metrics. A stated theory of change will assist in ensuring any inclusion implementer is aligned with the IOU WE&T's priorities." p. 44.

Illume Advising. (2016, July 20). *SoCalGas Cold Water Default Clothes Washer Process Evaluation, CALMAC Study ID SCG0217.01*. Retrieved from http://www.calmac.org/publications/SoCalGas_CWDCW_Process_Evaluation_Final_Report_07-20-2016.pdf

Abstract: This report summarizes the results of the Southern California Gas Cold Water Default Cold Washer (CWDCW) process evaluation. The CWDCW is a new measure offering through

⁴⁵⁵ California Community College Chancellor's Office. *Energy Construction and Utilities Sector Strategy*. Retrieved from <http://ecusectordwm.com>

SCG's Plug Load and Appliance (PLA) program. Customers who purchase a program-qualifying clothes washer receive a \$200 rebate for one specific machine, the Whirlpool Model WTW4715EW. This initiative targets vertical axis clothes washers in the \$376-\$475 price range, which is significantly lower than ENERGY STAR® washers. The Whirlpool machine was designed to appeal to mid-market shoppers, specifically moderate-income customers (e.g., low income above the Energy Savings Assistance (ESA) threshold, and middle income) who may not be able or willing to purchase an ENERGY STAR® washer. The wash cycle settings are what most distinguish the machine from other vertical axis models. Five of the six wash cycle settings use only cold water, including the "Normal" setting. In 2015, SCG partnered with five local retailers to promote the rebate. All stores market the rebate through point of purchase materials and sales associates. SCG hired a subcontractor to train retailers on the technology and how to educate customers on the machine's features and rebate. The evaluation methodology included a combination of primary data collection and secondary analysis with participant and non-participant customers, including: online marketplace review and analysis; mystery shopping at participating retailers; formative participant interviews and quantitative surveys; nonparticipant surveys of prospective and recent clothes washer purchasers, and; interviews with the participating manufacturer and retailers. SCG worked closely with manufacturers, including Whirlpool, to bring a cold water clothes washer to market. CWDCW uptake has been slower than anticipated. There are a number of reasons why uptake may have been slower than expected, including (a) difficulty gaining floor space with the larger big-box retailers, (b) limited in-store promotion of the washer by some participating retailers (indicative of additional training and support needs), and (c) limited education and awareness activities to kick off the product launch. Additionally, we found some inconsistency in how retailers communicated information about the machine to customers. Customers that purchase the washer are generally satisfied, and view the machine as being both energy and water efficient. Customer confusion about water efficiency is noteworthy because, although the washer meets federal water use standards, it does not save water compared with other washers on the market. This study found mixed results on the influence of the rebate on sales, indicating that more time on the market and more research is needed to understand market uptake. The majority of customers reported that price was a very important factor in their purchase, although some said they would have purchased without a rebate. Retailers thought the rebate was important in influencing purchase and would continue to be influential, even if offered at a slightly lower level.

Itron, Inc. (2015, July 17). *2013 Custom Impact Evaluation: Industrial, Agricultural, and Large Commercial*, CALMAC Study ID CPU0107.01. Retrieved from http://www.calmac.org/publications/IALC_2013_Report_Final_071715.pdf

Abstract: This report presents impact evaluation results from California's energy efficiency programs, focusing on nonresidential custom measures. This evaluation addresses program year (PY) 2013 claims falling under the administration of PG&E, SCE, SCG and SDG&E. The custom programs evaluated include an array of projects and measures that received custom incentives via more than 100 utility programs. The custom impact evaluation was conducted under the Industrial, Agricultural and Large Commercial (IALC) Roadmap, which is part of the Joint CPUC/IOU Energy Efficiency Evaluation Plan, and addresses a wide range of nonresidential facilities, including commercial, institutional, agricultural and industrial applications. The evaluation addresses nonresidential custom measure claims of all types with three exceptions: custom lighting measures and whole building new construction projects, which are the subject

of separate evaluation reports, and pump test claims. The key objectives of the study included the development of independent estimates of gross and net savings, and the reporting of findings and recommendations to improve program implementation and cost effectiveness. The evaluation includes an innovative element -- Project Practices Assessment (PPA) -- which addresses project conformance with regulatory policy and guidance and program rules, with an emphasis on ex-ante gross savings development and methods. The custom evaluation included 189 gross impact M&V points and 146 net impact points. Resulting gross lifecycle realization rates range from 0.44 to 0.63 for energy saving estimates and from 0.44 to 0.76 for summer demand (kW) estimates. Net to gross ratio (NTGR) results range from 0.55 to 0.66. A combination of the PPA analysis and a discrepancy factor analysis revealed several key issues with ex-ante savings claims: 1) Inappropriate baseline specification or improper screening of ineligible measures led to 31 out of 189 sampled points having gross realization rates of zero or lower; 2) Inaccurate ex-ante reporting of operating conditions and the use of alternative ex-post calculation methods also had large negative impacts on evaluated savings; 3) Inadequate documentation and reporting of project EUL was a key factor in driving down lifecycle gross realization rates. The evaluation also quantified the occurrence of factors responsible for low NTGRs. Common themes related to free ridership were that project adoption was often related to corporate policy or regulatory compliance, non-energy benefits, or decisions to implement energy efficiency improvements prior to program application. Stakeholders can use the findings of this evaluation to concentrate on key issues and factors that, if successfully addressed, can improve project gross and net savings estimation and better align claimed and evaluated savings.

Itron, Inc. (2016, July 8). *Comprehensiveness Analysis Report, Phase I, CALMAC Study ID CPU0146.01*. Retrieved from http://www.calmac.org/publications/Comprehensiveness_Analysis_Report_-_Phase_I.pdf

Abstract: The research effort described in this Report is a foray into developing a program effectiveness metric for all non-residential resource programs in California called the Depth of Retrofit – Cost-effectiveness (DORCE) metric. Based on data from 163 non-residential resource programs from 2010-2014, this metric directly combines cost-effectiveness indicators of program performance with depth of savings indicators into a single metric. In doing so, the metric serves as a quantitative indicator of how deeply a given program achieves savings with its participants as well as how cost-effectively it achieves those savings. The purpose of the study is to provide an indicator of program performance that is more aligned than existing quantitative metrics with the state's energy efficiency goals, including the goals outlined in Executive Order B-30-15 for doubling the efficiency savings from existing buildings. Existing cost-effectiveness tests such as the Total Resource Cost test (TRC) provide important feedback about the balance of program benefits and costs. However, they don't provide quantitative insight into the depth of energy demand and usage reduction for the average participant in a program and they are vulnerable to "cream skimming", or rewarding programs that focus on mass delivery and promotion of individual measures rather than reaching deeply across energy end uses for participating customers. Using multivariate regression techniques, we illustrate the degree to which various elements of a program's design, such as its target sector or distribution of customer sizes, correlate with high or low DORCE scores across the IOU nonresidential portfolio, as well as with high or low scores separately for the depth of retrofit (DOR) portion of the score

and the cost effectiveness (CE) portion. The DORCE score and associated Analysis represent a powerful set of tools for evaluating program and portfolio performance and for guiding program and portfolio design on a forward-looking basis for California, as well as regions outside of California that may lack the rich programming and history needed to perform this kind of Analysis. Key findings from this study include:

- Tradeoffs are not always necessary between depth of retrofit and cost-effectiveness, as it is only minimally observable that success in depth of retrofit sometimes corresponds with decreases in cost-effectiveness.
- On balance, focus on very small customers yields higher DORCE returns than focusing on large customers.
- A relatively high proportion of total program cost toward incentives and, conversely, a low proportion of total program costs toward marketing and outreach correspond with better cost-effectiveness outcomes, without a notable overall impact on depth of retrofit outcomes.
- Colleges, offices, and food/liquor stores stand out as building types with high returns on cost-effective, deep savings, while restaurants and public assembly building types give the lowest returns.
- Approximately equal numbers of programs achieve high effectiveness scores (top 20%) via three pathways: Notably high scores on both depth of retrofit and cost-effectiveness; exceptionally strong cost-effectiveness with reasonable depth of retrofit; and exceptionally strong depth of retrofit with reasonable cost-effectiveness
- Some particular programs significantly outperform peer programs of similar design as shown by high positive residuals in the regression models.

Itron, Inc. and KEMA, Inc. (2008, May 12). *California Energy Efficiency Potential Study*. Retrieved from www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5300

Lincus Inc. (2015, February 24). *EnergyStar® Gas-Fired Fryer Field Evaluation Study, ETP Project ID# ET13SCG0002*. Retrieved from <http://www.etcc-ca.com/reports/energy-star-gas-fired-fryers-field-evaluation-report?dl=1483479751>.

KEMA, Inc., The Cadmus Group, Inc., Itron, Inc., Nexus Market Research, Inc., & ENRG, Inc. (2010, April 9). *Codes & Standards (C&S) Programs Impact Evaluation California Investor Owned Utilities' Codes and Standards Program Evaluation for Program Years 2006-2008, CALMAC Study ID CPU0051.01*. Retrieved from http://www.calmac.org/publications/Codes_Standards_Vol_III_FinalEvaluationReportUpdated_04122010.pdf

Navigant Consulting, Inc. (2013, May 6). *Market Characterization Report, For 2010-2012 Statewide Agricultural Energy Efficiency Potential and Market Characterization Study, CALMAC Study ID PGE0328.01*. Retrieved from http://www.calmac.org/publications/CA_Ag_Mrkt_Characterization_Final_5-13-13.pdf

Abstract: This Market Characterization involved telephone and face-to-face interviews with agricultural subject-matter experts, growers, dairymen, greenhouse/processing managers, and trade associations. The survey content was tailored to the respondent,

but generally sought to gain insight into the sector's Energy use, attitudes, EE awareness and behavior, as well as water and waste management.

Navigant Consulting, Inc. (2015, February 9). *Measure, Application, Segment, Industry (MASI): Chain Operations CALMAC Study ID SCE0377.04*. Retrieved from http://www.calmac.org/publications/MASI_Chain_Operations_Final_Report.pdf

Abstract: Introduction Navigant Consulting, Inc. (Navigant) undertook this Measure, Application, Segment, Industry (MASI) study from the California investor-owned utilities with the purpose of understanding the process that chain operations undertake when deciding whether to implement energy efficiency measures. For the purposes of this study, a chain operation is a business with multiple, customer-facing store locations that operate under a centralized decision-making structure, which includes decisions on energy efficiency measures that require capital expenditure. First, Navigant conducted secondary research to determine high-potential chain operations sectors, and used that to focus the scope of the study. Next, Navigant conducted primary interviews with utility account managers and executives who work with chain operations; third-party implementers of programs that serve chain businesses; and corporate decision makers such as energy, sustainability or operations managers at chain accounts. In all, Navigant conducted 15 interviews. Early on in the process, Navigant found that hotels/lodging were not truly representative of the nature of a chain operation due to the highly localized management structure of hotel locations, and thus did not consider it further in the study after understanding its decision-making process. Findings and Recommendations From these interviews with utility account representatives, third-party program implementers, and corporate energy managers, Navigant developed a set of recommendations for improving energy efficiency in chain operations, which are summarized below:

- » Synchronize the rebate application process with corporate timelines: We recommend that utilities develop prescriptive rebates earlier in the year to align with chain operations' budgeting process for capital projects.
- » Explore simplifying the pre-inspection process: We recommend that utilities further investigate the possibility of taking advantage of the fact that establishments within a chain are similar or identical, and develop a simplified pre-inspection process for custom projects based on a sample of establishments within California.
- » Continue long-term relationships between chains and account executives and between chains and third-party program managers: We recommend that California utilities, as well as third-party implementers of utility programs, continue to be proactive and responsive in their communications with chain operations. In general, chain customers consistently saw the relationships with account managers as a bright spot.
- » Better understand effects of upstream rebates and communicate their purpose: We recommend that utilities conduct further research and determine the impact of upstream rebates on downstream participants, particularly for heating, ventilating, and air-conditioning systems, to ensure that upstream rebates achieve their intended market transformation effect. Utilities should also ensure that downstream customers understand the purpose of the upstream rebates to avoid possible friction with upstream sellers and/or utilities.
- » Explore the need for grocery program in southern California: We recommend that southern California utilities reach out to potential chain grocery customers and possible internal or external program implementers to see if there is a need for a dedicated program similar to that of Pacific Gas and Electric Company's EnergySmart Grocer program.

Navigant Consulting, Inc. (2015, February 18). *Measure, Application, Segment, Industry (MASI): Integrated Design for New Construction, CALMAC Study ID SCE0377.01*. Retrieved from http://www.calmac.org/publications/MASI_Integrated_Design_for_New_Construction_Buildings_Final_Report.pdf

Abstract: The State of California is using building code revisions to advance the energy efficiency of commercial buildings in order to help address statewide emissions goals. In 2007, The California Energy Commission endorsed a set of goals in the Integrated Energy Policy Report of achieving zero net energy (ZNE) buildings for all new residential and commercial construction by 2020 and 2030, respectively. ZNE buildings are achieved through a set of design, construction, and operational practices that promote efficient materials, architecture, and maintenance. The concept of integrated design (ID) has long been promoted as a method to ensure all key stakeholders are involved and committed to ZNE goals. ID has been used in building design and constructions outside of ZNE projects, as a way of ensuring common goals are achieved. This study begins by presenting the definitions and background of ZNE and ID in California. In order to understand how the current market perceives and understands ZNE and ID concepts, the study reports on the results of a survey of California Architecture, Engineering, and Construction firms regarding their understanding of ZNE and ID concepts, as well as their views on relevant California investor-owned utility (IOU) programs. Major findings indicate that the IOU programs can aid the promotion and penetration of ZNEs and the use of ID through information dissemination, training on the concepts, and by streamlining the IOU programs themselves. In conclusion, open-ended questions are presented to further aid in understanding the state of ZNE commercial building development in California.

Navigant Consulting, Inc. (2015, March 13). *Measure, Application, Segment, Industry (MASI): Wastewater Treatment Facilities, CALMAC Study ID SCE0377.05*. Retrieved from http://www.calmac.org/publications/MASI_Wastewater_Treatment_Plants_Final_Report.pdf

Abstract: In the Wastewater Treatment Efficiency Study, Navigant Consulting, Inc. (Navigant) provides data and insights useful for developing strategies to effectively address wastewater treatment facility efficiency opportunities. The study assesses the technical potential of select retrofit efficiency measures for wastewater treatment plants (WWTPs) operating within California. The study objective is to provide program planners with information that is immediately useful in program design efforts. Navigant estimated the technical potential for energy efficiency (EE) measures in wastewater treatment facilities by conducting secondary source research and interviewing utility program managers, subject matter experts, utility account managers, and facility operators. Technology areas of focus included biogas recovery, aeration, sludge processing, variable frequency drive (VFD) pumps, and ultraviolet (UV) disinfection. Through interviews, Navigant developed the following recommendations for utilities to strengthen their relationships with wastewater treatment plants and further reduce energy usage within this sector.

» Consider plant size: Small facilities (those that process 10 MGD or less on average) and large facilities (those that process more than 10 MGD on average) are vastly different in their energy intensity, budgeting process, priorities, and needs; therefore, for these reasons, future studies should consider them as separate categories. Many large plants have already picked the low-

hanging fruit and are looking for the next frontier of energy savings. Utilities can help by being a resource for information on the most advanced features, continuing to fund pilot studies of emerging technologies and generally helping these plants come up with customized solutions for their needs. Small plants, on the other hand, are not as sophisticated and many, because of their size, do not have the revenues or budget to invest in advanced technologies.

» Help customers handle competing regulations: Utilities should try to help their customers save energy even in the presence of competing regulations from the Air Quality Management Districts in California, which restrict emissions from biogas-using equipment. Utilities may not be able to affect the regulations, but should adapt their incentives to the fact that the barrier is no longer to production of biogas but to making that biogas usable.

» Focus on process as well as technology: Utilities should look beyond specific technologies to consider how the treatment process itself can be made more efficient. Beyond the low-hanging fruit, the logical next step in EE for some plants could be redesigning the process altogether or looking for energy savings beyond the process itself.

» Continue long-term relationship development through account managers: California utilities should continue to be both proactive and responsive in their communications with WWTPs. Interviewees at wastewater treatment facilities consistently saw their relationship with their utility account managers as positive.

» Continue to share industry knowledge: Utilities should stay educated and up-to-date on the latest information on advanced technologies and energy-saving measures. Since WWTPs generally do not compete with each other, they are willing to share their knowledge among themselves.

Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Agriculture, CALMAC Study ID SCE0377.03*. Retrieved from http://www.calmac.org/publications/MASI_Agriculture_Final_Report.pdf

Abstract: This Agriculture Measure, Application, Segment, and Industry (MASI) study details findings from Navigant Consulting, Inc.'s (Navigant's) research into the current equipment installation, usage, and maintenance practices in the California agricultural industry. Navigant focused on current practices in the California agricultural market, with the goal of helping utilities understand equipment and systems installation and usage patterns. Navigant also explored energy-related market trends, drivers, and barriers to energy-efficiency adoption, as well as growers' decision-making processes with respect to energy usage and equipment installation. Navigant has provided recommendations to help program planners in future program design efforts. Based on project scoping discussions with the California investor-owned utilities (IOUs), Navigant focused its research on the following two distinct market segments: » Greenhouse equipment and installation practices (greenhouses)

» Agricultural irrigation design and usage (irrigated agriculture) For the greenhouse portion of this study, Navigant conducted primary and secondary research to identify current and emerging installation practices in California greenhouses. General Findings For both the greenhouse and irrigated agriculture market segments, the commodity drives growers' equipment installation and usage practices. While growers consider water and energy efficiency to an extent, their primary concern is the health and yield of their crops. Growers will select equipment based on the needs of the crop that they are growing. This may mean that growers will forgo systems that are more efficient because the crop requires more water to grow. For example, rice requires high amounts of water; therefore, rice growers may continue to use flood

irrigation for these crops, as low-flow systems may hurt the crop or decrease a farmers' yield. The source of an operation's irrigation water can also play a large role in growers' equipment decisions, particularly in irrigated agriculture operations. For example, farms with access to a municipal water source or close proximity to a river will have fewer expenses related to water pumping than farms that require drilling new wells or pumping water long distances. When approaching a grower with programs and information, utilities should consider the operation's crop types and water sources rather than categorizing an operation by its acreage, square footage, or energy consumption. Addressing the market by crop type could help utilities to distinguish between late adopters and farmers who use water-intensive systems because their crops require it. Utilities can then address these late adopters directly to identify barriers to technological adoption. Growers remain very cost-constrained in their operations, and continue to rely on rebates for many of their energy-efficiency upgrades. The agricultural industry is moving toward efficiency; however, growers report that this is largely out of necessity. Many growers continue to struggle financially, and a number of greenhouses have gone out of business within the last decade. Rebates for high-efficiency equipment play a critical role in growers' ability to install high-efficiency equipment, and can help them to stay in business. Grower interviews suggest this may apply to both large and small operations.

Navigant Consulting, Inc. (2015, March 31). *Measure, Application, Segment, Industry (MASI): Food Processing Industry*, CALMAC Study ID SCE0377.06. Retrieved from http://www.calmac.org/publications/MASI_Food_Processing_Final_Report.pdf

Abstract: This MASI research study explores energy-efficient equipment and process upgrades for the industrial food processing sector. California's food processing consumes more than 600 million Therms of natural gas and over 3.7 billion kilowatt hours of electricity per year. Food processing is the third largest industrial energy user in the state. The food processing industry has the following market trends:

- » Certain food processing sub-sectors such as wineries and food canning are seasonal in their operation. Facilities with seasonal operations tend to install energy-efficiency equipment during the downtime of the year.
- » The food processing sector is very aware of energy costs affecting their bottom line and prefers payback of three years or less when making retrofits/installing new equipment.
- » Title 24 captures most energy efficiency opportunities for boilers measures; facility managers have limited opportunities beyond Title 24 requirements.
- » The food processing industry has been slow to adopt new technologies as the industry is heavily regulated by food safety and sanitation standards. Navigant Consulting, in conjunction with ASWB Engineering, conducted 13 interviews with a variety of stakeholders and industry experts. The three subject matter experts were food processing industry experts including an executive in a food processing trade association, an engineering manager at a global agri-business; and a regulatory analyst at a state regulatory commission (each with decades of experience in the food processing energy space). Navigant identified the top energy consumers in the food processing sector: cheese manufacturers, fruit and vegetable canneries, and wineries. Using secondary literature and data from the industrial assessment database, Navigant identified the measures with highest energy savings potential in the food processing sector. The Navigant team developed the following recommendations.
 - » Provide Expert Advice in Energy Audits or Planning Stages of Construction- Two facility managers and the trade association subject matter expert expressed that a thorough energy

audit would help them identify potential opportunities in their facilities. Additionally, receiving expert advice during the early stages of construction would allow the facility to implement energy efficient measures at a much lower cost.

» Energy Management Tools/ Equipment- Four out of the seven facility managers felt that they would benefit from tools or equipment that could help them better understand their energy consumption. Through better understanding of their facilities' energy flow, facility managers are better equipped to implement measures targeting energy-intensive equipment or production areas.

» Training for Non-Energy Staff- A major barrier to measure installation was the lack of knowledge regarding the choice of measures, particularly for smaller facilities that do not have dedicated energy teams. Two of the smaller facility managers expressed an interest in training to help them identify and address energy efficient opportunities. » Water Recycling Opportunity Awareness- Water intensive processes are common amongst many sites based on facility managers' feedback. According to the California Food Processing Industry Technology Roadmap, the fruits and vegetable processing industry, cheese manufacturing industry, and wineries are the most water intensive food processing industries in California.

Navigant Consulting, Inc. (2015, April 10). *Measure, Application, Segment, Industry (MASI): New Opportunities for Oil and Gas Extraction and Produced Water Management and Recycling*, CALMAC Study ID SCE0377.07. Retrieved from http://www.calmac.org/publications/MASI_Oil_and_Gas_Final_Report.pdf

Abstract: The New Opportunities for Oil and Gas Extraction and Produced Water Management and Recycling study explores new program opportunities that specifically target oil and gas extraction and water management and recycling (North American Industry Classification System (NAICS 211 and 213). In alignment with the Project Coordination Group's (PCG) indicated interests, the study characterizes major and minor oil producers and identifies market barriers, drivers, and trends. The study discusses codes and standards, as well as the customer decision-making processes. It evaluates existing energy efficiency opportunities and the potential for future energy efficiency savings, determining whether utility programs and incentives can effectively promote new energy efficiency technologies and practices in this market segment. Oil and gas extraction, inclusive of water management and recycling, is a well-established field with limited new energy saving opportunities. However, from conversations with facility managers and industry experts, Navigant and ASWB Engineering developed a list of potential energy saving opportunities. Opportunities were ranked by new energy savings potential based on the following factors: market saturation, ease of adoption, cost to implement, and return on investment. An important observation is that the remaining energy efficiency opportunities vary for major and minor producers due to different energy efficiency measure adoption rates and Industry Standard Practices (ISPs), which impact the recommendations. These opportunities are explained in detail in the report.

Navigant Consulting, Inc. (2015, September 25). *Energy Efficiency Potential and Goals Study for 2015 and Beyond, Stage 1 Final Report*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=4033>

Navigant Consulting, Inc. (2016, March 31). *AB802 Technical Analysis Potential Savings Analysis*. Retrieved from <http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=11189>

Nexant. (2016, June 2). *Municipal Utility Joint Program Study, CALMAC Study ID SCG0216.01*.

Retrieved from

http://www.calmac.org/publications/Municipal_UTILITY_Joint_Program_Study_FINAL_7.22.16_v1.pdf

Abstract: Southern California Gas (SoCal Gas) retained Nexant to develop a comprehensive summary of the residential energy efficiency programs implemented or administered by municipal electric utilities that overlap with SoCal Gas's service territory. The goal of this effort was to explore utilities that demonstrate partnership opportunities with SoCal Gas on residential dual-fuel, gas-and-electric energy efficiency programs. Nine municipal utilities were identified for inclusion in this study. Each municipal utility was prioritized based on publicly available information on the territory, the utility's energy efficiency program efforts, and information that supported the possibility of forming partnerships with SoCal Gas. Nexant collected data on these utilities primarily through in-depth interviews with utility personnel and augmented this effort through secondary research and a literature review of associated utility energy efficiency programs. At the time of writing, LADWP and Pasadena had the highest frequency of current joint offerings, whereas Riverside, Azusa, and Pasadena had the highest frequency of possible joint offerings amongst existing programs. Imperial and Pasadena expressed interest in the largest number of future offerings. As part of its comparative analysis, Nexant ranked the nine utilities' joint fuel program opportunities according to four key criteria developed to assess possible joint fuel savings. Those criteria included: total residential program savings, program or measure offerings, program participation, and the presence of local energy efficiency-related initiatives or policies. Based on this ranking, Nexant found that the highest partnership opportunity exists with LADWP and Riverside utilities. These municipal utilities scored highly on the defined criteria. Pasadena and Glendale also presented strong partnership opportunities, with high program participation, relatively moderate levels of program savings, and program or measure offerings that are amenable to joint fuel energy savings. However, Nexant emphasizes that this ranking is informational only; the study authors encourage SoCal Gas to perform its own ranking and analysis based on the utility's internal drivers and strategic goals.

NMR Group Inc. (2013, November 25). *A Review of Effective Practices for the Planning, Design, Implementation, and Evaluation of Market Transformation Efforts, CALMAC Study ID PGE0330.01*. Retrieved from

http://www.calmac.org/publications/FINAL_NMR_MT_Practices_Report_20131125.pdf

Abstract: This study identifies effective program planning, design, implementation, and evaluation practices as described in the market transformation literature. It also examines practices that have been used to support market transformation for five types of residential programs (lighting, products including appliances and consumer electronics, whole house, HVAC, and new construction) in jurisdictions outside California. It focuses on actionable lessons learned based on the experiences of program administrators in the Pacific Northwest, New England, and New York that have long implemented market transformation program approaches. The purpose of the study was to identify and summarize effective practices in support of market transformation from both programs and the literature for the consideration of the California investor-owned utilities.

NMR Group, Inc. (2015, January 14). *Baseline Market Effects Study of Investor Owned Utility Residential and Small Commercial HVAC Quality Installation and Quality Improvement Programs in California (Work Order 054), CALMAC Study ID CPU0102.01*. Retrieved from http://calmac.org/publications/CPUC_HVAC_Baseline_Market_Study_Final_Report.pdf

Abstract: The CPUC investor-owned utilities (IOUs) have designed programs to increase the quality of HVAC installation (QI), the quality of HVAC maintenance (QM), and the market share of high-efficiency systems. The objective of this study was to provide a baseline for the market Transformation Indicators (MTIs) established for CPUC HVAC QI and QM programs. With a particular focus on residential and small commercial customers, this study sought to establish baselines for a range of current maintenance and installation practices and the market shares of highly efficient systems that were recently installed. These data will assist the CPUC in future retrospective assessments of the market effects attributable to these programs. This multi-faceted study made use of data collected from contractors, customers, program managers, and others involved in the California HVAC market. It relied substantially on other work orders for information inputs and data collection, necessitating substantial coordination with those data collection efforts. Overall, the study found significant market shares of energy-efficient HVAC equipment sold in 2011 and 2012 in California. However, the study also found low baseline values for adherence to Quality Installation (QI) and Quality Maintenance (QM) practices. The study also outlined a market share tracking system that would recruit distributors to participate in a systematic process for quarterly reporting of market share by efficiency level and sales.

Opinion Dynamics Corp. (2010, March 23). *Indirect Impact Evaluation of the Statewide Energy Efficiency Education and Training Program, CALMAC Study ID CPU0014.01*. Retrieved from http://www.calmac.org/publications/06-08_Statewide_Education_and_Training_Impact_Eval_Vol_I_FINAL.pdf

“Behavior Change: Almost four out of five (77%) commercial respondents **took actions to save energy at their facilities**; while more than two out of five (43%) residential end-users **took actions to save energy in their homes as a result of the course(s)**. For the residential end-users who took action, the majority of changes were related to solar energy, followed by building envelope, HVAC, lighting and changes in practices such as turning off lights. Commercial end-users show similar results in terms of subject focus with changes primarily in HVAC, lighting, and building envelope. (See Section 8.1.1).” p. 2

“**Clearly identify program goals and performance metrics** and ensure that these are acknowledged by both the utilities and the CPUC either prior to the program cycle, or as early as possible. The 2006-2008 program goals (as documented in the quarterly reports) focused primarily on the number of trainings and/or participants. The CPUC, however, indicated in their April 2005 decision that the **performance basis should be on awareness, attitudes, knowledge, and energy savings**. For the future, it is important to commonly acknowledge program goals prior to implementation in order to ensure that the programs are working toward the specific goals that the Centers are envisioned to play within California’s Energy Efficiency Strategic Plan (e.g., goals for workforce education and trainings, etc.)” p. 123

“Review the results and use this information to help **inform future program design**, such as the roles that they seek to play in the marketplace, the emphasis on some technologies over others

(e.g., HVAC), and the level of effort placed on channeling into rebate programs. While not a process evaluation, the findings from our indirect impact evaluation can help inform future efforts by the Statewide Education and Training programs. If used in conjunction with the process evaluation efforts, the information gathered through our research can **provide insights that can help align actual efforts with the goals**. Specifically, our findings show the focus of the courses in terms of technologies, types of participants attending, and level of effort placed on channeling into rebate programs. This information could be reviewed against the goals for the 2010-2012 programs to help confirm that the courses offered through the Centers align with the current goals and/or re-direct efforts, if necessary.” p. 123

“The 2006-2008 evaluation also provided **insights on the current tracking mechanisms**, and how these could be enhanced in order to allow the Centers to better identify who they are touching, which would then allow future program efforts to target populations that are not currently being touched. In addition, tracking certain info can help provide additional metrics on the reach of these Centers, as well as inform whether (and how) the Centers are helping to meet the Workforce Education and Training goals identified in California’s Strategic Plan.” p. 124

Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume I: Centergies, CALMAC Study ID PGE0317.01*. Retrieved from [http://www.calmac.org/publications/2010-2012 WE%26T Centergies Process Eval Report volume I.pdf](http://www.calmac.org/publications/2010-2012_WE%26T_Centergies_Process_Eval_Report_volume_I.pdf)

“Our evaluation therefore set out to answer the following questions: [1] Strategic Alignment: How is the WE&T program aligned with California’s Strategic Plan and the WE&T Needs Assessment? And what should the utilities do now to ensure that they can meet the Strategic Plan’s goals of this effort over the next 10 years? [2] Program Effectiveness: Is the WE&T Centergies Program effective in terms of following learning principles and/or best-practice educational methods, meeting the needs of the target market, and covering the energy efficiency related topics desired?” p. 19

“Builder Operator Certification (BOC)

In addition to the Energy Centers, the evaluation also explored the Builder Operator Certification Program (BOC), a certification program that is offered at the Energy Centers statewide. The BOC program received a process evaluation in the ‘06-‘08 program cycle; therefore, evaluation efforts for BOC in this program cycle were limited documenting how that program responded to the previous evaluation’s recommendations []. The program is a **nationally recognized energy efficiency training and certification program founded on the principle that trained and motivated operators can reduce energy consumption by 5 to 15%. BOC combines classroom training, exams, and in-facility project assignments to train and certify building engineers and O&M technicians in the practice of energy-efficient building operations and management.**

The targeted program participants are commercial and industrial end users who seek certification and who value the importance of efficient building technologies for their ongoing business. Typical program participants would require their employers to make an investment in this education. [SCE/IOUS] program funding does not cover 100% of the cost of certification. The balance of the required funding is contributed by the participant’s employer. The Northwest Energy Efficiency Council (NEEC), extending efforts initiated by the Washington State Energy

Office and the Idaho Building Operators Association, developed the Building Operators Certification program for the Northwest Energy Efficiency Alliance (NEEA) in 1997. The NEEC BOC training is now offered in about 20 states, including California, starting in 2002. The California utilities licensed the training from NEEC and have contracted with NEEC for its delivery.

The program serves commercial and industrial end users who seek certification, particularly building engineers and O&M technicians.” pp. 34-35

“Filling a Need in the Marketplace. More than half of survey respondents indicated that the Energy Centers are the only place they go for energy efficiency classes, trainings, or other ongoing career education, an indication that the Energy Centers are filling a need in the marketplace and playing a valuable role. As shown in Figure 10, **about half (44%) listed a variety of other facilities and organizations, including conferences, universities, community colleges and trade/tech schools, and online courses, but no one source stood out.**” p. 57

“Make course information easily transferable to others to extend reach: Most supervisors and people in a position to share information said courses provided information that was easy to share with their employees/clients. However, some additional materials or improvements to existing materials to help ensure this sharing of information are encouraged. The Energy Centers should consider making course materials available online/electronically (i.e., PowerPoint files), developing more actionable handouts such as step-by-step guides that can be referenced on the job, providing more visual materials (i.e., photos, diagrams), and/or providing additional references/links/resources to supplement coursework.” p. 81

Opinion Dynamics Corp. (2012, December). *2010-2012 WE&T Process Evaluation Volume II: Connections, CALMAC Study ID PGE0317.02*. Retrieved from [http://www.calmac.org/publications/2010-2012 WE%26T Connections Process Eval Report FINAL-volume II.pdf](http://www.calmac.org/publications/2010-2012%20WE%26T%20Connections%20Process%20Eval%20Report%20FINAL-volume%20II.pdf)

Abstract: Volume II of the report details the results of the 2010-2012 WE&T Connections sub-program which consists of seven specific program elements (five that target K-12, one that targets community colleges, and one that targets higher education). These elements seek to “promote green careers; educate students on energy, water, renewable energy, demand response, distributed generation greenhouse gases and the environmental impact, with the goal of influencing day-to-day decisions of students and their households; and educate on the benefits of adopting energy efficiency and demand response policies at their facilities to help them save energy and money”. These elements target a variety of ages ranging from kindergarten through high school and into college-level initiatives. The goals of this evaluation were to 1) understand how the WE&T sub-programs aligned with California’s Strategic Plan and WE&T Needs Assessment and 2) if the program is effective in meeting the needs of the target market while covering the desired energy efficiency related topics. As part of this effort, we conducted: reviews of program material, staff interviews, observations of training/internship sessions, a survey of over 2500 program participants (teachers, staff, and student interns) and an instructional design assessment of course materials and course delivery methods. From this evaluation, the Connections sub-program made contributions to California’s Strategic Plan and Needs Assessment such as including career exploration related to Energy Efficiency in K-12 curriculums and redirecting outreach efforts to low-income and minority communities. Overall, the evaluation found the sub-program to be effective in offering energy efficiency or conservation education since 57% of participating schools or districts indicated they had not

provided education of the same subject outside of the program with 43% of teachers making a similar claim.

“Our evaluation therefore set out to answer the following questions: [1] Strategic Alignment: How is the WE&T program aligned with California’s Strategic Plan and the WE&T Needs Assessment? And what should the utilities do now to ensure that they can meet the Strategic Plan’s goals of this effort over the next 10 years? [2] Program Effectiveness: Is the WE&T Connections Program effective in terms of following learning principles and/or best-practice educational methods, meeting the needs of the target market, and covering the energy efficiency related topics desired?” p. 11

Opinion Dynamics Corp. (2014, June 6). *2013-2014 Statewide WE&T Program Program Theory and Logic Model Update; Centergies Data Needs; And Critical WE&T Data Needs, CALMAC Study ID SDG0278.01*. Retrieved from [http://www.calmac.org/publications/2013-2014 WET PTLM and Critical Data Gap Assessment.pdf](http://www.calmac.org/publications/2013-2014%20WET%20PTLM%20and%20Critical%20Data%20Gap%20Assessment.pdf)

Abstract: This report on the 2013-2014 Statewide Workforce Education & Training (WE&T) Program provides: 1) A revised program theory and logic model update for the 2013-2014 WE&T Centergies program based on workshops with the Centers and a review of the existing program theory and logic model for the 2013-2014 WE&T Connections program; 2) An investigation into the Centers’ program data tracking to determine whether the Centers are consistent and collecting the right data to support the new Program Theory and Logic; and 3) An investigation into how the WE&T Centergies program can and should respond to Decision 12-05-015 based on interviews with WE&T Centergies implementation and EM&V staff and an early investigation into how some IOU resource programs have responded to Decision 12-05-015 based on interviews with IOU staff, program implementation staff and secondary research. The program focus has evolved due to implementation of the California WE&T Needs Assessment findings, sector strategies and additional CPUC requirements. Now, the Centers, while continuing their traditional information dissemination activities and goals, are increasing partnerships in order to facilitate and contribute to certification programs; reach out to disadvantaged workers; increase awareness of integrated demand side management (IDSM) among the trades and professions that attend seminars; and increase the number of market actors and/or the skill levels in the green workforce. The new Centergies Logic Model in this report shows how the Centers’ current activities and strategies support traditional and new program goals. The Centers are inconsistent in their data tracking and collection efforts and these should be modified to better support the Theory. As such, the study provides suggestions for how the Centers can collectively improve data tracking and collection efforts in support of its Theory and Logic. The 2013-2014 WE&T research roadmap references two decisions (Decisions 12-05-015 and 12-08-044) that are relevant to WE&T initiatives. The study team investigated the 12-05-015 Decision in the context of three certifications for three specific sectors: CALCTP for the non-residential lighting sector, BPI for the residential whole house retrofit sector, QI/QM for the residential HVAC sector. Based on an analysis of the Decisions, it became clear that these decisions are actually relevant to specific IOU resource programs and not Centergies as much of the data collection activities should be initiated by the specific programs rather than the WE&T team. The cross-cutting nature of WE&T has produced uncertainty amongst the IOUs and Centers as to who is supposed to act on policy decisions related to WE&T, and the study provides suggestions for clarification.

“This program theory and logic model was updated for all IOUs in California because of the redirection of the Centers requested by the CEESP and the Needs Assessment. While these documents have not required the Centers to stop providing their traditional services, new objectives were added to the old. The IOUs have been re-orienting themselves to include new objectives that focus on workforce training toward developing a green workforce capable of supporting CEESP goals, and toward bringing disadvantaged workers into that workforce. As a result, it is an appropriate time to gain clarity on the current direction of the Centers through an updated program theory and logic model (PTLM).” p. 7

Opinion Dynamics Corp. (2016, June 25). *PY2013-2014 California Statewide Workforce Education and Training Program Contractor Training Market Characterization, CALMAC Study ID CPU0134.01*. Retrieved from http://www.calmac.org/publications/CPUC_WET_Contractor_Training_Market_Characterization_FINAL.docx

“Of the trainings we reviewed, most are offered nationally as well as in California and most are classroom-based with written exams. Industry stakeholders and experts believe, however, **that hands-on training, such as that included in the California Advanced Lighting Controls Training Program (CALCTP) or required by union apprentice programs, is preferable.**” p. 8

“According to members of our residential expert panel, barriers to participation in energy efficiency-related trainings and certifications include **lack of contractor awareness of available offerings** as well as **the difficulty determining which to pursue given the large number of trainings and certifications available.**” p. 9

“The expert panel discussed two barriers to IOU energy efficiency program participation. First, the panelists suggested that the **lack of contractor awareness of available trainings** is more of a barrier to a trained workforce than the number of trainings offered or their quality. Second, panel members believed that contractors **need guidance on trainings and certifications to pursue, given the large number of trainings available.** They suggested that it may help contractors if IOUs or another group could package together recommended trainings, recognizing that technicians will have different training needs at different points in their careers.” p. 21

“Expert panel participants noted that there is a skill gap between participating and non-participating contractors that is likely due to the additional trainings taken by program participants. However, the panel also discussed that some of the gap in skills between participating and non-participating contractors could be because of self-selection. In their opinion, contractors seeking to maximize the benefits to their customers **are more likely to embrace energy efficiency and will seek out and develop the necessary skills.** Additionally, panelists remarked that some contractors do not follow all of the necessary rules when completing projects, such as pulling the proper permits, and these contractors will likely not participate in IOU energy efficiency programs to avoid scrutiny. The panel noted that this has an impact on the contractors’ quality of work but is not something that can be solved through training.” p. 22

Opinion Dynamics Corp. (2016, August 2). *PY2013-14 Third Party Commercial Program Value and Effectiveness Study Report (Volume I of II), CALMAC Study ID CPU0128.01*. Retrieved from

http://www.calmac.org/publications/CPUC_3P_Report_Vol_I_FINAL_Published_Aug_2_2016.pdf

Abstract: This Report presents the findings from a Value and Effectiveness Study completed by Opinion Dynamics. The purpose of the Study is to characterize the unique Value that the 2013–14 Third Party (3P) Commercial Programs bring to the market and how effectively the Third Party organizations and investor-owned utilities (IOUs) implement and manage those Programs. To develop the findings in this Report, the evaluation team conducted a range of research tasks that combined a secondary data review with in-depth interviews and quantitative surveys. The Study develops indicators of (1) Program Value (including the Value 3P Programs bring to the overall Commercial demand side management (DSM) portfolio) and (2) Program Effectiveness, both in terms of implementation Effectiveness and management Effectiveness. As part of this Study in Volume II, the Evaluation Team includes ten case studies that take a deeper dive into specific Programs, as well as Program profiles of each of the 38 active Commercial 3P Programs and the nine Programs that have since closed. Overall, the 3P Programs in this Study contributed sizable savings to the Commercial portfolio, generating 277 GWh, 0.05 GW, and 4,300 million therm savings during 2013–14. They accounted for 14% of all electric savings and 13% of all gas savings in the Commercial portfolio of Programs. The Evaluation Team found high levels of both Value and Effectiveness from the 38 3P Programs, based on participants’ scoring of the importance of Program features and of Program performance. By design, the Programs provided Value by serving multiple target markets and technologies with known hard-to-reach barriers to energy efficiency. Research with participants in the 10 case Study Programs, which reflected the majority of the savings from 3P Programs and most of the target markets served, revealed that customers did need most of the Programs’ services to adopt energy efficiency. The majority of Programs passed the TRC cost- Effectiveness test and participants gave the implementers very high performance scores.

Opinion Dynamics Corp. (2016, December). *PY2013-2014 California Statewide Workforce Education and Training Program Workforce Conditions Data Investigation, CALMAC Study ID CPU0133.01*. Retrieved from

http://www.calmac.org/publications/CPUC_Workforce_Conditions_Data_Report_Final_12-17-2015.docx

“Consider the learnings from this study when determining how to best collect demographic information from program contractors in the future.

In addition to the lessons learned from ESAP’s previous data collection efforts summarized in this report, SoCalGas offers further lessons learned from this study, including:

- Contractor interviews revealed that employers cannot provide valid demographic data of their workforce. Based on the contractors interviewed, collecting demographic information only from employers about their workers is not possible given their lack of knowledge about their employees’ ethnicity, household income levels or disadvantaged status. Data should be collected from each worker within a company instead of asking a company representative to report on all of their workers.
- The use of subcontractors for the installation of program measures is common in the lighting segment and occurs to some extent among Home Upgrade Program contractors. Contractors do not have the requested information for installers who are not their own

employees. As a result, data collection from contractors would not capture the entire installer workforce unless subcontractors are approached as well.

- Provide a clear and compelling argument for why contractors should provide this information to the state. Both IOU staff and contractors expressed some concerns regarding the collection of sensitive wage and demographic information. They are in general agreement that employees should not be required to provide this information and requested a clear explanation as to why such information is needed and how it would benefit the industry.
- Use existing government wage data sources as context for program contractor findings. Compare reported wages to government wage data and check that workers participating in the programs are making a living wage or have higher-than-average wages.” pp. 39-40.

Opinion Dynamics Corp., & Dunsky Energy Consulting. (2016, March). *PY 2014 Finance Residential Market Baseline Study Report, Volume I of II, CALMAC Study Id CPU0131.01*.

Retrieved from

http://www.calmac.org/publications/PY2014_Residential_Finance_Market_Baseline_Volume_1_FINAL.pdf

Abstract: This report summarizes findings from Opinion Dynamics’ and Dunsky Energy Consulting’s baseline study and characterization of California’s **residential** energy efficiency **finance** market. As a “baseline”, this study provides a “snapshot” of the market before the CA Rate-Payer Funded Statewide **residential** Energy Efficiency Financing Pilots (Pilots) launch. This study helps to understand the market for energy efficiency financing and provides a baseline measurement of the market that will help assess market transformation over time. The Evaluation Team conducted online research to determine the types of financing available, reviewed statewide data on customer credit worthiness, and interviewed financial institutions, HVAC and general contractors, and homeowners. There are three common types of energy efficiency financing products currently available on the market: home equity loans, term loans (i.e., term loans from financial institutions that can be either secured or unsecured against equipment), and Property Assessed Clean Energy (PACE) loans. Of these PACE dominates the energy efficient financing volume, so far. Contractors are aware of energy efficient financing options, but only 15% directly promote them. This study found one-third of homeowners completed energy-related upgrades in the last two years and one quarter used some form of financing. Among those who used financing, 14% used energy efficient financing such as PACE or energy efficient loans. One in three homeowners is aware of some form of energy efficient financing and only one in ten is currently aware of PACE. 40% of homeowners are likely to make an energy-related upgrade in the next two years, and 27% are at least somewhat likely to use financing. Over half of homeowners surveyed (54%) agreed that high upfront cost is why they might not make an energy-related upgrade, and a third of homeowners stated that a loan could help overcome the costs.

Opinion Dynamics Corp., & Energy and Resource Solutions. (2015, November). *PY2013-2014 Emerging Technologies Program Targeted Effectiveness Study Report, CALMAC Study ID CPU0112.01*. Retrieved from http://www.calmac.org/publications/PY2013-2014_ETP_Targeted_Effectiveness_Evaluation_Volume_I_FINAL.pdf

Abstract: This research Study looks at the effects and accomplishments of Targeted aspects of the PY2013-2014 Emerging Technologies Program. The Emerging Technologies Program is a non-resource Program run and operated by each of the four investor owned utility companies (IOUs) in California for the purposes of (1) feeding the energy efficiency portfolio with Emerging technologies, and (2) supporting market demand, such as customer interest and acceptance, supplier capabilities, costs, and other issues that ultimately influence Technology's uptake in the marketplace. The Study has three Targeted research objectives, including: 1) Providing a summary description of the ETP portfolio and evaluate the Effectiveness of ETP measures adopted into the IOU energy efficiency (EE) portfolio by identifying savings within the EE portfolio; 2) Evaluating the Effectiveness of ETP Assessment Activities, and; 3) Evaluating the Effectiveness of ETP external dissemination efforts via ETCC website subscribers. Our analysis of the ETP data demonstrated that the IOUs have met their Program Implementation Plan (PIP) objectives and are contributing to both the EE portfolio and the broader California Energy Efficiency Strategic Plan (CEESP) goals in alignment with the PIP Program Performance Metrics (PPM). However, our team found that the current PPMs are insufficient for the CPUC Energy Division to assess achievement of regulatory objectives (such as the California Energy Efficiency Strategic Plan and AB 32), as well as progress towards achieving these objectives. Overall, the evaluation team found that ETP is a looked-to leader in its approach to assessing Emerging technologies. However, given ETP's focus on technical readiness activities (as well as achievement of Program objectives), additional effort is needed to align objectives and metrics with ETP's regulatory and legislative guidance (e.g., market readiness efforts). ETP currently has a suite of tactics in support of accelerating both technical readiness and market readiness for its technologies, but the current data tracking and metrics do not enable comprehensive assessment of long-term policy achievements.

Research Into Action, Inc. (2015, June 8). *Residential Solutions Workbook Phase I: Market View (Version 2)*, CALMAC Study ID SCE0361.03. Retrieved from http://www.calmac.org/publications/SCE_RSW_Phase_I_Documentation_Report_07-23-2014_final.pdf

Abstract: The Residential Solutions Workbooks (RSWs) is a set of Residential energy efficiency program planning tools created to help program managers identify opportunities and manage programs by aggregating and displaying device-level market and energy savings data. The Workbooks were developed to support the needs of the California Investor Owned Utilities' Statewide Plug Load and Appliances program team, and team provided input for developing these tools. The RSWs are designed primarily to address the program team's planning needs. They display key market information, providing a single starting point for subsequent produce research through a unified point of access to program planning data, along with display controls for filtering and comparing results; they are not intended to serve as a business or market planning tool. The data were drawn from evaluation and engineering studies, and market characterization reports. Data in the RSWs are "order of magnitude accurate" and are intended to provide a single quick reference or starting point to present device-level data (or market indicators) drawn from multiple sources and enable users to compare devices and prioritize opportunities as well as identify gaps in available data. The tools were designed and developed as Microsoft Excel Workbooks in two Phases: Phase I and Phase II. This abstract pertains to RSW Phase I (see PGE0359.01 for RSW Phase II). The RSW Phase I (or RSW I) presents a "Market View" summary of energy and market data for 132 plug load devices display with additional data

for 21 devices of particular interest for utility programs. This is the second release of the RSW I tool. The RSW I version 1.0 was released on June 23, 2014 and available on CALMAC under study ID SCE0361.01. The RSW I version 2.0 was finalized in June 2015. Version 2.0 includes the following changes: 1) 2013 ENERGY STAR® market share for all products and 2011 California ENERGY STAR market share for selected products; 2) 2013 Potential Study unit energy savings, technical potential, Title 20 unit savings and Title 20 compliance rate for overlapping Tier 1 products; 3) incorporates both gas and electric savings for all dual fuel products. The published outputs associated with Phase I are an Excel Workbook and a documentation report. The RSW I data are summarized in two dashboard-like worksheets (or tabs). The Household View tab provides an overview of device penetration and saturation and ENERGY STAR market share and ENERGY STAR unit energy consumption savings for all energy-using household devices. The Device View tab provides an in-depth look at the 21 devices selected for enhanced data collection, including usage, savings, ENERGY STAR model availability by price point, and a summary of current and future codes and specifications updates. Documentation tabs provide data tables and source information.

Research Into Action, Inc. (2016, October 25). *Targeted Draft report: Targeted process evaluation of the local government partnership program*. Retrieved from http://www.energydataweb.com/cpucFiles/pdaDocs/1669/LGP%20TPE_Draft%20Report_10.25.16.pdf

Executive Summary: This report provides findings and recommendations from Research Into Action's targeted process evaluation of the Local Government Partnership (LGP) program. Through the LGP program, California's four investor-owned utilities (IOUs), Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas Company (SCG), and San Diego Gas and Electric (SDG&E), partner with local governments (LGs) to help constituents save energy through energy efficiency. Local governments that are members of an LGP are expected to:

- Support the five goals of California's Long-Term Energy Efficiency SP, which we refer to as SP activities throughout the report. Appendix E provides California's SP goals.
- Retrofit municipal buildings to become more energy efficient, which we refer to as municipal retrofits or municipal retrofit projects throughout the report.
- Perform core program coordination/implementation by engaging constituents in energy efficiency activities and encouraging participation in existing IOU programs, including direct install programs.

This evaluation targets the SP support and municipal retrofit components of the LGP. While we limit the focus of this evaluation, a broader aim of this evaluation is to help the IOUs develop effective support capabilities and metrics appropriate to the diverse types of LGPs. In addition, prior evaluations noted the considerable diversity across partnerships and we examined whether LGPs can be categorized to facilitate tailored lessons learned, good practices, and recommendations, with the objective of helping the IOUs serve the LGPs more appropriately and consistently.

Our targeted process evaluation made use of interviews with key IOU program staff, the former California Statewide Local Government Energy Efficiency Best Practices Coordinator (former Best Practices Coordinator), and LGP representatives as well as a review of IOU-provided SP project data. Our exploration of factors to use for categorization of partnerships incorporated these sources as well as a review relevant industry literature and prior LGP evaluations.

Summit Blue Consulting, LLC et al. (2010, February 3). *Final Report: Evaluation of the California Statewide Emerging Technologies Program, CALMAC Study ID CPU0031.01*. Retrieved from http://www.calmac.org/publications/Final_Comprehensive_ETP_Final_Report_02-04-10_R7_3.pdf

Abstract: This report represents the Final Evaluation results for the 2006-2008 California Statewide Emerging Technologies Program (ETP or Program) as implemented by the four investor-owned utilities (collectively referred to as the IOUs or the utilities). The study was prepared by the Summit Blue Consulting team (Evaluation team) for the California Public Utilities Commission. The Evaluation of the ETP was focused on conducting four overarching goals: 1) an Evaluability Assessment, 2) a Program Design Assessment, 3) a Program Implementation Assessment, and 4) an Impact Assessment. The team undertook a number of activities linked to the elements of the California Evaluation Protocols to achieve these goals including: Program theory and logic model and performance indicators; Business Risk Assessment; aggregate analysis; verification of basic achievements; Program implementation and delivery; measure tracking; peer review; and literature review. The research agenda included multiple primary and secondary data collection efforts and Evaluation methods. The Evaluation team concluded that the design of the ETP as implemented during the 2006-2008 Program cycle was plausible and that the implementation processes developed by the utilities were consistent with the broad Program intentions outlined within the Program Implementation Plans. The Evaluation team also included recommendations to improve Program performance with the following needs being most notable: improved quality and consistency of Program documentation (processes, procedures, and decision-making); development of more robust technical and market potential estimates, as well as enhanced market research, for Technologies being considered for inclusion in the Program; expansion of the technology selection process to include a broader array of stakeholder interests and perspectives, to increase the transparency and rigor with which the process is undertaken, and to ensure that technology selection priorities align with the ultimate goals of the ETP as specified by ETP staff and the CPUC; increased collaboration with EE Program staff and the CPUC to create consistent project naming and numbering conventions, decision documentation, and feedback loops between the ETP and the EE Programs; enhanced data tracking systems and activities; increased collaboration with the CPUC and other Program stakeholders to establish standards for the design, execution, and documentation of technology assessments; and continued dialogue with the CPUC to ensure a smooth transition to the 2010-2012 Program cycle by reaching agreement on the indicators that will be used to assess Program progress during the 2010-2012 Evaluation cycle, the success criteria associated with these indicators, and the requisite data collection and documentation processes to be incorporated into Program implementation.

The Cadmus Group, Inc. (2013, October 2). *Impact Evaluability Assessment of California's Continuous Energy Improvement Pilot Program, CALMAC Study ID CPU0067.01*. Retrieved from http://www.calmac.org/publications/CA_CEI_Pilot_Evaluability_Assessment_REVISED_FINAL.pdf

Abstract: The California investor-owned utilities (IOUs) currently administer the Continuous Energy Improvement (CEI) pilot program. The pilot was launched in early 2010, and the IOUs recruited participants in late 2010 and in 2011. The program provides long-term energy-management consulting services that educate and train commercial and industrial energy users to: (1) develop and execute a long-term energy-planning strategy, and (2) integrate energy management into their business planning permanently. The IOUs' primary purpose in offering the pilot program was to examine alternative options and to develop workable methods for implementing CEI programs in their service territories. The evaluability assessment goals were these: Assess the evaluability of the CEI program based on the data collected thus far and recommend improvements to data collection, and Demonstrate the methodology for determining future energy savings from CEI. Cadmus conducted the evaluability assessment and then estimated the energy savings for facilities with sufficient data. We selected two sites from each of the five third-party CEI advisors so that we could assess the availability and usefulness of the data collected by the CEI advisors and the data quality's impact on the ability to estimate energy savings. Cadmus estimated the energy savings with regression analysis, using facility information, billing data, production data, and weather data. Our estimation approach also accounted for capital projects completed during the baseline and pilot test periods, so that savings from O&M projects could be isolated. The results of this assessment served as the basis for our recommendations for improving the data collection process. The key findings and the resulting recommendations are as follows. Data Completeness: Cadmus received all of the data needed for assessing the energy savings, except capital measure cost required for calculating cost-effectiveness. Ability to Calculate Energy Savings: Based on the results of this and other studies of CEI programs, regression analysis provides a reasonably reliable method for estimating the impacts, subject to several considerations, most importantly availability and completeness of data. Recommendations include: collect billing and production data at higher frequencies, provide engineering calculations for capital measures, track large facility events during enrollment, and consider metering large capital projects.

The Cadmus Group. (2014, April 22). *California Joint Utilities Financing Research: Existing Programs Reviews, CALMAC Study ID PGE0338.01*. Retrieved from http://www.calmac.org/publications/Existing_Programs_Review_FINAL.pdf

Abstract: To help inform the design and evaluation efforts related to seven statewide energy efficiency Financing pilots, the California IOUs engaged Cadmus to conduct a comprehensive review of 15 existing Financing programs representing noteworthy program models across the United States and internationally. The work presents the current "best practices" observable in the marketplace. The IOUs and Cadmus selected the following residential and commercial-industrial programs: Clean Energy Works Oregon, Help my House (SC), HERO (CA), Illinois On-bill Finance, Keystone HELP (PA), Mass Save HEAT Loan, Michigan Saves, Midwest Energy HowSmart (KS), NYSERDA On-bill Recovery, Windsor Efficiency PAYS (CA), Green Deal (UK), Power Smart Residential Loans (Manitoba Hydro), United Illuminating Small Business Energy Advantage (CT). International Finance Corporation programs in China and Hungary Cadmus created a profile for each program based on 10 key subjects identified by the team. These included: Program results, Details of the loan product, Overlapping programs, Borrower eligibility, Loan performance (including default rate), Measure eligibility, Contractor networks, Process and impact evaluation strategies, Cost-effectiveness, and Keys to success/lessons learned.

In addition to creating an individual profile for each program, Cadmus analyzed the results for trends across programs, leading to several key findings. For example: Interest rates vary but were all below 9%; Maximum loan amounts may be positively correlated with average loan size; Program managers stated that a combination of rebates and Financing might work best to promote energy efficiency, though programs with only Financing can also be successful; Borrower eligibility has been set as low as a FICO of 590 - nevertheless, mid- and low- income customers may not often participate ;The average bill-pay customers for at least one program appear similar to customers assessed by credit score; Financing programs can have more flexible measure requirements than utility rebate programs, because they are generally not subject to cost-effectiveness testing; Most programs are not analyzing the cost-effectiveness of savings attained through a Financing program, and no Financing programs had any specific energy-savings related goals; and Nor are any programs attributing savings between rebates and Financing, where both are available to the customer.

The Cadmus Group, Inc. (2013, February 1). *Energy management pilot impact evaluation, A report to the Bonneville Power Administration*, pp. 34-35. Retrieved from https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Energy_Management_Impact_Evaluation_Final_Report_with_Cover.pdf

The Cadmus Group. (2016, October 3). *HERO Program Profile Final Report, CALMAC Study ID PGE0388.01*. Retrieved from http://www.calmac.org/publications/HERO_Program_Study_Final_Report.pdf

The Cadmus Group. (2016, October 3). *HERO Program Savings Allocation Methodology Study, Final Report, CALMAC Study ID PGE0388.02*. Retrieved from http://www.calmac.org/publications/HERO_Program_Study_Final_Report.pdf

Abstract: This study, which was conducted by Cadmus under contract to PG&E, SDG&E, SCE, and SCG, looks at a property-assessed clean energy (PACE) financing program for single-family homeowners known as HERO (formerly the Home Energy Renovation Opportunity Program). Volume 1: The HERO Program Study, evaluates key components of program structure and implementation in terms of program growth, objectives of HERO stakeholders and HERO Program goals and design compared to driving energy efficiency, and characteristics of typical participants and projects funded by the HERO Program compared to IOU rebate programs and projects not influenced by any program. The findings in this report are based on the following primary data collection activities: interviews with six local government sponsors of the HERO Program, including the Western Riverside Council of Governments (WRCOG), the local government with primary responsibility for administering the program; one interview with Renovate America staff; interviews with 23 participating contractors; and, an online survey of the general population of single-family homeowners in parts of Riverside and San Bernardino counties where HERO initially launched (3,501 completed surveys). The study finds that: financing is an important factor for achieving larger energy efficiency improvement projects with multiple measures; HERO enables high-efficiency improvements in market segments that rebates do not penetrate; despite the popularity of HERO and PACE, there are still gaps in the market for residential energy efficiency financing; meeting contractor needs is the key to

delivering energy efficiency financing; and, program flexibility is crucial for contractor and customer appeal.

Volume 2: The HERO Program Savings Allocation Methodology Study, which is a companion report, compares different methodologies for determining the relative impact of financing and IOU rebates on a homeowner's decision to make an upgrade. Five candidate methodologies were identified for review: Self-report, Quasi-experimental analysis (QEA), Analytical hierarchy process (AHP), Expanded Self-report, and Discrete choice modeling (DCM). To collect data for the tests, Cadmus conducted a broad survey of utility customer homeowners in Riverside and San Bernardino counties, where the HERO Program has been active since 2012 and where Southern California Edison and Southern California Gas provide electric and gas services. The survey targeted the general utility customer homeowner population. However, because Cadmus expected the incidence of HERO and rebate participation within the general population to be very low, the study stratified the sample to include as many HERO and rebate participant contacts as possible. The analysis found that: HERO financing was more important than rebates in influencing homeowners' decisions; discrete choice modeling has important advantages and disadvantages relative to self-report; and, expanded self-report has important advantages and disadvantages relative to discrete choice modeling. From these findings it was recommended that the IOUs should conduct allocation studies of future IOU financing programs and that the IOUs should consider both discrete choice modeling and self-report methodologies as an option for conducting future financing program allocation studies.

The Cadmus Group, Inc. (2012, October 26). *Process Evaluation of California's Continuous Energy Improvement Pilot Program*. CALMAC Study ID SCE0394.01. Retrieved from http://www.calmac.org/publications/CA_CEI_Process_Evaluation.pdf

Abstract: The primary purpose for the Pilot CEI Program was to provide the IOUs with a learning forum for testing different Program concepts and implementation strategies. The process Evaluation of the CEI Pilot encompassed these activities: 1) Review other CEI-type Programs, 2) Determine customer perceptions of CEI, 3) Uncover CEI implementation barriers, 4) Investigate interactions between CEI and other IOU Programs, 5) Recommend how California's CEI Program might proceed. The IOUs collaborated well in designing similar Programs with distinct features and they communicated often after Program implementation began. Through regular Program meetings, CEI advisors discussed their customers' experiences, and these conversations enabled the Program managers to improve facility-level CEI implementation. Program managers reported learning a great deal from the Pilot. Participants also expressed satisfaction with the support they received through the Program thus far. In particular, they appreciated CEI advisors' free technical expertise, as this provided credibility regarding the participants' proposed projects, enabling some projects to move forward that otherwise would not have been implemented. Program managers, account executives, and CEI advisors highlighted the following lessons learned from the Pilot Program:

- Due to the level of commitment required by CEI, either AEs or CEI advisors screened customers before approaching them regarding Program participation.
- The recruitment of customers for Program participation produced mixed results.
- When initially approaching customers about the Program, recruiters found it was important to emphasize the commitment required for participation.
- Participating facilities may undergo unforeseeable changes. (For example, staff turnover or company expansions may impede a facility's ability to continue to participate.) Thus,

Program staff agreed off-ramps should be included in facility-level CEI plans, allowing customers to disengage from the Program while still maintaining a relationship with the IOU. This would also reduce the likelihood of IOUs investing money in Energy management consulting services without realizing results at facilities.

- Information provided by IOU staff to CEI advisors about other IOU Program offerings allowed for the leveraging of incentives or services such as equipment rebates or audits.
- The Program does not currently quantify or claim savings, and IOU staff voiced concerns that this may limit recognition of a full-scale Program's success and hinder the ability for the Program to receive funding in the future.

The Energy management Programs offered by NEEA, BPA, and BC Hydro have been evaluated and Energy savings achievements have been quantified. The methodology used in quantifying Energy savings through these Programs was based on a billing analysis approach.

The Cadmus Group, Inc. & DNV-GL. (2014, May). *Reach Code Subprogram 2010-2012 Process and Pilot Impact Evaluations, CALMAC Study ID CPU0070.02*. Retrieved from http://www.calmac.org/publications/PY2010-2012_Reach_Code_Study_Published.pdf

TRC Energy Services. (2015, February 27). *Residential ZNE Market Characterization, CALMAC Study ID PGE0351.01*. Retrieved from http://www.calmac.org/publications/TRC_Res_ZNE_MC_Final_Report_CALMAC_PGE0351.01.pdf

“6.1.2. Expand Market Actor Training and Collaboration

6.1.2.1. Expand Contractor and Subcontractor Training for ZNE-type Home Practices

Conclusion: **Builders reported that many subcontractors and builders of code-compliant homes do not have the knowledge needed to execute advanced building practices [i.e. zero-net energy qualified buildings] successfully. Building officials reported challenges in the code compliance process, both with homes built to code and those built above code.**

Recommendation: Continue and expand education efforts for builders and their contractors and trades regarding code compliance, and above code building practices. Use a multi-pronged approach to help transform subcontractor practices:

- The PAs—including staff at their educational facilities, CEC, and building departments—should develop methods for expanding outreach to reach builders and contractors/trades. This should include:
 - On-line training for those builders and contractors/trades that cannot attend in-person trainings.
 - Training provided at the building departments. Building officials could identify and invite their local contractors and subcontractors, and the PAs could provide the training. As a benefit for participating, building departments could offer builders faster permitting times or lower permit fees for their next application, or another incentive. However, this should be balanced with the need for more building department resources (discussed in Section 5.10.6).
- The CEC could potentially require that certain energy efficiency features be installed or verified by trained and certified contractors/trades.
- The PAs should work with builders to identify best practices for installing high performance measures correctly. This investigation should consider:

- Best practices under different subcontractor models (e.g., for builders that use their own crews, builders with preferred subcontractors, and builders that use a competitive bid process).
- Motivations for subcontractors for learning and implementing these practices.
- Subcontractor scopes of work in these best practices, which the PAs could consider providing as examples to other builders and subcontractors.” pp. 104-105

Turiel, I. (2009, November). *Comprehensiveness in California’s Small Retrofit Programs Within Local Government Partnerships, CALMAC Study ID CPU0047.01*. Retrieved from [http://www.calmac.org/publications/Local Government & Comprehensiveness 11-4-09ES.pdf](http://www.calmac.org/publications/Local_Government_&_Comprehensiveness_11-4-09ES.pdf)

Abstract: The purpose of this study is to provide the California Public Utilities Commission (CPUC) with an assessment of the Comprehensiveness of Small business Retrofit Programs that are administered by Local Government Partnerships (LGP) and determine if there is any correlation between the business model or theory of operation of a Small business direct install program, and that Comprehensiveness. Investor-owned utilities (IOUs) in California have engaged with both Local Governments and contractors to perform audits and installation of energy efficiency measures in Small businesses such as retail and food stores. This study focuses on LGP in examining Comprehensiveness with regard to measures considered and installed and also the approaches taken to accomplish their goals. For PG&E and SCE, lighting measures provide the majority of energy savings. For PG&E, there is a wide variation in the percentage of energy saved from lighting measures with some Programs deriving large percentages of savings from refrigeration and other measures. For SCE, the two Programs derive essentially all of their energy savings from lighting measures. For the PG&E Programs, the percentage of lighting energy savings that come from CFL installations ranges from 5% to 76%, and for the two SCE Programs the CFL percentages are 45% and 73%. For the PG&E Programs, there is a wide variation in business types reached by each program, and for the two SCE Programs, the number of business types is only four and six. However, for these two SCE Programs, one business type listed as retail or food store could comprise many sub types that are listed separately in the PG&E Programs. Therefore, additional investigation is needed to learn more about business types reached. Barriers to Comprehensiveness listed below were mentioned by at least several interviewees (utilities and Local Government):

1. The difficulty and cost of reaching all Small businesses.
2. The difficulty of overcoming the barrier to business owners of the initial cost of Retrofits.
3. The difficulty in meeting a benefit-to-cost ratio equal to or greater than 1.3 for measures other than lighting with the present TRC definition.
4. incentives are often too small to cost-effectively implement measures beyond lighting.
5. For some measures, there are no incentives (e.g., packaged air conditioners).
6. There are no payments for referrals to contractors who could implement additional measures.
7. The presence of split incentives when businesses rent space from others: the renters pay the utility bill, but the owners are responsible for investing in energy efficiency.
8. The difficulty in finding contractors who are trained and willing to do Small jobs such as strip curtains for refrigerator cases.
9. Rebates are not available for equipment replacements (e.g., HVAC or refrigeration equipment).

10. Some Local Governments do not have personnel who are trained to manage Retrofit Programs. The money offered by IOUs are not sufficient to hire new personnel.
11. Some Small businesses are hard to reach in rural areas.
12. The difficulty of convincing business owners that saving money through energy efficiency in difficult economic times is still worthwhile.

This study was managed by the California Institute for Energy and Environment (CIEE) under contract to the CPUC.

University of California, Berkeley Donald Vial Center on Employment in the Green Economy. (2014, May). *Workforce issues and energy efficiency programs: A plan for California's utilities*. Retrieved from <http://laborcenter.berkeley.edu/pdf/2014/WET-Plan-Executive-Summary14.pdf>

“Engage a Peer Review Group (PRG) of Key Workforce Stakeholders and Experts to Advise the IOUs on the Development and Review of the RFPs

We recommend that the IOUs form a Peer Review Group (PRG) to provide ongoing input into the statewide RFP process for the skills-building portfolio and help the IOUs’ access expertise on workforce development best practices and how to leverage the state’s existing training infrastructure.

The members of the PRG should be the same or similar to the Stakeholder Advisory Group overseeing the design and execution of this Guidance Plan contract, which includes state agencies such as the CWIB, DAS, and California Community Colleges Chancellor's Office (CCCCO), and leading advocates for environmental, labor, and low-income groups throughout the state. Other workforce development experts and SMEs can be added. The state agencies may determine that their participation is less critical in this forum once a Statewide energy efficiency Workforce Steering committee is established, as described below.

The role of the PRG should be to:

- Participate in the design of the RFPs for the skills-building portfolio by identifying guiding principles and criteria for project selection;
- Provide input on appropriate metrics of success;
- Participate in the review committees to select the winning bids;
- Advise IOUs on the selection of staff or technical consultants to administer the RFPs, including subject matter experts;
- Provide ongoing input and feedback as needed throughout program implementation; and
- Offer feedback on program effectiveness upon completion.

Staffing for Skills-Building Portfolios

The IOU staff/consultants who administer the RFPs should have workforce development expertise, experience, and good working relationships with the core education and training institutions for each energy savings and inclusion initiative.

The roles of staff/consultants administering the RFPs will be to:

- Draft RFPs based on the PRG’s guidance and priority-setting process outlined here;
- Propose workforce skills-building priorities for review by the PRG for each occupational category;
- Oversee the administration of the RFPs, including coordinating review processes; and

- Support implementation, including helping to convene regional training partnerships that can apply for funds; identifying opportunities to leverage funds and/or align efforts; providing technical assistance to applicants and grant recipients; and carrying out field reviews.” pp. 93-94

University of California, Berkeley School of Law's Center for Law, Energy and the Environment and UCLA School of Law's Emmett Institute on Climate Change and the Environment. (2016, March). *Powering the savings: How California can tap the energy efficiency potential in existing commercial buildings*. Retrieved from <https://www.law.berkeley.edu/wp-content/uploads/2016/03/Powering-the-Savings.pdf>

“Barrier #4: Lack of An Energy Efficiency Workforce to Execute and Market Retrofit Projects. Convening participants noted that the workforce lacks sufficiently trained and skilled workers who can both market and execute energy efficiency projects to a consistent degree. While policy makers, academics and other experts can study the problem to suggest solutions, many industry participants believed that the industry itself needs to enhance its training efforts. Some also suggested that a more competitive and lucrative market for energy efficiency contracting, spurred by regulatory reform and utility procurement practices, could encourage more privately held training programs for contractors. **As a result, this barrier could be symptomatic of the larger inability to develop a thriving energy efficiency market.** **SOLUTION: Identify Workforce Needs and Support Training Programs That Address Them.”** p. 20.

Wirtshafter Associates, Inc. (2005, June 3). *Evaluation of the 2003 Statewide Education and Training Services Program Final Report, CALMAC Study ID SCE0211.01*. Retrieved from http://www.calmac.org/publications/STE_Final_Report.pdf

Abstract: In addition to a process evaluation, case studies were conducted for each of the five statewide energy centers: PG&E's Energy Training Center (ETC), SCE's Customer Technology Application Center (CTAC), SCE's Agricultural Technology Application Center (AgTAC), SCG's Energy Resource Center (ERC), SDG&E's education and training seminars. The locally-funded PG&E Pacific Energy Center (PEC) was also included in this evaluation study. Case studies focused on specific challenges that each energy center was facing, providing requested information for center staff. Best practices in adult education were also surveyed and presented. Recommendations were made for further improvements.

“Findings from the Statewide Survey of Course Attendees

A satisfaction survey was conducted by phone with 318 attendees to the six centers in 2003. The results indicate:

- Overall satisfaction levels are quite good for the majority of ETS workshops, with nine out of 10 participants rating themselves satisfied with the workshop they attended.
- Similarly, nine out of 10 attendees would recommend the workshop they attended to a colleague.
- Overall, the strongest points of the workshops are the strengths of the instructors, with ‘technical knowledge of the instructor’ and ‘teaching skill of the instructor’ receiving favorable ratings by nearly all attendees.
- Eight out of 10 participants **feel that they better understand how to improve efficiency at their own facilities and are more likely to specify energy-efficient options in the future.**

- Three-quarters are more aware of high-efficiency solutions and have more confidence in the performance of these products.
- Approximately one-third of workshop **attendees report operational and maintenance changes** made as a result of their participation in the workshop.
 - A majority of participants feel that the course information will **influence future purchase decisions (64%)**.
 - About 10% of attendees **report subsequent participation in utility rebate programs** as a direct result of their workshop attendance.” p. E-5

Appendix C: Cited Research

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Appendix D: Issue Tracker

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0596	R	CAR - 9 Please note that "REALTOR®" is a collective membership mark owned by the National Association of REALTORS® and is used by C.A.R. with permission. Guidelines for using "REALTOR®" can be found on the National Association of REALTORS® website: www.realtor.org .	11/19/2016	NA-Input not applicable to this PA	not applicable
0699	R	NRDC provides a number of editorial and other recommendations for SCG consideration, but is not looking for any kind of acknowledgment regarding resolution.	11/20/2016	Addressed in Sector Chapter of BP	The residential chapter has been revised to reflect various recommendations by various stakeholders.
0808	R	EEFA - 1 While we understand many of the details for the other Program Administrators will be developed as part of the implementation plan, we want to draw attention to the BayREN multifamily recommendations as a model example for future efforts. We recommend that the PAs review the following sections: <ul style="list-style-type: none"> • Suggest reviewing BayREN entire multifamily section (pg. 2.21-2.30), as an example of a multifamily residential section that includes data, strategies, barriers and opportunities for the sector, and expand scope to include low income. • Suggest reviewing BayREN Figure 5 (Pg. 2.23) for example of characterizing multifamily. • Suggest reviewing BayREN Business Plan Figure 6 for example of program metrics (See p. 2.25, "BAMBE Completed Projects"). • Suggest reviewing SoCalREN p. 7 for characterization of different multifamily market segments. 	11/23/2016	Addressed in Sector Chapter of BP	See Residential Sector Market Characterization.
0809	R	EEFA - 2 Observations <ul style="list-style-type: none"> • IOU Business Plans do not currently provide information on On-Bill Financing terms for the multifamily residential sector. • Ordering Paragraph 51 of the November 10th ESA decision requires the following (see p.201 of final decision): 51. Pacific Gas and Electric Company, Southern	11/23/2016	Deferred to Implementation Plan or Program Design Stage	Specific modifications to the On-Bill Financing offering will be detailed in the implementation plans.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		<p>California Edison Company, San Diego Gas & Electric Company and Southern California Gas Company (four large Investor-Owned Utilities), in their program implementation plan, shall file addendums for their On-Bill Financing and On-Bill Repayment programs that should aim to: (1) better integrate On-Bill Financing and On-Bill Repayment with the Energy Savings Assistance Program Single Point Of Contact model that has been further established and empowered in this Decision and (2) consider and, if warranted, propose modified loan terms that are more accessible to the multifamily market. The plans shall identify strategies, update program design, and include detailed marketing plans to reach the multifamily sector, including the low-income occupied multifamily housing sector. The four large Investor-Owned Utilities must identify how they will utilize the Single Point of Contact budgets to include technical assistance for multifamily On-Bill Financing projects.</p> <p>Recommended Action</p> <ul style="list-style-type: none"> • Business Plans should commit to review On Bill Financing terms for low-income multifamily housing within 30 days of the final decision on the BP applications. • Viable financing options are important for supporting participation in multifamily programs. 			
0810	R	<p>EEFA - 3 Observations</p> <ul style="list-style-type: none"> • Business plans of PG&E, SCE, SDG&E, SCE, and SCG do not include market characterization for the multifamily residential sector, or low-income multifamily sector. • PG&E (p.10): "Sector Overview:" does not include market characterization of multifamily sector, lowincome sector, or low-income multifamily sector. BP also omits any description of overall approach to these sectors. • SCE (p.4): Sector Profile: Sector Overview: does not include market characterization of multifamily sector, low-income sector, or low-income multifamily sector. BP also omits any description of overall approach to these sectors. • SDG&E (pg. 19-20): Market Characterization and Segmentation: does not include market characterization of multifamily sector, low-income sector, or low-income multifamily sector. BP also omits any description of overall 	11/23/2016	Addressed in Sector Chapter of BP	See, Residential Sector Market Characterization. Multi-family buildings range from duplexes to high-rises with more than 100 units. Ownership varies with some properties being leased to residents and others owned by their occupants. Rental buildings can be owned by an individual or companies that own and operate hundreds of building nationwide. Some multi-family rental buildings house low-income residents and receive government subsidies that go towards

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		<p>approach to these sectors.</p> <ul style="list-style-type: none"> • SCG (p. 6): Market characterization: does not include market characterization of multifamily sector, low income sector, and low income multifamily sector. BP also omits any description of overall approach to these sectors. • SCG does not include any unique MF challenges, and characterizes barriers to serving single family and multifamily as generally the same. See p. 5-6 “Response to Sector Challenges.” Suggest reviewing SoCalREN “Target Audience” section on pgs. 6-8, or BayREN p.2.22, for a good example. • SoCalREN (p.8): Missing citations for footnote 14 and 15. <p>Recommended Action</p> <ul style="list-style-type: none"> • We acknowledge that the BPs are for general efficiency programs, but given the ESAP direction on OBF and the requirement that general EE coordinate with ESAP multifamily efforts, it would be an informative and necessary strategy to include these characteristics. • Include market characteristics on multifamily residential sector, including low income multifamily. These characterizations could help inform a more descriptive approach to coordinating with the ESAP multifamily offerings (see CHPC-EEFA comment #8 for more information) • The general EE portfolio programs should serve those Low Income Multifamily buildings that are not eligible for new ESA program, and understanding the market is an important aspect of outreach to the sector. • See ESA decision p.206, re: buildings that will be served under new ESA multifamily whole building programs: Eligible properties must meet the partial definition of deed-restricted in California Public Utilities Code Section 2852 (a)(A) further modified here. For this ESA Program multifamily effort, a property must be a multifamily residential complex financed with low-income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state, or federal loans or grants. The property must also house at least 65% of tenants with incomes at or below 200% Federal Poverty Guidelines, per ESA Program rules. 			<p>rent, or are owned and operated by a public housing authority. Still others are market rate. Nevertheless, the need for improvement varies from property to property, SoCalGas sees the need for continuous engagement of property owners and managers. This outreach and engagement can be as simple as a periodic reminder (email, direct mail) of available programs or direct communications by the utility Single Point-of-Contact.</p>

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0811	R	<p>EEFA - 4 Observations</p> <ul style="list-style-type: none"> The annual program timelines for Energy Upgrade California Home Upgrade Multifamily Program and lack of secured long-term funding is a barrier to participation, and has the potential to impact the perception of the program's success. Further, whole building energy efficiency projects for large multi-family take considerable time to develop; for example, in affordable housing properties, a large scale EE retrofit would be developed and implemented over the course of 1.5 - 3 years. PG&E and SDG&E's EUC multifamily whole building programs currently have waiting lists, and uncertainty about the programs delays the pipeline, thus preventing households from being served. <p>Recommended Action</p> <ul style="list-style-type: none"> Business Plans should provide for guaranteed funding allocations for 3-5 years and work with CPUC and annual advice letter process to make this possible. This change will provide more market certainty for potential program participants. All Business Plans should include as a barrier: Multifamily projects take longer to cultivate and implement. See pp. 23-25 of the Cadmus Multifamily Study, http://www.energydataweb.com/cpucFiles/pdaDocs/1000/ESA%20MF%20Segment%20Study%20-%20Volume%201%20Final%20Report%2012-04-13.pdf, citing timing of upgrades and long-term planning as critical needs for owners and barriers presented by existing programs. 	11/23/2016	Addressed in Sector Chapter of BP	Consistent with the rolling portfolio approach, annual adjustments to program funding levels will be made to meet increases in customer demand for energy efficiency programs, including customers in the Residential sector.
0685	C	<p>CPUC_Clinton - 4 This business plan presents strategies at a very high level, and it is impossible to connect the front-end discussion of market segments, opportunities, and barriers to the desired outcomes, strategies, or expected results.</p>	11/20/2016	Addressed in Sector Chapter of BP	Chapter reorganized and greater specificity provided including the connection among market segments, sector challenges, desired outcomes, sector-level strategies, program intervention strategies, and tactics.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0686	C	<p>CPUC_Clinton - 5</p> <p>By way of example:</p> <ul style="list-style-type: none"> · Page 15, Table D.2 for the desired outcome of “increased EE levels in EE in commercial leased properties”, indicates 8 program strategies in a bulleted list, of which one is “customer Incentives”. These names tell me nothing about the substance, nor how likely each is to support the desired outcome. THEN · Page 18, Figure 2 of barriers and intervention strategies, for the “Split Incentive” barrier (clearly related to the leased property situation), shows 3 intervention strategies – Direct Install, Small business Outreach, and Partnering. It is not at all clear to me how such intervention strategies will indeed tackle the leased property participation desired outcome and the problem of split incentives. FINALLY, · Page 23, Table D.4 descriptions of program intervention strategies, for the “Partnering” strategy, shows 3 aspects – utility, industry, and customer partnering. The descriptions refer to both “industry associations” generically, and “partnering with large property owners” to create actions plans for property management. · With regard to “customer incentives”, on p. 28 the table indicates Pay for Performance via ESCOs, and other options such as customized, deemed, bundled, and whole-building. I do not see how any of the described customer incentive strategies on pp. 28-29 would apply to the challenge of commercial leased properties per page 15. · I cannot connect the dots in a linear way across these tables and concepts to convince myself exactly how appropriate strategies will produce savings participation in leased properties. 	11/20/2016	Addressed in Sector Chapter of BP	Chapter reorganized and greater specificity provided regarding the connection between sector challenges and program intervention strategies and tactics. It's unlikely an individual program solution will overcome specific market barriers such as split-incentives. In response, a suite of program intervention strategies and tactics are presented to allow for customer choice and facilitate increased program participation.
0706	C	NRDC provides a number of editorial and other recommendations for SCG consideration, but is not looking for any kind of acknowledgment regarding resolution.	11/20/2016	Addressed in Sector Chapter of BP	The Commercial chapter has been revised to reflect recommendations by various stakeholders.
0852	C	<p>CPUC - 16</p> <p>Observation: Sector Challenge #4 iis “improper HVAC” replacement and maintenance</p> <p>Recommendation: Clarify what “improper” means. Not to code, not trained or not reight equipment?</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Sector Challenges discussion.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0853	C	CPUC - 17 Observation: The list of state legislation doesn't include AB802 (baselines, benchmarking or metered savings) Recommendation: Include AB802	11/27/2016	Addressed in Sector Chapter of BP	See, Legislation discussion.
0854	C	CPUC - 18 Observation: Each IOU has a different classification of segment and sub-segment Recommendation: Seems like a common classification of segment and sub-segment would be helpful for tracking participation penetration.	11/27/2016	Addressed in Sector Chapter of BP	See, EM&V section regarding need to conduct a market study to identify the unique segments within the commercial sector and to examine their unique characteristics, barriers, and trends within their specific segment or sub-segment.
0855	C	CPUC - 19 Observation: Penetration of participation in eligible population is not provided Recommendation: Provide statistics on the penetration of programs in customer segments not just energy savings and counts of total participants.	11/27/2016	Addressed in Sector Chapter of BP	See, Market Characterization section for customer energy usage, past participation and future energy efficiency potential.
0856	C	CPUC - 20 Observation: Figure 1-4 has almost no commentary on what the large difference in market and economic potential means for the programs and potential. Recommendation: Add a discussion of the implications of this difference for the commercial sector (why is it so big? What barriers does it represent?)	11/27/2016	Addressed in Sector Chapter of BP	Energy efficiency potential is based on the CPUC's study, which includes several assumptions on future potential. See, Navigant Potential Study.
0857	C	CPUC - 21 Observation: "Significant Market Adoption" is cited Recommendation: Provide quantitative estimate of "significant"	11/27/2016	Addressed in Sector Chapter of BP	Discussion is revised.
0858	C	CPUC - 22 Observation: Objective of increasing adoption levels does not capture the breadth or depth of this expectation. Recommendation: Specify if the intent is to increase the impact per customer or the penetration of the customer base (or both)	11/27/2016	Addressed in Sector Chapter of BP	See, Commercial Sector Metric Table that identifies specific metric targets based on energy savings. Consistent with SB 350 to achieve a cumulative doubling of energy efficiency in California by 2030, the objective is to capture additional energy savings, in total.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0859	C	<p>CPUC - 23</p> <p>Observation: Percieved market barriers table includes many market barriers that are relevant.</p> <p>Recommendation: High first cost shouldn't be limited to ZNE discussion; Captial planning extending beyond program cycles seems to be moot in a rolling portfolio cycle paradigm (if plans are in place the influence and role of the program is questionable – creates a barrier to claiming savings but not necessarily the project); Statement that “not enough work has been done to measure and validate the energy savings generated by the programs” needs to be more specific (this may be specific to gas programs only).</p>	11/27/2016	Addressed in Sector Chapter of BP	Revised. The market barriers discussion directly linked to each sector challenge and corresponding goal.
0860	C	<p>CPUC - 24</p> <p>Observation: Sector metrics are “high” and “increase” ; Increase in EE Levels of commercial leased properties is not clear.</p> <p>Recommendation: Make them more specific and actionable to identify numbers of participants, or percent of eligible population (breadth) or more adoptions by customers (depth) ; decrease in endues intensity of commercial leased property is more tangible.</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Commercial Sector Metric Table. Sector metrics have corresponding metric targets that propose specific numeric values over next 10+ years.
0861	C	<p>CPUC - 25</p> <p>Observation: the 10 year visioin of “increased installation and improved maintenance of HVAC” is not hitting on the objective of the interventions. Likewise the sector metric is increase in EE savings in HVAC – but that may not align with vision and goal.</p> <p>Recommendation: Modify to specify the goal is increased high quality installations (if that is the goal); and/or increase in high efficiency HVAC installations, or orient the vision to the skills needed to get at the problem statement – like trained work force to ensure quality installations and high efficiency recommenations across the service territory?</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Commercial Sector Metric Table. Proper installation (aka, high quality) represents appropriate installation consistent with manufacturer specifics and local codes. Tactics will be sought from the third party implementer community to best accomplish this goal.
0862	C	<p>CPUC - 26</p> <p>Observation: Strategic Energy Management is cited as a strategy</p> <p>Recommendation: Ensure the definition used is consistent with that for detailed program being developed for Industrial – and all of the components of evaluation (specifically segregation of capital projects v. BROs).</p>	11/27/2016	Addressed in Sector Chapter of BP	The Strategic Energy Management will be guided by the statewide working group proposal for the industrial sector.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0867	C	CPUC - 5 Need sector chapters included in TOC.	11/27/2016	Addressed in Sector Chapter of BP	Agreed. Business Plan Table of Contents includes sector chapter contents.
0868	C	CPUC - 6 Budgets & Cost-Effectiveness- All TBD from 2018-2028. No estimates of savings.	11/27/2016	Addressed in Sector Chapter of BP	See, Commercial Sector Budget, Cost-Effectiveness, and Savings discussion. Energy savings forecast and corresponding annual budgets provided.
0869	C	CPUC - 7 Need better understanding of Intervention Strategies.	11/27/2016	Addressed in Sector Chapter of BP	Revised. Greater explanation of the program intervention strategies and their relationship to sector challenges and goal achievements.
0870	C	CPUC - 8 Very high level commercial chapter.	11/27/2016	Addressed in Sector Chapter of BP	Revised. To provide deeper discussion of sector challenges, goals, sector strategies and program intervention strategies.
0871	C	CPUC - 9 Observation: This is a very short paragraph on Third Party implementation. More information on how SCG will meet CPUC guidance for third party programs based on D.16-08-019. Table F.1: Program Solicitation Schedule- all TBD (very high level)	11/27/2016	Addressed in Sector Chapter of BP	See, Transition Plan section within the Executive Summary of the Business Plan.
0872	C	CPUC - 10 Sector Metric table (appendix A)- the only metric source is program tracking data. How about looking at additional sources for this sector.	11/27/2016	Addressed in Sector Chapter of BP	See, Performance Sector Metrics discussion. Specific numerical targets provided for each metric over a ten-year period. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the program administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
					and removing the subjectivity from determining goal achievement.
0905	C	CPUC-CF - 22 Observation: - Didn't have time to make the same comments for all IOU commercial chapters. Recommended Action: - All IOUs should review and incorporate the intent and ideas in the above into your commercial chapters, clarifying where such activities advance 2030 commercial building goals, and when/where they advance other goals	11/27/2016	Addressed in Sector Chapter of BP	See discussions in the Commercial chapter.
1043	C	CEE - 11 Observations (re Poor Installation Quality) [See source document] Recommended Actions: Amend sections to recognize that improper installation of lighting systems and other efficiency measures also reduce achieved energy savings.	11/27/2016	Addressed in Sector Chapter of BP	Lighting systems not applicable to the SoCalGas Business Plan. Improper installation of other gas-related energy efficiency equipment has not been identified as a sector challenge.
1044	C	CEE - 12 Observations Coalition supports objective to "Support the proper installation, maintenance, and use of HVAC systems in the commercial sector." However, this section then goes on to say that it will achieve this by partnering with "electric utilities and key market actors to offer a simplified suite of programs that capture and recognize all realized HVAC-related EE savings." This second sentence of the objective is vague and doesn't appear targeted to address the quality installation and maintenance objective stated in the first sentence. Recommended Actions: Delete second sentence. See CEE-2 for more specific recommendations for addressing workforce quality in the Business Plan.	11/27/2016	Addressed in Sector Chapter of BP	To increase program participation, the business plan proposes to simplify program participation. Such simplification will be examined in collaboration with the energy efficiency service provider community, the customer, and the regulator. Industry partnering will be applied to achieve specific tactical objectives including proper HVAC installation and maintenance consistent with local codes and manufacturer specifications.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1045	C	<p>CEE - 13</p> <p>Observations Coalition supports tactical objective to “Train facility staff to create in-house expertise to develop permanent EE practices, improved process efficiency, and on-going benchmarking monitoring.” However, this objective should be amended to align with the development of certification programs for the operation and maintenance of building energy efficiency systems.</p> <p>Recommended Actions: Amend as follows: “Support development and provision of operational certification programs to train facility staff to create in-house expertise to develop permanent EE practices, improved process efficiency, and on-going benchmarking monitoring.”</p>	11/27/2016	Addressed in Sector Chapter of BP	Uncertain whether a certification approach is the optimal strategy to achieve the desired outcome. However, specific programmatic solutions will be sought from the third-party EE service provider community as part of a competitive solicitation process.
1046	C	<p>CEE - 14</p> <p>Observations The Market Sector Overview table, Market Barriers & Program Intervention Strategies table and Sector Metric table identify improper HVAC replacement and maintenance as a barrier to achieving energy savings and as a barrier to achieving performance certainty for customers, but none of the program strategies listed directly address this issue. The strategies consist solely of buzzwords and lack any substance or meaning. SoCalGas fails to support its assumption that these vague, indirect strategies will significantly increase the number of properly installed and maintained HVAC systems with any evidence or analysis. The only study for addressing this issue is the UCB-DVC study. The UCB-DVC study recommendations should be adopted as program strategies.</p> <p>Recommended Actions: See CEE-2.</p>	11/27/2016	Addressed in Sector Chapter of BP	The Commercial chapter is revised to clearly connect sector challenges, such as proper HVAC replacement and maintenance, with program intervention strategies intended to overcome the identified market barriers.
1047	C	<p>CEE - 15</p> <p>Observations Figure 1: Market Barriers and Program Intervention Strategies identifies performance uncertainties as a barrier to energy efficiency efforts because “Customers are uncertain of claimed benefits associated with energy efficiency equipment.” The Business Plan then lists the following strategies to address this issue: Intelligent Outreach, Strategic Energy Management and Small Business Outreach. None of the program strategies directly address the issue of performance not meeting claimed</p>	11/27/2016	Addressed in Sector Chapter of BP	The Commercial chapter is revised to clearly connect sector challenges with program intervention strategies intended to overcome the identified market barriers. In this instance, the barrier exists prior to customer taking action. Utility-delivered outreach can inform customers regarding the benefits

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		benefits. Recommended Actions: Address through EM&V of actual savings and through workforce training and quality standards to better ensure that field installations match lab installation. See CEE-2 and CEE-10.			associated with energy-efficient equipment so they do take action. Post-installation performance was identified as a key market barrier.
1075	C	CPUC-JST - 05 PGE states “high tech customers are responsible for 22% of commercial electricity consumption yet have the lowest participation rate in EE reveals the need to target this segment to capture savings potential “but does the definition of high tech include high tech companies with long term sustainability plans and possibly higher levels of free-ridership. And are these definitions for “high tech” and “bio-tech” similar across the other PA’s?	11/28/2016	NA-Input not applicable to this PA	Not applicable.
1238	C	CSE - OA - 1 While the commercial sector includes large, medium, and small commercial buildings, CSE encourages all PAs to empower building owners, of all sizes, to more effectively manage the energy of their buildings. CSE feels there are complementary roles to play among the PAs serving owners in the same territory, specific to building size and customized tools for a specific building subset (e.g., if BayREN and MCE are to focus on the smaller buildings, then how can PG&E’s offerings support medium and larger buildings). o In particular, large commercial building owners (and large portfolio owners) are already quite sophisticated when it comes to energy management, so the focus becomes how to continue to engage with them effectively to: 1) get persistent savings; and 2) share their stories of success with medium and small business owners.	11/28/2016	Addressed in Sector Chapter of BP	The Commercial chapter seeks to capture energy efficiency opportunities across all segments and customer sizes.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1239	C	<p>CSE-OA-2</p> <p>As much as PAs are equipped to do so, and CSE would argue that PAs are uniquely equipped (the IOUs in particular), business plans should align with the market as it relates to energy efficiency in the commercial sector. The commercial sector craves standardization and continuity. As such, the business plans play an integral role in laying the groundwork for and enabling continued participation by the commercial sector in improving energy efficiency in their buildings.</p> <ul style="list-style-type: none"> o CSE encourages all of the PAs to engage CRE stakeholders (BOMA, IREM, USGBC) more regularly and uniformly, so as to better understand the needs and opportunities of the commercial sector in improving building performance. 	11/28/2016	Addressed in Sector Chapter of BP	See, Key Partners discussion. Industry partnering will be initiated to overcome various market barriers through collaboration with specific industry market groups.
1240	C	<p>CSE-OA - 3</p> <p>While numerous business plans touched on AB 802 specific to efficiency standards, few plans elevated the importance of and opportunity in the state's new benchmarking program.</p> <ul style="list-style-type: none"> o The forthcoming statewide benchmarking program has an unprecedented opportunity to weave together building-level information with business plan goals for the commercial and multifamily sectors. o The IOUs should create online benchmarking portals allowing them to provide and collect building information; an even more robust data set can be accessed when using Portfolio Manager Web Services as utilities can pull building profile information back from Portfolio Manager submissions. o The implementation of the new benchmarking program will require commercial and multifamily buildings (larger than 50,000 sq. ft. according to current draft regulations) to benchmark their buildings. This act, to happen annually, will foster an already growing industry practice to track building performance. Business plans can best serve the commercial sector by not duplicating program offerings, but rather making sure key services (i.e., audits) can be accessed statewide. 	11/28/2016	Addressed in Sector Chapter of BP	See, Intelligent Outreach. Benchmarking is an integral tactic for the commercial sector.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1241	C	CSE - OA - 4 While there will be statewide programs for the commercial sector specific to HVAC (up/midstream) and Savings by Design, CSE strongly encourages PAs and the Commission to consider additional statewide coordination in working with commercial buildings. CSE feels that PG&E included several excellent ideas for engaging commercial owners [e.g., complementing energy audits with project development assistance and partnering with large customers to develop long-term strategic energy management plans. (Pg. 26)], and CSE would like to see those offerings implemented throughout the state. CSE is disappointed that PAs did not choose downstream pilots, such as the Commercial Energy Advisor, as suggested in D.16-08-019.	11/28/2016	Addressed in Sector Chapter of BP	See, Partnering discussion, which includes a focus on commercial property owners and a development of action plans. See, Statewide Program Coordination and Transition Plan for programs that will be statewide and supporting rationale.
1242	C	CSE - OA - 5 CSE was encouraged that several business plans incorporated ideas for elevating the tie between energy efficiency in buildings and grid reliability. In particular, SCE wrote about its IDSM Grid Reliability Rapid Response Pilot, where “this pilot will supply a rapid response set of EE, DR, Solar, and IDSM solutions to help alleviate grid restraints” (Pg. 24). Given the recently published Phase III scoping memo and mention of “locational targeting or sourcing of energy efficiency”, it certainly seems that business plans looking to incorporate and emphasize this strategy are correctly anticipating the strength of these pilots and the potential for scalability.	11/28/2016	Addressed in Sector Chapter of BP	See, Customer Incentives discussion regarding varied customer incentive based on location.
1243	C	CSE - 1 “The commercial sector is trending towards more leased properties creating a larger split incentive barrier between owners and tenants”. ☐ CSE encourages SoCalGas to refer to DOE’s Green Lease Library as well as the newly launched Landlord-Tenant partnership for more information on addressing the split incentive.	11/28/2016	Addressed in Sector Chapter of BP	See, Goals, Strategies, and Tactics section in the commercial sector chapter for a discussion on green lease solutions to help overcome the split incentive barrier for certain commercial customer groups.
1244	C	CSE - 2 Overall, the plan is not particularly specific to gas efficiency. The commercial sector objectives are quite vague.	11/28/2016	Addressed in Sector Chapter of BP	The Commercial sector goals are revised to provide greater specificity.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1245	C	<p>CSE - 3</p> <p>“Due to the limited natural gas usage within this segment and the need to simplify customer engagement in the delivery of DSM programs, SoCalGas proposes to coordinate program delivery with local utilities (electric, water), where practicable. This will allow for a single customer engagement and will empower the customer to implement a complete energy (and water) efficiency plan.”</p> <p>☐ Please provide more specificity on the coordinate program delivery in the final plan.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Partnering discussion, which includes a tactic to co-delivery programs with electric utilities and water agencies.
1409	C	<p>ORA - 1</p> <p>The Business Plan should address barriers and shortcomings of current utility practices. This should begin with a clear discussion of the sector characteristics and what SoCalGas has done in the past as a baseline against which new strategies can be judged.</p> <ul style="list-style-type: none"> o Table A.2, for example, which list new program intervention strategies, should match Section 2 and compare the proposed programs with prior cycles. The information about prior cycles provides a baseline for understanding the proposed changes in the new cycle. o Section 3, which describes market barriers, needs to be much more detailed and better documented; documentation of market barriers should include discussions of past EM&V reports and evidence from SoCalGas’ experiences in prior cycles. 	11/28/2016	Addressed in Sector Chapter of BP	The commercial chapter has been revised to provide greater connectivity between sector challenges, market barriers, and sector-level strategies including specific program intervention strategies. References to applicable EM&V studies are included.
1410	C	<p>ORA - 2</p> <p>The link between Problems (Barriers) and strategies is not clear because SoCalGas applies the same strategies regardless of the problem.</p> <ul style="list-style-type: none"> o Table D.2 lists three different problem statements but the same program strategies for each. If the strategies are designed to address barriers, this is unlikely to be the case. 	11/28/2016	Addressed in Sector Chapter of BP	The Commercial chapter is revised to provide greater connectivity between sector challenges, market barriers and sector-level strategies including specific program intervention strategies. It is unlikely one program will overcome a market barrier for all commercial customers. A coordinated suite of program offerings, which allows for customer choice, is the preferred approach. This approach also allows the energy

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
					efficiency program portfolio to quickly adapt to dynamic changes in the market and in regulatory policies.
1411	C	<p>ORA - 3</p> <p>Performance Metrics need to be much clearer and baselines need to make sense for metrics o For example: The first line of the table in Appendix A: Sector Metrics uses participation levels as a baseline for a metric that is measuring savings. This is inappropriate since participation levels cannot tell us whether greater levels of savings are achieved.</p> <ul style="list-style-type: none"> o In general, there will be participation metrics and energy savings metrics -- and then proportions of savings from different market segments. o It is difficult to judge the usefulness of targets and whether they are reasonable measures of success/failure in the absence of (1) numbers that specify the baseline and (2) information showing that SoCalGas’s goals are ambitious and achievable. o Failure to specify the actual baseline and targets means that a crucial element of SoCalGas’s commercial sector business plan will not be adequately vetted with stakeholders prior to filing. 	11/28/2016	Addressed in Sector Chapter of BP	See, Commercial Sector Metric Table. Commercial chapter proposes specific metric targets to increase program participation and energy savings. Source of metric baselines are provided.
1412	C	<p>ORA - 4</p> <p>Budgets should be specified for the full ten-year business plan period and should align with market characterization and intervention strategies over the short-, medium- and long-term.</p> <ul style="list-style-type: none"> o The absence of budgets makes it difficult to assess whether SoCalGas’s request for resources aligns with its analysis of the needs in the public sector and its proposed intervention strategy. o Failure to specify the budget means that a crucial element of SoCalGas’s commercial sector business plan will not be adequately vetted with stakeholders prior to filing. 	11/28/2016	Addressed in Sector Chapter of BP	See, Performance Sector Metrics discussion. Specific numerical targets provided for each metric over a ten-year period. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the program administrator’s data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels and removing the subjectivity from

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
					determining goal achievement.
0962	I	<p>CPUC-Hardy - 2</p> <p>Program intervention strategies include a “simplified suite of financial incentive strategies” that is not clearly described unless it refers to everything that follows – that is unclear.</p> <p>The chapter notes that a simplified approach to program delivery in the industrial sector but does not provide specifics. In a response to an earlier comment regarding CAEECC proceedings, SCG says “The business plan proposes a simplified, low hassle customer engagement for all EE programs. This requires a collaborative examination by administrators, implementers and regulators of current program requirements to significantly reduce the customer hassle factor” (p. 47, highlight added). This is absolutely correct. In light of issues such as low realization rates and high freeridership noted in the industrial sector, approval of the business plan cannot be assumed to be approval of any program delivery approach that bypasses known issues through “simplification.”</p> <ul style="list-style-type: none"> · Generally, the strategies do not acknowledge the direction provided in D. 16-08-019 respecting industrial projects although the decision is included in the list of Legislative/Commission directives and SEM is properly called out. · As with the Ag chapter, this is a kitchen sink of strategies that is perhaps setting up a situation where SCG can submit any type of IP for the industrial sector. There is no explanation in the chapter as to why these strategies are 	11/27/2016	Addressed in Sector Chapter of BP	See, discussion in Approach to Achieve Industrial Sector Goals section, Challenge 2, regarding the limited resources of smaller industrial customers to pursue equipment retrofits. This barrier does not extend to the customer's participation in energy efficiency programs. However, to increase program participation, the business plan proposes to simplify program participation. Such simplification will be examined in collaboration with the energy efficiency service provider community, the customer, and the regulator. Additional discussion provided to show how program strategies are linked to sector-level strategies to support goal achievements. Industrial chapter recognizes current CPUC policies directed at the sector including the application

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		<p>appropriate and whether they are appropriate for different customer sizes.</p> <ul style="list-style-type: none"> Note that the bibliography lists CPUC Studies but all but one are IOU studies (there is also a joint study). Also, the bibliography does not list the most recent impact evaluation (2014) and there is no indication in the chapter that any of the recommendations have had any effect on program development. Thank you for your responses to my comments. I continue to be concerned about the proposal for top down, P4P projects in the industrial sector and reiterate that such projects would be available for building-envelope type projects and not as an overall approach including what are currently custom projects. Generally, the intervention strategies are so numerous and broad that it raises concerns about the contents of the implementation plans. 			<p>of existing baseline for process-oriented projects under a strategic energy management approach and building-related projects similar to commercial sector. References added to support discussion. D.16-08-019 notes additional policy determination for the industrial sector will be addresses in Phase III. The sector approach is designed to adapt to dynamic changes in the market and evolutions in regulatory policies.</p>
1420	I	<p>ORA - 1</p> <p>There is no discussion of past programs and evaluation of past experiences.</p> <ul style="list-style-type: none"> The discussion of past programs should act as a benchmark for understanding current barriers and justifying and informing new strategies for addressing these barriers. Lessons from EM&V need to be discussed or incorporated. 	11/28/2016	Addressed in Sector Chapter of BP	<p>The industrial chapter was developed from gap analysis which included past evaluations. The chapter provides the appropriate references to prior evaluation studies and corresponding discussion to help shape the Industrial sector approach.</p>
1421	I	<p>ORA - 2</p> <p>The large industrial customer segment requires additional discussion and articulation of goals and strategies for achieving savings.</p> <ul style="list-style-type: none"> The goal of increased adoption by small/micro industrial customers does not provide appropriate specificity. The goal should identify the amount of savings that could be achieved from this group, based on evidence, and describe past strategies and lessons learned to help educate potential bidders. This segment is only 8% of market share but the majority of the discussion and goals relate to this relatively small portion of the industrial class. Plan needs to address the 92% of gas usage by large industrial customers. 	11/28/2016	Addressed in Sector Chapter of BP	<p>See, Market Characterization section that addresses energy efficiency potential within the smaller-sized industrial customer group. The smaller-sized customer represents over 90% of the industrial sector customer base. SoCalGas has a rich history of serving their large and very large customers as evidenced by past program participation and savings data. SoCalGas will continue to serve this market through current</p>

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
					program offerings as well as new, yet-to-be-solicited offerings. The smaller-sized customers in this segment are historically underserved, as captured in the gap analysis. SCG will explore new offerings to cost-efficiently serve this market.
1422	I	<p>ORA - 3</p> <p>Market Barriers are not documented -- each barrier is met using the same program strategies.</p> <ul style="list-style-type: none"> o BP lacks specificity about how and why strategies will work and where and when they will be used. o Tables d.1-d.3 use the same set of overly broad strategies for each of the identified market barriers. 	11/28/2016	Addressed in Sector Chapter of BP	Additional discussion provided on how strategies will overcome specific barriers. Specific program designs will be sought through competitive program solicitations.
1423	I	<p>ORA - 4</p> <p>Budgets should be specified for the full ten-year business plan period and should align with market characterization and intervention strategies over the short-, medium- and long-term.</p> <ul style="list-style-type: none"> o The absence of budgets makes it difficult to assess whether SoCal Gas's request for resources aligns with its analysis of the needs in the public sector and its proposed intervention strategy. o Failure to specify the budget means that a crucial element of SoCal Gas' industrial sector business plan will not be adequately vetted with stakeholders prior to filing. 	11/28/2016	Addressed in Sector Chapter of BP	See, Sector Budget table, which proposes annual, budgets from 2018-2025.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1424	I	<p>ORA - 5</p> <p>Performance metrics should have concrete targets in order to judge the success or failure of intervention strategies.</p> <ul style="list-style-type: none"> o Metrics should also measure the quality of participation and progress towards goals such as energy savings rather than solely based on participation. o Targets should be specified. o It is difficult to judge the usefulness of targets and whether they are reasonable measures of success/failure in the absence of (1) numbers that specify the baseline and (2) information showing that PG&E's goals are ambitious and achievable. o Failure to specify the actual baseline and targets means that a crucial element of PG&E's public sector business plan will not be adequately vetted with stakeholders prior to filing. 	11/28/2016	Addressed in Sector Chapter of BP	See, Performance Sector Metrics discussion. Specific numerical targets provided for each metric over a ten-year period. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the program administrator's data requirements (e.g., energy savings, customer participation, etc.). This approach improves the accuracy and timeliness of metric tracking while keeping the monitoring costs to reasonable levels and removing the subjectivity from determining goal achievement.
0788	A	<p>CFBF - 1</p> <p>Link between Water and Electric Usage</p> <p>Attached is a slide titled Electricity Rates and Water, which depicts the electricity usage changes relative to reduced surface water allocations, covering some drought years. The impact is particularly relevant for the SCE and PG&E territories, as SDG&E agricultural water sources differ from those in the other two territories. It is important to recognize that there is significant variability in load by agricultural customers, because determinative externalities – surface water and rainfall – are not under their control and predictions about those externalities must constantly be updated. Because usage can vary from one year to the next in a substantial way, measurements of usage must account for the variability and incorporate a level of flexibility that may be unique to agricultural customers.</p>	11/23/2016	NA-Input not applicable to this PA	Not applicable.
0789	A	<p>CFBF - 2</p> <p>Water Pumping is the Common Link among Agricultural Operations The PAs all recognize the diversity of the agricultural class, however, water usage and pumping equipment is central to substantially all agricultural operations, and thus is the key portal to energy savings on</p>	11/23/2016	NA-Input not applicable to this PA	Not applicable.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		California farms.			
0790	A	CFBF -3 TOU Periods Over the next few years, electric users will be facing significant changes to TOU periods, which will have an unknown effect on electric costs. As yet, no specific timeline is available for the transitions to new TOU periods. Depending upon how customers elect to adapt to the new periods, changes in usage could be driven by that new element.	11/23/2016	NA-Input not applicable to this PA	Not applicable.
0791	A	SFBF - 4 Regulatory Changes Agricultural customers statewide are facing significant regulatory mandates affecting their operations in labor and water management. Because such mandates drive inputs into electricity usage in this sector, usage is driven by compliance with such requirements and may impact abilities to make or apply operational/equipment changes.	11/23/2016	NA-Input not applicable to this PA	Not applicable.
0792	A	CFBF - 5 In response to previous comments on agricultural sector business plans, reference has been made by all PAs to the legalization of marijuana. Because it has been a product grown in the shadows and illegally, careful consideration should be given to the development of benchmarks for such operations and the administration of program funding to such operations. Balanced review and thought must be afforded between such new entrants to the sector and traditional producers who have undertaken continuing efforts to increase the efficiency at which all inputs are used to grow crops.	11/23/2016	Addressed in Sector Chapter of BP	See, Key Trends discussion regarding federal laws and state legalization.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0961	A	<p>CPUC - Hardy - 1</p> <p>A kitchen sink approach to programmatic approaches that appears to set the course for submission of any type of implementation plan; no explanations of why certain approaches, such as direct install or comprehensive direct install are appropriate. This should be a red flag for CPUC staff.</p> <ul style="list-style-type: none"> · For some reason includes comments that were submitted on the PGE draft ag chapter that was submitted early for review. · Does not address direction in D. 16-08-019 regarding Ag programs, AB802 type approaches, and custom projects (see p. 43). · Bibliography includes no CPUC sponsored studies whatsoever. This is troubling as both ex ante and ex post review have identified issues with measure eligibility in the Ag sector. · Overall, this is a general chapter that does an OK job at describing the sector, proposes a wide variety of program approaches with no justification, does not address issues with standard practice or other measure-related eligibility, does not really lay out what measures are realistic for the gas company, does not go in depth into dual-fuel type programs or partnerships with water agencies that are critical points of program development. 	11/27/2016	Addressed in Sector Chapter of BP	<p>Additional discussion provided to show how program strategies are linked to sector-level strategies to support goal achievements.</p> <p>Agricultural chapter recognizes current CPUC policies directed at the sector including the allowance of operational and maintenance energy savings and retrocommissioning using existing baseline and normalized metered energy consumption. The sector approach is designed to adapt to dynamics in the market and in regulatory policies. References added to support discussion.</p>
1402	A	<p>ORA - 1</p> <p>SoCalGas should incorporate a discussion of market characterization from this section into strategies for its business plan.</p>	11/28/2016	Addressed in Sector Chapter of BP	Market characterization sections among all sectors have been revised for consistency.
1403	A	<p>ORA - 2</p> <p>SoCalGas should precisely identify how natural gas is used in the agricultural sector.</p> <ul style="list-style-type: none"> o Market barriers identified focus on issues affecting the agricultural sector in general but are not related to how the sector uses natural gas (the main product), or any barriers of access to natural gas. 	11/28/2016	Addressed in Sector Chapter of BP	See, Market Characterization discussion. The sector goals reflect a focus on natural gas energy efficiency solutions for customers.
1404	A	<p>ORA - 3</p> <p>Business Plan identifies that there are limited natural gas EE programs, but does not provide a strategy to increase innovation to address this problem within the sector.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Sector Strategy discussion related to Goal 3. SoCalGas will collaborate with agricultural industry to identify emerging natural gas technologies and to increase adoption levels of those energy efficiency technologies.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1405	A	ORA - 4 Partnering with electric IOUs needs to be clearly defined o Which program interventions will be co-delivered and who will claim credit for implementation?	11/28/2016	Addressed in Sector Chapter of BP	See, Partnering discussion. Such partnering is conducted through co-funding agreement among two or IOUs. Sharing of program costs and benefits are detailed in each co-funding agreement among IOUs.
1406	A	ORA - 5 The business plan should identify the need for new construction in the agricultural sector or redesign the incentive program o In Table D4, SoCalGas describes a plan to offer agricultural sector participants customized EE retrofits, including new construction, but has not identified a need for the EE retrofit.	11/28/2016	Addressed in Sector Chapter of BP	See, Customer Incentives program intervention strategy and the Energy Efficiency Potential & Realized Energy Savings discussions. New construction incentives will also apply to this sector. Based on current estimated energy efficiency potential there is significant retrofit opportunities.
1407	A	ORA - 6 The midstream equipment finance incentive program should be targeted. o SoCalGas indicates that, based on identification of the market sector, midstream equipment is not frequently purchased and there is little to no turnaround of this equipment. o SoCalGas should identify how the incentive program will be effective in light of low turnover of this equipment.	11/28/2016	Addressed in Sector Chapter of BP	The EE service provider community will be solicited for programs to help improve customer adoption of EE equipment in this sector. The incentive offerings coordinated with other program intervention strategies such as Intelligent Outreach are expected to increase energy efficiency adoption levels.
1408	A	ORA - 7 IDSR offerings and resources are incomplete.	11/28/2016	Addressed in Sector Chapter of BP	See, Cross-cutting Sector Coordination section.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0711	P	NRDC - 2 p.18 Metric #1 – if the outcome is to have public entities self-sustaining, why is the metric participation in programs? · P.22 – what is SCG’s plan for how to do an “integrated program strategy deployment.” Given the moving parts, statewide, and third party bidding, how does SCG hope to achieve this? · P.36 – might have missed this in the other chapters (and understanding this is a draft) but need to provide more rationale for which programs and why SCG should keep them.	11/22/2016	Addressed in Sector Chapter of BP	Public sector metrics are revised. See, Public Sector Metric Table. As the Program Administrator, SoCalGas is uniquely positioned to coordinate program design and deployment both on a local and statewide level. An integral part of SoCalGas responsibilities includes the integration of DSM offerings as summarized in the Cross-cutting Sector Coordination section. The Public chapter is revised to provide greater connection between sector challenges and program intervention strategies.
0712	P	NRDC provides a number of editorial and other recommendations for SCG consideration, but is not looking for any kind of acknowledgment regarding resolution.	11/22/2016	Addressed in Sector Chapter of BP	The Public chapter has been revised to reflect various recommendations by various stakeholders.
0818	P	NAESCO - 3 The draft BPs do not appear to offer the detailed bidding plans that the Commission requires. [See more detail in source document in relation to this question]	11/27/2016	Addressed in general section of BP or Testimony in Application	See, Transition Plan section in the Executive Summary chapter.
0819	P	NAESCO- 4 The draft BPs appear to offer no plan or schedule for the implementation of the clear mandate of AB 802 that the measurement of EE program savings be reset to existing baselines and that the measurement of savings be based on normalized energy meter (NEM) analysis. [See more detail in source document in relation to this question]	11/27/2016	Addressed in Sector Chapter of BP	See, Program Intervention Strategy discussion, within the customer sector chapters, regarding metered-based energy savings estimates and implementation timeframes.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0820	P	NAESCO - 5 The draft BPs appear to offer no realistic approach to the mandate of SB 350 that the California EE programs double their production of energy savings and their reduction of GHG emissions. [See more detail in source document in relation to this question]	11/27/2016	Addressed in Sector Chapter of BP	SB 350 call for a doubling of energy savings in California by 2030. IOU energy efficiency programs will contribute to this goal but it is not expected that the programs will carry the full burden of the state's goal. The Business Plan sets forth extensive program intervention strategies that will enable achievement of the CPUC energy efficiency goals. Thus supporting the State's energy savings goal.
0821	P	NAESCO- 5 The draft BPs appear to offer no realistic approach to the mandate of SB 350 that the California EE programs double their production of energy savings and their reduction of GHG emissions. [See more detail in source document in relation to this question]	11/27/2016	Addressed in Sector Chapter of BP	SB 350 calls for a doubling of energy savings in California by 2030. IOU energy efficiency programs will contribute to this goal but it is not expected that the programs will carry the full burden of the state's goal. The Business Plan sets forth extensive program intervention strategies that will enable achievement of the CPUC energy efficiency goals. Thus supporting the State's energy savings goal.
0822	P	NAESCO - 6 The draft BPs appear to be incomplete, in that they do not include all of their currently planned EE programs and activities. [Distinction between EE portfolio programs and RFOs] [See more detail in source document in relation to this question]	11/27/2016	Addressed in Sector Chapter of BP	The Business Plan includes a combination of current and new program intervention strategies.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
0823	P	<p>CCCCO-1 Observations</p> <ul style="list-style-type: none"> · Several statewide institutional partnerships will be managed as a statewide program by a lead PA. Close coordination with the lead PA and with cross-cutting EE programs will be critical to the success of this sector · As ordered in decision CPUC Decision R.13-11-005, 29 several statewide institutional partnerships will be managed by a "lead PA." This will be a change from the way they are managed now, separately, in the service territories of each IOU. · California Community Colleges operate under a process called shared governance. We work collaboratively to involve stakeholders in the process of achieving energy efficiency. In addition, PG&E represents the majority of our campuses and energy usage. · The needs of Community Colleges, which operate more like a statewide agency, are unique and require additional mechanisms to ensure consistency of statewide programs across IOU territories to meet goals. <p>Recommended Action</p> <ul style="list-style-type: none"> · In view of the observations and comment above we recommend the following solution, the statewide lead PA for California Community College should reside with one IOU that has full authority to implement a consistent program across the state. At this point given other considerations the preferred IOU would be PG&E. 	11/27/2016	Addressed in Sector Chapter of BP	See, Statewide Programs section in the Executive Summary chapter.
0907	P	<p>CPUC-CF - 24 Observation:</p> <ul style="list-style-type: none"> - Not enough time to comment on all IOUs chapters <p>Recommended Action:</p> <ul style="list-style-type: none"> - Please review comments on PG&E's Public Sector chapter and reflect in your final Public Sector chapters as well 	11/27/2016	Addressed in Sector Chapter of BP	Reviewed and responded. See, response to CPUC recommendations to PG&E Public chapter.
0949	P	<p>CA - 1a Adapting OBF to include upfront construction costs would help to enable the state to leverage this financing approach</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Program Intervention Strategy: Financing discussion within the Public sector chapter.
0950	P	<p>CA - 1b Most of the projects in large state buildings exceed the current \$1M limit for financing via OBF. Increasing this limit would address</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Program Intervention Strategy: Financing discussion within the Public sector

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		another barrier.			chapter.
0951	P	<p>CA - 2</p> <p>Further, there is a need to more strategically identify the retrofit opportunities with the highest and most comprehensive savings potential long term. Implementing investment grade audits for all buildings would be cost prohibitive. The state is seeking support from IOUs and PAs to provide this strategic targeting support.</p> <p>· To target the limited partnership budget most effectively, it is important to strategically identify the best retrofit opportunities within the portfolio of state buildings. The state does not have the financial or technical resources to do so and would greatly benefit from support from the Partnership in this area. Approaches such as remote audits and greater use of interval meter data for analytics would be cost efficient to complete this critical first step. This would benefit both the State and the Partnership in most efficiently identifying the highest value opportunities to target Partnership funding.</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Intelligent Outreach discussion in the Public sector chapter.
0952	P	<p>CA - 3a</p> <p>The state is exploring alternative models for engaging with ESCOS more effectively, at lower costs and more timely execution. The Federal Government has effectively modeled an energy services relationship with the IOUs that may be modified to work with State entities. We encourage the Partnership to work with us to develop alternative ways of delivering efficiency projects to state customers.</p>	11/27/2016	Addressed in Sector Chapter of BP	The Partnering strategy provides flexibility to adapt new partnering arrangements. See, Partnering discussion in the Public sector chapter.
0953	P	<p>CA - 3b</p> <p>The state is open to piloting metered based savings approaches with incentives tied to measured savings</p>	11/27/2016	Addressed in Sector Chapter of BP	The Business Plan supports the implementation of meter-based energy savings. See, Customer Incentives discussion regarding metered-based energy savings within the Public sector chapter.
0954	P	<p>CA - 3c</p> <p>Extending the current direct install program to small/medium state facilities statewide would help to save time and resources. Further expanding the direct install program to include HVAC measures and control measures would</p>	11/27/2016	Addressed in Sector Chapter of BP	See, Comprehensive Direct Install discussion proposing an expansion of the direct install program strategy to capture deeper energy

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		capture a larger portion of the current needs.			savings in the public sector.
0955	P	CA - 4 Given the example that the state must set with its own facilities, coupled with the significant barriers the state faces with implementation, it is important that the budgets and levels of support to the state be sufficient to scale the financial and resource barriers. The current budgets proposed appear very insufficient for the support needed and described above.	11/27/2016	Addressed in Sector Chapter of BP	Consistent with the rolling portfolio approach, annual adjustments to program funding levels will be made to meet increases in customer demand for energy efficiency programs, including customers in the public sector.
1055	P	CEE - 27 Recommended Action: The Coalition recommends that at least 40% of incentive funds that use the AB 802 existing condition baseline be directed to renovate public sector buildings (i.e., state, county, municipal, university, schools, and hospitals) or low-income housing. The Public Sector chapter should also be amended to include a description of the advantages that public sector incentives have over other sectors – such as lower free ridership concerns, ancillary ratepayer benefits and increased investment in skilled and trained workforce. A description of these benefits is necessary to assess and support overall budget recommendations.	11/27/2016	Addressed in Sector Chapter of BP	The rolling energy efficiency portfolio allows for annual adjustments, in part, to respond to increase customer demand for certain programs. Current CPUC policies allow adequate funding flexibility to meet increase in customer demand including the Public sector. SoCalGas prefers to focus customer attention on increasing the level of energy efficiency rather than budget allotments. SoCalGas applied the CPUC required net-to-gross ratios and non-energy benefits adjustments in the Public sector forecasts.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1095	P	<p>SEC - 1</p> <p>To date, it appears the K-12 schools as a building sector have seen very little investment from this Local Government Program/Public Sector funding, and primarily within "non-resource" or the "Workforce Education and Training" category. While most of these programs in the past may have been successful in educating a relatively small group of school-age students, we believe there is an opportunity to invest in two areas of great impact: providing for actual implementation of energy efficiency in existing K-12 facilities to greatly assist school districts in driving to zero net energy goals by 2030; and the opportunity to implement actual "workforce" (not K-12 students) "training"— both in building technical capacity within existing facilities operations/energy management staff, such as through the BOC, or other training programs, and training of our future workforce in energy management, environmental controls, advanced lighting, renewable energy systems, and commissioning, through community colleges or trade programs. While we have not had the time to review the specifics of each Program Administrator's Business Plans in great detail, we would respectfully request that you consider a proposal to create a new "Statewide K-12 Public Schools Partnership," to address direct implementation of energy efficiency/deep energy retrofits in our existing portfolio of over 700,000,000 square feet of building portfolio, (the largest single Public Sector aggregate of GHG reduction potential in the State,) with arguably, the most distributed community support for investment of these public dollars.</p>	11/28/2016	Addressed in Sector Chapter of BP	<p>See, Public chapter regarding K-12. Unlike other partnerships, unified school districts do not have a unified statewide decision-making body. As such, a statewide partnership approach is not an optimal solution. Partnering with common industry organizations (e.g., CASBO) presents more effective solutions to increase awareness and adoption of energy efficiency solutions.</p>
1096	P	<p>SEC - 2</p> <p>In addition, we would like to propose that the Business Plans reflect some prioritization of these public goods charges towards the Public Sector overall, and the K-12 schools in particular, at least in the earlier 5 years of the funding cycle, in proportion to use/potential savings, ease of achievement of ZNE to scale, and visibility of local models of our Statewide goals.</p>	11/28/2016	Deferred to Implementation Plan or Program Design Stage	<p>Consistent with the rolling portfolio approach, energy efficiency portfolios and corresponding funding will be refreshed to meet additional program demand including any foreseen demand from the Public sector.</p>

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1257	P	<p>CSE OA - 1</p> <p>There is not enough detail in any of the business plans about how to tackle the hurdle of master meters and submeters or how aggregated data will be able to be broken out for analysis. To effectively benchmark a property today, Portfolio Manager requires the input of monthly, whole-building data. The majority of public sector customers do not have building-specific meters, but rather, they have a master meter with submeters. This meter set-up does not give facility managers a clear picture of where energy intensity is highest. For example, a city property may be metered with the street lights around it. As such, it can be very difficult for these public sector customers to determine where energy efficiency measures would be most useful. To address this situation, PAs can offer intensive Portfolio Manager training as well as offer onsite experts at complex public sector sites. Furthermore, PAs can help public sector customers understand their options for other meter configurations or data analytics.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Intelligent Outreach discussion, which identifies a Facility Energy Audit tactic that will be used to support master-metered accounts. In support of AB 802 benchmarking, facility audits and technical services will be offered help identify EE opportunities. In prior years, SoCalGas offered Portfolio Manager training on a quarterly basis with very low participation. In response, SoCalGas offers on-demand technical services to offer assistance with Portfolio Manager.
1258	P	<p>CSE - OA - 2</p> <p>All IOUs include the need for more robust energy management systems for the public sector in their business plans. While public sector properties would certainly benefit from access to energy management software and its analysis, there also needs to be a process in place for creating an institutional culture around energy management. The strategy to offer more energy management tools to public sector customers should be thoughtfully considered so as not to have possible stranded benefits in the years to come.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Strategic Energy Management (SEM) discussion. SEM will develop and implement a long-term energy planning strategy, and permanently integrate energy management into the culture of public planning at all organizational levels, from the facilities management to public leaders.
1261	P	<p>CEEIC (1)</p> <p>The Efficiency Council respectfully requests all the PAs (investor-owned utilities (IOUs), regional energy networks, community choice aggregators, and local governments) add the material below to a solicitation-process section in the business plans. Inclusion of this information will allow market actors to effectively prepare to respond to solicitations and support a vibrant and competitive market that can offer viable and cost-effective solutions. We believe that it is in the interest of</p>	11/28/2016	Addressed in general section of BP or Testimony in Application	See, Transition Plan section in the Executive Summary chapter. Specific request for proposals will provide adequate detail to allow potential bidders to prepare and propose program designs.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		the PAs, ratepayers and third parties to facilitate a robust market for energy efficiency services.			
1425	P	<p>ORA - 1</p> <p>Intervention strategies should address specific market barriers and opportunities and should be distinct from tactics.</p> <ul style="list-style-type: none"> o Many of SoCalGas' strategies are the same as the tactics; e.g. partnering, direct install, and financing. o Intervention strategies appear to be a list of current programs and practices (i.e. tactics) and do not map onto key market barriers they are targeted to overcome. 	11/28/2016	Addressed in Sector Chapter of BP	The Public chapter is revised to provide greater connectivity between sector challenges, market barriers, and sector-level strategies including specific program intervention strategies.
1426	P	<p>ORA - 2</p> <p>Market characterization and intervention strategies should be relevant to the targeted market segment.</p> <ul style="list-style-type: none"> o Example: SoCalGas public sector chapter identifies four distinct segments and relevant sub-segments with unique challenges, but the interventions strategies are generic across segments and do not appear to substantively target distinct market barriers by segment. 	11/28/2016	Addressed in Sector Chapter of BP	<p>The public chapter is revised to provide greater connectivity between sector challenges, market barriers, and sector-level strategies including specific program intervention strategies.</p> <p>The program intervention strategies presented create the foundation for specific program offerings. Specific program design details in response to specific customer segment needs and opportunities will be detailed in the corresponding implementation plans.</p>
1427	P	<p>ORA - 3</p> <p>Intervention strategies are generic and the same strategies are targeted repeatedly to diverse problem statements and market barriers.</p> <ul style="list-style-type: none"> o The same generic strategies (partnering, outreach, direct install, etc.) are identified as interventions to overcome a wide variety of problems/barriers (limited resources, competing priorities, serving disadvantage communities). o The failure to target specific interventions to specific barriers risks a generic approach to the sector that ultimately does not overcome the specific barriers identified. 	11/28/2016	Addressed in Sector Chapter of BP	The Public chapter is revised to provide greater connectivity between sector challenges, market barriers, and sector-level strategies including specific program intervention strategies.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1428	P	<p>ORA - 4</p> <p>Solicitation strategy should be based on Commission directives and should be specific.</p> <ul style="list-style-type: none"> o The chapter currently lacks a defined third-party solicitation strategy that outlines the types of public sector solicitations SoCalGas will run and a strategy for balanced procurement. o The only reference to solicitation objectives concerns innovation, with no significant discussion of how the solicitation strategy will encourage efficiency, cost-control, or market targeting to support state and Commission objectives. o The absence of a developed solicitation strategy and details means that a crucial element of SoCalGas's public sector business plan will not be adequately vetted with stakeholders prior to filing and misses an important opportunity to inform the market in advance of solicitation issuance. 	11/28/2016	Addressed in Sector Chapter of BP	See, Transition Plan section within the Executive Summary of the Business Plan.
1429	P	<p>ORA - 5</p> <p>Activities proposed for in-house implementation should contain a compelling showing that the utility is uniquely positioned to provide the greatest value at the lowest cost.</p> <ul style="list-style-type: none"> o The current discussion of activities to be maintained by the utility is vague and rests on assertions rather than facts and analysis. o Instead, the business plan must explain in detail why the utility is the best entity to continue to implement distinct activities and make a reasonable showing that it is the least cost/best fit implementer for those activities. 	11/28/2016	Addressed in Sector Chapter of BP	See, Transition Plan section within the Executive Summary of the Business Plan. For statewide programs, the approach supports the Commission stated two-part goal of easy program access to program and, in part, to lower transaction cost for the administrator and implementer.
1430	P	<p>ORA - 6</p> <p>Participation metrics should only be used when appropriate and should be specifically tailored to relevant goals and intervention strategies.</p> <ul style="list-style-type: none"> o Example: It is unclear how participation counts of public customers in SoCalGas programs are a useful and specific metric to measure whether a variety of intervention strategies are overcoming the barrier of customers having access to limited resources. o More useful metrics would target the specific barrier (resource constraints) and whether specific intervention strategies are overcoming those barriers. 	11/28/2016	Addressed in Sector Chapter of BP	See, Public Sector Metric Table. Metrics are revised to support stated desired outcomes.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1431	P	<p>ORA - 7</p> <p>Budgets should be specified for the full ten-year business plan period and should align with market characterization and intervention strategies over the short-, medium, and long-term.</p> <ul style="list-style-type: none"> o The absence of budgets makes it difficult to assess whether SoCalGas' request for resources aligns with its analysis of the needs in the public sector and its proposed intervention strategy. o Failure to specify the budget means that a crucial element of SoCalGas' public sector business plan will not be adequately vetted with stakeholders prior to filing. 	11/28/2016	Addressed in Sector Chapter of BP	See, Public Sector Budget, Cost-Effectiveness, and Savings discussion. Energy savings forecast and corresponding annual budgets provided.
1465	P	<p>CPUC - 1</p> <p>The IOUs were requested by ED at the CAEECC and within other forums to address within the BPs the questions below: "What constitutes a partner and what constitutes a partnership?"; "How are the IOUs expecting to adapt the LGPs in response to new PA actors in the LG space?"; "As a mature program with ten-plus years of operations, how can the LGPs do more to drive innovation, and lead themselves and the statewide EE community?"; "What can be done about significant capacity disparities that exist from LGP to LGP and does every corner of the State merit having an LGP or would some other strategy be more appropriate?"; and "The State has invested considerably in the LGPs, spending nearly a quarter billion dollars from PY2013-2016 to build their capacity to deliver EE where others cannot. Are the IOUs prepared to commit to a course to develop the LGPs to occupy a place as the premier and elite program delivering EE among the various PAs? If so, what strategies and changes are needed to get there? And if not, can the IOUs justify continuing to have an exclusive arrangement to distribute muni-facility retrofit-incentive and nonresource monies to local governments?"</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Program Intervention Strategy: Partnering discussion. SoCalGas will partner with the various public sector customers when it is beneficial for the customer and the ratepayer. However, there will not be a partnership arrangement for all Public sector customers. See, Local Government Partnership Statewide Consistency section for discussion on statewide consistency of local government partnerships. Further details will be provided as part of the implementation plans.
1466	P	<p>CPUC - 2</p> <p>Too little specificity for LGPs, their purpose, role, and future outlook.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Local Government Partnership Statewide Consistency section for discussion on statewide consistency of local government partnerships. Further details will be provided as part of the implementation plans.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1467	P	CPUC - 3 SCG's treatment of public sector in five segments attempts to lump in K-12 with UC/CSU. Yet UC/CSU are within the State Partnerships category. This creates challenges for budget and savings trackings and for evaluation purposes. Would surmise that UC/CSU share more in common with other state agencies than with the typical K-12 institution or bureaucracy.	11/28/2016	Addressed in Sector Chapter of BP	The Public chapter groups customers into four segments based on NAISC code groupings. K-12, community colleges, and universities share the common goal of education and as such, share common decision-making practices. Further sub-segmentation can address unique characteristics within education segment to identify both barriers and drivers to energy efficiency.
1468	P	CPUC - 4 EM&V discussion needs to explain how SCG staff with good knowledge of LGPs will inform the IOU-led evaluations. Informed IOU program staff input is scarce and it seems SDG&E and other IOUs do not have staff available to inform their and the ED's evaluation efforts.	11/28/2016	Addressed in Sector Chapter of BP	SoCalGas will fully support the evaluation of local government partnerships and coordinate with other IOUs, as appropriate.
1469	P	CPUC - 5 SCG identifies three LGP goals. ED recently clarified this list to include explicit mention of peer to peer knowledge transfer, participation, and informing the CPUC on progress on and challenges with advancing State goals.	11/28/2016	Addressed in Sector Chapter of BP	SoCalGas along with the other IOU's are consistent with the current three stated LGP goals of Municipal Retrofits, Core Program Coordination, and Strategic Planning, however SoCalGas does support the ED's proposed recommend six LGP expectations. SoCalGas will address this further in the implementation-planning phase and will need to coordinate with the other IOU's to encourage consistency.
1470	P	CPUC - 6 Consistency discussion. "Next few years" too vague a timeline; commitments given overly vague.	11/28/2016	Addressed in Sector Chapter of BP	Specific timeframes, by year, are identified for the implementation of all program intervention strategies.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1471	P	CPUC - 7 Consistency discussion appears to repeat of what PG&E put forward and mentions SCE and PG&E efforts without identifying any SCG-specific strategies.	11/28/2016	Addressed in Sector Chapter of BP	See, Local Government Partnership Statewide Consistency section for discussion on statewide consistency of local government partnerships. The approach represents all four IOUs plan for greater statewide consistency.
1472	P	CPUC - 8 Consistency discussion. SCG presents an unclear concept proposal that appears to be a pilot to have the IOUs test limited statewide consistency for the three or four LGPs that exist that are co-supported by more than two IOUs. Unclear when or how this would get underway or how it would set forward in earnest an effort to have the IOUs get on the same page with how the LGPs are administered.	11/28/2016	Addressed in Sector Chapter of BP	See, Local Government Partnership Statewide Consistency section for discussion on statewide consistency of local government partnerships. The approach represents all four IOUs plan for greater statewide consistency. The approach is not a pilot and will be implemented for all local government partnerships among all four IOUs.
1473	P	CPUC - 9 Consistency discussion. References as an example of IOU efforts to promote consistency a statewide menu of strategic plan support activities available to local govt partners.	11/28/2016	Dropped-- Insufficient data/evidence to support addressing proposal or claim	Recommendation unclear.
1474	P	CPUC - 10 Market Barriers, Table D.1.	11/28/2016	Addressed in Sector Chapter of BP	See, Approach to Achieve Public Sector Goals section regarding sector challenges and market barriers.
1475	P	CPUC - 11 Problem Statement, Table D.2. SCG states that "Many public sector customers have limited resources" and then provides nine solutions of which technical assistance comes last.	11/28/2016	Addressed in Sector Chapter of BP	The strategies provided in the SoCalGas Business Plan were not presented order of priority. To enable customer choice, a suite of program intervention strategies will be offered to assist in overcoming specific barriers and increase energy efficiency adoption.

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0889	CS	CPUC-CF - 6 Observation: - Insufficient time to read all IOUs plans Recommended action: - Please review comments above based on SCE's chapter, and incorporate in your C&S chapters	11/27/2016	Addressed in Sector Chapter of BP	See, responses to CPUC comments on SCE's Codes & Standards chapter.
1052	CS	CEE- 24 Observations (re Code Compliance) Barrier discussion should identify widespread avoidance of permit and code requirements as a key barrier. Recommended Action See Global Comment CEE-5.	11/27/2016	Addressed in Sector Chapter of BP	See, EM&V Preparedness and Research Needs section regarding anecdotal evidence on code compliance and the need to study code compliance.
1053	CS	CEE - 25 Observations (re Consistency with State Energy Goals) Coalition supports goal to "Proactively enhance regulations to include DR requirements, grid connectivity, etc. and enable the plug and play grid." In addition to evaluating codes and standards for consistency with SB 350, the Business Plans should assess overall incentive program consistency with state energy goals. Recommended Action The Coalition recommends adopting the following strategies to achieve this goal. · Implementation Plans shall assess consistency with SB 350, Existing Building Energy Efficiency Action Plan and other California energy goals and strategies. · Conduct annual reviews to assess overall incentive program consistency with state energy goals. · Evaluate and identify barriers impeding the adoption of automated demand response capabilities in existing buildings. Align incentive and Codes and Standards programs with efforts to address these barriers. · Where multiple code compliance pathways exist, ensure programs incentivize code compliance pathways that are compatible with automated demand response capabilities. · Change references to "Demand Response" to "Automated Demand Response" to distinguish from unconnected demand response controls that do not provide grid management capabilities.	11/27/2016	Addressed in Sector Chapter of BP	See, EM&V Preparedness and Research Needs section regarding anecdotal evidence on code compliance and the need to study code compliance.

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1246	CS	Please refer to CSE comments on the PG&E Codes & Standards Sector chapter, as PG&E is the overall assigned statewide lead for Codes & Standards.	11/28/2016	NA-Input not applicable to this PA	See, responses to CSE comments on PG&E Codes & Standards chapter.
1413	CS	ORA - 1 Discussion of using Codes & Standards (C&S) to increase efficiency of existing buildings should include discussion of AB 802 and problems encountered in lighting retrofit codes. o SoCalGas' focus on using building codes as an intervention strategy for existing buildings moves in the opposite direction of AB 802's directive to use incentives. o C&S chapter fails to acknowledge that customers are under no obligation to make alterations in existing buildings and code requirements for existing buildings may in fact discourage efficiency adoption through IOU incentive programs (example: lighting retrofit code requirements).	11/28/2016	Addressed in Sector Chapter of BP	See, Rescuing "Stranded" Potential discussion in the Approach to Achieving C&S Goals section.
1414	CS	ORA - 2 C&S chapter should include discussion of impact of statewide (SW) administration, timeline for SW transition, SW roles and responsibilities and how SW C&S work will be bid out. o C&S chapter should have a robust discussion of the new SW structure and its impact on C&S administration, activities, and structure. o Failure to include C&S SW issues in the business plan draft means that a crucial element of the C&S business plan will not be adequately vetted with stakeholders prior to filing.	11/28/2016	Addressed in general section of BP or Testimony in Application	See, Statewide Program section within the Executive Summary chapter.
1074	ET	CPUC-JST - 04 Since the ETP program has been around in the EE portfolio for a long time, have the IOUs looked at how many ETP projects/idea/demonstrations have made it through to a full scale production program offering between 2006 through 2015? This would seem like a good indicator of ET success. Even if there are ET projects that did not make it through, are there reasons why that would help inform other parts of the portfolio across the state, for example are some ET demonstrations not ready for full scale implementation because the technology requires additional skill that could be gained through increased WE&T in that area.	11/28/2016	Deferred to Implementation Plan or Program Design Stage	See, Objective 1 discussion in the ETP Strategies section. To ensure all high priority areas are addressed, ETP's strategy is to use collaboratively designed technology priority maps to drive the ETP research agenda. Through this collaborative process, recommendations such as sharing of emerging technology reviews can be fully vetted.

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1256	ET	Please refer to CSE comments on the SCE ETP chapter, as SCE is the assigned statewide lead for Emerging Technologies (Electric ET).	11/28/2016	Addressed in Sector Chapter of BP	See, responses to CSE comments on SCE's Emerging Technology chapter.
1419	ET	ORA - 7 Emerging Technologies (ET) program chapter should include a discussion of what role(s) if any the non-lead utilities will play in the administration and activities of the statewide ET program. o The only mention of non-lead utilities in the ET chapter notes that PG&E has a different stage-gate process than other utilities. o The new SW structure would appear to require harmonization across utilities and/or elimination of direct program administration and implementation at non-lead utilities, which is not evident in the ET chapter. o Failure to substantively address SW ET issues in the business plan draft means that a crucial element of the ET plan will not be adequately vetted with stakeholders prior to filing.	11/28/2016	Addressed in general section of BP or Testimony in Application	See, Statewide Program section within the Executive Summary chapter.
1247	F	CSE-OA - 1 CSE wants to underscore the importance of a concierge or coach when it comes to financing. Regardless of the quantity of financial product offerings, if there are not consistent resources or points of contact to help customers learn about and understand how different financial offerings are best suited for their needs, then uptake of energy efficiency financing (regardless of quality) may suffer.	11/28/2016	Addressed in Sector Chapter of BP	See, Public chapter Financing strategy. The strategy proposes a concierge tactic to help public sector customers with potential financing vehicles (ratepayer-funded or otherwise).
1248	F	CSE-OA - 2 CSE encourages all PAs to include more information on how they will plan to integrate financing into their portfolios broadly and on how they intend to allocate money to better fund marketing, education, and outreach. Furthermore, CSE encourages all PAs to pair with that information regarding how energy savings associated with financing can be tracked and claimed toward goals.	11/28/2016	Addressed in Sector Chapter of BP	See Financing program strategies in each of the customer sector chapters. The issue budget allocation is an implementation level detail and will not be addressed in the BP. CPUC has deferred the energy savings attribution issue to ex-post evaluations.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1249	F	<p>CSE - OA - 3</p> <p>CSE wonders why there is no mention of leveraging Go Green Financing resources. Moreover, CSE finds it problematic that there is no mention of the REEL Financing Program or integrating a financing message into overall program design. Market research has shown that financing cannot be successfully promoted as a stand alone effort; rather, it must be part of the consumer engagement strategy for energy efficiency program participation. States that have had successful uptake in financing have had an interwoven strategy promoting energy efficiency concept benefits with incentives and financing solutions in a way that customers could best achieve their objectives for accessing energy efficiency improvements.</p>	11/28/2016	Addressed in Sector Chapter of BP	See Program Strategies and Delivery section for a summary of REEL. The Business Plan proposes to offer a simplified suite of integrated program offerings to help customers select the optimal mix of programs (including finance) to achieve deeper energy efficiency levels.
1250	F	<p>CSE - 1</p> <p>“In recognition of the unique characteristics in the public sector including their permanency with the communities they serve, an enhanced on-bill financing strategy will be offered to public customers to encourage deeper EE installations sooner. The public OnBill financing strategy will enhance the standard OBF offering by extending the loan period to reduce the re-payment burden. This will allow public customers to incorporate into their plans to finance EE projects throughout their facilities. Where applicable, other financing strategies will be offered.”</p> <p>☐ SoCalGas presents the OBF program with expanded terms as the solution to the barrier. The CHEEF's forthcoming non-residential program with OBR will solve the same problems, but without many of the IOU requirements tied to the financing. The rules and regulations have still not been confirmed, but the decision states that 70% of the approved EE measures must meet rebate requirements, and 30% can be anything else (distributed generation is allowed in the financing program that does not receive a credit enhancement). Because the barrier for public agencies is more pertaining to the structure of the agency (meaning the department paying the utility bills does not align with the department paying back the loan) utility on-bill repayment/financing is</p>	11/28/2016	Addressed in Sector Chapter of BP	All applicable financing offerings, including OBR, will be presented to all applicable customers, including Public sector customers. However, in the public sector, customers have indicated financing supported by private financing is not attractive to them.

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		the only way the agency can take on the liability without requiring capital improvement funds. However, in reality, the OBR products will most likely be more attractive to the public agencies and should be presented as a priority in their deployment. The data collection requirements per the decision insinuate that the CPUC will allow the energy saved through financing to be claimable against portfolio goals, so there is no real conflict in SCG or any utility positioning OBR as the primary focus of their efforts.			
1251	F	<p>CSE - 2</p> <p>"The Public Financing Assistance (PFA) strategy will be offered to public customers to encourage self-funding of EE projects and other DSM solutions including clean renewables. The PFA offering will educate customers on how to create a self-funding mechanism including training and support to assist the public customer in obtaining loan assistance from alternate funding sources. The PFA sets aside customer funds created by prior EE project rebates and bill savings into a dedicated fund within customer's annual operating budget. These customer funds will be used in combination with other financing mechanisms (e.g., OBF) as well as other funding sources (e.g., Prop 39, bonds) to install deeper, more comprehensive EE (and other DSM) projects."</p> <p>☐ CSE understands the Public Financing Assistance strategy to be another term for a Revolving Loan Fund, something that has been tried by other PAs during past program years. CSE feels very few public agencies would be able to dedicate budget savings to any one particular program, while other programs experience shortfalls.</p>	11/28/2016	Addressed in Sector Chapter of BP	The Public Financing Assistance strategy includes promotion of alternate financing vehicles (non-ratepayer funded) and customer assistance with developing a self-funding revolving loan fund. Public sector customer interest continues to grow in such innovative approaches.
1252	F	<p>CSE - 3</p> <p>"SoCalGas will continue its long-term collaboration with CAEATFA to design and promote innovative financing strategies that will encourage greater customer investment in EE. However, the financing for the public sector will rely mostly on an enhanced OBF offering, and engaging various 'grant' opportunities."</p> <p>☐ While OBF always had a limit on how much money could be loaned at 0% interest, OBR will not have that restriction. The CHEEF's</p>	11/28/2016	Addressed in Sector Chapter of BP	All applicable financing offerings, including OBR, will be presented to all applicable customers, including Public sector customers. However, in the public sector, customers have indicated financing supported by private financing is not attractive to them.

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		involvement will help mitigate risk for the lenders, even without the credit enhancements, which historically only lead to a 1%-1.5% interest rate reduction; this reduction will then trickle down to the public agencies. None of the CHEEF financing programs require IOU rebate program participation, which has been noted to delay or slow down projects from moving forward, costing non-residential projects considerably.			
1253	F	<p>CSE - 4</p> <p>"High costs associated with more comprehensive EE projects. The combination of financing and rebates appeared to be more effective than either method alone in both the residential and nonresidential sectors."</p> <p>☐ CSE feels that this statement may not reflect the large majority of projects that occur around California. For example, CHEEF pilots are being design to expand awareness of energy efficiency in both the building industry and financial market sectors.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, CALMAC Study ID PGE0338.01, dated April 22, 2014, p. 4. Study indicated that "Most program managers believed they had better results from offering both financing and rebates than either alone. For instance, participation in United Illuminating's Small Business Energy Advantage (SBEA) program dropped to zero when the rebate funding briefly ran out. Once monies were replenished and rebates were resumed, the uptake returned."
1254	F	<p>CSE - 5</p> <p>"Create education and outreach partnerships with lenders focused on financing whole building, whole solutions and major EE equipment installations."</p> <p>☐ Besides contractors and lenders, SoCalGas does not identify other trusted messengers (e.g., real estate industry, local government stakeholders, retailers, architects, engineers) who could comprise a strategic partner network helping residential and nonresidential consumers see financing as a solution.</p>	11/28/2016	Addressed in Sector Chapter of BP	See, Goals discussion in the Approach to Achieve Finance Vision section.

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1255	F	CSE - 6 While SoCalGas spends two pages (524-525) outlining the proposed financing pilots, there is no information on how the IOUs will integrate the pilots into their overall program management (i.e., how these solutions will be brought to their customers base, how they will be integrated into their portfolio of programs, and how financing will weave between planning and implementation moving forward).	11/28/2016	Deferred to Implementation Plan or Program Design Stage	The Business Plan proposes to offer a simplified suite of programs to customers through an integrated approach that will enable customer choice that best suits the customer's needs. Financing solutions will be integral to the portfolio offering. More detail on program integration will be presented in the implementation plans.
1415	F	ORA - 3 Financing chapter should include a discussion of how energy savings from financing will be quantified resource program. o This is relevant to current initiatives as well as potential future transaction structures that SoCalGas is proposing in its financing chapter. o The EM&V section does not appear to address energy savings measurement either but there should be a plan for attributing savings to financing efforts.	11/28/2016	Addressed in Sector Chapter of BP	See, EM&V Considerations section. SoCalGas notes that the Financing chapter presents the new OBR financing pilots as authorized in Decision 13-09-044.
1416	F	ORA - 4 Financing chapter should include a discussion of the cost-effectiveness of financing and whether ratepayer funds should be directed to On-Bill Financing (OBF). o The chapter makes no mention of the potentially substantial ratepayer opportunity costs in fully funding OBF transactions and whether the risk and return on those funds merits tying up large sums of ratepayer funding.	11/28/2016	Addressed in Sector Chapter of BP	Consistent with CPUC direction, the cost-effectiveness showing is presented at the portfolio level in this Business Plan. The Business plan will promote private financing, public financing and ratepayer-funded financing offerings as well as self-funding mechanism to the applicable customers. The ratepayer-funded financing options are typically far less cost to ratepayer than other offerings such as incentives.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
1417	F	<p>ORA - 5</p> <p>Business Plan chapters should include specific performance metrics and targets that can be used to judge the success/failure of proposed intervention strategies and market influence.</p> <ul style="list-style-type: none"> o Metrics should include both market-level metrics and intervention metrics that can be used to judge the success/failure of individual intervention strategies. o Failure to include financing performance metrics in the business plan draft means that a crucial element of the financing business plan will not be adequately vetted with stakeholders prior to filing. 	11/28/2016	NA-Input not applicable to this PA	Metrics for the statewide Financing program are presented in PG&E's Business Plan.
0598	WT	<p>NREDC-1</p> <p>Footnote 24, p.17 - Unclear why SCG is referring to the EE Policy Manual 4.0 from 2008 when there is a 5.0 from 2013. In addition, there are only 32 pages in the 4.0 version. What is the intended citation for?</p> <ul style="list-style-type: none"> · Understanding this is draft, please provide full citations and links if available in the final to enable easy review. · Suggest reviewing SCE's trends section, p.8 to expand on SCG's section · Suggest reviewing PG&E's challenges section, p.9 as an example of an elaborated discussion · The legislation table is simply a description of the legislation, but not how SCG plans to integrate WE&T to support the efforts. See SDG&E's p.189 for how they addressed legislation. 	11/19/2016	Addressed in Sector Chapter of BP	The WE&T chapter is revised to include all referenced materials and expanded discussion on industry trends, sector challenges and response to legislative directives.
0599	WT	<p>NRDC - 2</p> <p>Observations · Appreciate the list of items reviewed to inform WE&T BP · Few references throughout to the actual studies, reports, etc. Recommended Action · Cite to the documents reviewed to come up with conclusions (e.g., p.5 for barriers and p.12 for gaps) · Suggest reviewing PG&E's EM&V trends (p.22) to see if additional evaluation lessons apply. Also suggest including a similar summary to aid the reader in understanding the derivation of the goals.</p>	11/19/2016	Addressed in Sector Chapter of BP	The WE&T chapter is revised to include all referenced materials in the development of sector challenges.
0600	WT	<p>NRDC - 3</p> <p>Observations</p> <ul style="list-style-type: none"> · Some goals seem more like overarching strategy · No clear goal to train people or increase skills · Don't see intervention strategies or sample 	11/19/2016	Addressed in Sector Chapter of BP	The WE&T chapter is revised to clarify sector goals including two overarching metric targets to track sector progress towards goal

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		<p>tactics in the chapter, only in the metrics table. However, they don't appear to match the goals identified on p.5</p> <ul style="list-style-type: none"> · The list of opportunities on p.16 seems as though it would inform the goals, but there is no clear link to the goals or the metrics <p>Recommended Action</p> <ul style="list-style-type: none"> · Add a goal that aims at increasing the # of skilled workforce. Strategies would involve matching/targeting training programs. See PG&E p.10 or SCE p.18. · The first goal seems more an operational, not a goal of the WE&T program itself. Suggest removing it. · The second goal seems reasonable, but there is no description or strategies associated to fully understand what's intended. Recommend adding a description and strategies such as through a table as noted above. · Goal 3 seems like a strategy/tactic to implement NRDC's proposed higher arching goal · Goal 4 also seems like a strategy/tactic to implement NRDC's proposed higher arching goal · Goal 5 also seems operational, similar to Goal 1. It's certainly a necessary focus, but since there isn't any description or associated strategies, seems like it's more of a way to implement the goals vs. being a goal itself. 			achievement.
0601	WT	<p>NRDC - 4</p> <p>Understanding Figure C.2 is illustrative, it would help to understand how such an image would be used. Do 3 of the 6 questions need to be met to count as a good partnership? More? Less? It's unclear how that would help guide decisions.</p>	11/19/2016	Addressed in Sector Chapter of BP	Figure C-2 removed.
0602	WT	<p>NRDC - 5</p> <p>Appreciate the link to other sectors, but what exactly will this plan do to address the identified needs in the other sectors? Which goals, strategies, partnerships will be used? Suggest reviewing PG&E's mapping to other sectors (p.16)</p>	11/19/2016	Addressed in Sector Chapter of BP	The WE&T chapter is revised to include greater discussion on how the WE&T offering will support other customer sector activities.
0603	WT	<p>NRDC - 6</p> <p>How is the WE&T team cohesive? Are there regular meetings, collective discussions of approaches, other? · The WE&T strategic plan forum? Is that PA specific? And how often is the engagement forum utilized? 2x a year? Other?</p>	11/19/2016	Addressed in Sector Chapter of BP	See Statewide Coordination discussion within the Cross-cutting Coordination section.

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0908	WT	<p>CPUC-CF - 25</p> <p>Observation:</p> <ul style="list-style-type: none"> - The Connections program teaching energy efficiency awareness would seem to be the lowest priority of all WE&T activities, as its impact is so indirect, and the IOUs can certainly pursue in-class room energy education using non-ratepayer funds if they see a name recognition benefit for this. <p>Recommended Action:</p> <ul style="list-style-type: none"> - Eliminate or reduce funding for Connections starting in 2018; transition (a relatively small portion of the current Connections) budget to career and workforce readiness educational activities for K-12, if prioritized 	11/27/2016	Addressed in Sector Chapter of BP	Consideration for this recommendation will be addressed by proposals received from the SW Career Connections program solicitation in conjunction with proposals received from the Career Workforce Readiness solicitation.
0909	WT	<p>CPUC-CF - 26</p> <p>Observation:</p> <ul style="list-style-type: none"> - Most stakeholders prefer hands-on training, and Centergies classes typically don't offer this. <p>Recommended Action:</p> <ul style="list-style-type: none"> - We would hope to see in 2018 going forward, the Centergies budgets reduced and the Partnership budgets increased, to support hands-on training via curriculum development or improvement activities with Partners. 	11/27/2016	Addressed in Sector Chapter of BP	<p>SoCalGas Business Plan notes existence and use of off-site relationships with manufacturer training sites for increased hands-on, as well as onsite Commercial Kitchen and water heating labs. Data reflected for trainings includes classroom and hands-on training (Market Characterization and Key Partners sections).</p> <p>Hands-on education is critically important. Specific initiatives supporting core energy education providers with curriculum, train-the-trainer, and collaborations under new Integrated Energy Education & Training framework will expand hands-on options for stakeholders.</p>

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0910	WT	<p>CPUC-CF - 27</p> <p>Observation:</p> <ul style="list-style-type: none"> - The Centergies programs and locations have been in place for years, so it is eye-opening to read that lack of awareness of offerings amongst key targeted audiences / industry members remains a barrier <p>Recommended Action:</p> <ul style="list-style-type: none"> - Add a metric to track and drive improvements in awareness - Decrease Centergies budgets if not able to drive currently employed, key targeted industry workers & professionals to needed classes 	11/27/2016	Addressed in Sector Chapter of BP	See Performance Sector Metrics section. The metrics include an increased collaboration and training uptake, which includes an underlying assessment on awareness. Metrics are intended to measure, and assess success toward achieving goals, and modifying course of action, as appropriate.
0911	WT	<p>CPUC-CF - 28</p> <p>Observation:</p> <ul style="list-style-type: none"> - The strategy to undertake partnerships to develop curricula or other support for already-existing training entities is the most important WE&T strategy that IOUs can undertake, most likely. But, insufficient information is provided on plans <p>Recommended action:</p> <ul style="list-style-type: none"> - Adopt a metric to track the number of entities IOUs partner with, and what is provided: a) curriculum development support; b) train the trainer support; c) etc - Commit to a non-financially interested stakeholder Advisor Committee for this function; - Commit to working with CPUC EE management to ensure that this Advisory Committee includes key state and other government entitites as this overall coordinated, strategic approach is critical to double EE savings by 2030 - This effort could also establish a dedicated non-financially-interested Advisory Sub-Group solely dedicated to the unique challenges of working to integrate disadvantaged communities into EE/IDSM - Commit the majority of the SW (and local) IOU WE&T budgets to this curricula development/ improvement and partnership function 	11/27/2016	Addressed in Sector Chapter of BP	See, Performance Sector Metrics section. The metrics include an increased collaboration and training uptake which includes an underlying assessment on awareness. Metrics are intended to measure and assess success toward achieving goals, and modify course of action, as appropriate.
0912	WT	<p>CPUC-CF - 29</p> <p>Observation:</p> <ul style="list-style-type: none"> - Training programs for local building inspectors regarding new technologies in buildings advancing “ZNE” type goals is an important need but is not included here, nor information provided to cross-reference to C&S plans <p>Recommended Action:</p>	11/27/2016	Addressed in Sector Chapter of BP	See Cross-cutting Sector Coordination section within each sector chapter which identifies how WE&T will support sector activities. Cost tracking and reporting will follow CPUC

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		<ul style="list-style-type: none"> - Initiate action within IOUs to develop a tracking and communication for ALL IOU WE&T activities, whether these are funded and developed in: 1) the dedicated WE&T programs; of, 2) via other resource or non-resource programs. - Develop an approach to track and communicate to non-IOUs (CPUC, stakeholders, other agencies, etc) the overall allocation of training funds between these two general buckets and their overall goals, metrics and targets 			reporting requirements for ratepayer funded activities.
0913	WT	<p>CPUC-CF - 30</p> <p>Observation:</p> <ul style="list-style-type: none"> - Metrics are included to track # of partnership organizations “touched,” but not to track the effectiveness of the trainings subsequently offered that were “improved” by these IOU/ratepayer-funded touches <p>Recommended Action:</p> <ul style="list-style-type: none"> - Develop a standardized beginning / end of course survey for students participating in trainings for partnership groups touched by IOU/ratepayer-funded support; develop, fund and implement a standard database for partner organizations to provide this information; - Implement a metric to track student learning and satisfaction in partnership trainings impacted by IOU “touch” 	11/27/2016	Addressed in Sector Chapter of BP	See, Performance Sector Metric section. To properly monitor progress, the metrics will rely on data currently collected, tracked, and verified as part of the Program Administrator’s data requirements (e.g., energy savings, customer participation, etc.). Metrics are intended to measure, assess success toward goals, and modify courses of action as needed. WE&T also employs pre/post-assessment on knowledge gain and satisfaction with training. Future implementation plans will be informed by proposals received from the statewide Career Connections program solicitation.
0914	WT	<p>CPUC-CF - 31</p> <p>Observation:</p> <ul style="list-style-type: none"> - Chapter not clear on plans to address workforce skill needs or certifications with various installation practices touched by IOU rebates or programs <p>Recommended Action:</p> <p>Clarify this in next iterations;</p> <ul style="list-style-type: none"> - Give strong consideration when doing so to working with Apprenticeship and other existing educational or certification bodies (such as architects/ designers/ energy raters, modelers 	11/27/2016	Addressed in Sector Chapter of BP	Contractor Policy has been identified for development. WE&T will make appropriate training available to market actors as specific policies are rolled out and adopted. See WE&T Sector Market Characterization for reference to current use of continuing education

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		<p>programs) to develop Continuing Education requirements and curricula for these existing training/certification entities</p> <ul style="list-style-type: none"> - Work with these partner groups to incorporate up-to-date EE installation requirements and hands-on training relevant to that target group of workers as requirements for these new (or improved) Continuing Education requirements 			units.
1039	WT	<p>EE - 7</p> <p>Recommended Actions:</p> <p>The business plan must be specific enough for meaningful evaluation to be made for each Program Implementation Plan. At a minimum, quantifiable outcomes should be specified for each intervention on a quarterly basis leading up to 2020, with annual milestones for the rest of business plan cycle.</p> <p>The coalition strongly supports Business Plan language that leads to increased PA collaboration with the state's major training institutions and that leverages the PAs expertise to improve the energy efficiency content of the these institutions' curricula for the major occupations that impact the use of energy in buildings, industry, etc. [see source document for more complete recommendations]</p>	11/27/2016	Addressed in Sector Chapter of BP	Metrics (increased collaboration and training uptake) are intended to measure and assess success toward achieving goals, and modify courses of action as appropriate (Table 7). See also Key Partners discussion.
1040	WT	<p>CEE - 8</p> <p>Observations (re WE&T) Goals should be crafted to ensure continued support for current WE&T funding but programs should be reconfigured in accordance with the recommendations of the Don Vial Center Guidance Plan.</p> <p>Recommended Actions: Business Plans should include goals to ensure that WE&T programs are adequately funded to both support effective current WE&T programs (e.g., lighting control installer training and certification, building operator professionals training and certification, community college stackable sustainable energy training and credentials, and to support development of new WE&T programs (e.g., training and certification for installers of automated demand response systems, electrical vehicle charging infrastructure, microgrids, energy storage, and expansion of community college stackable sustainable energy training and credentials). Funding for these specific trainings should be</p>	11/27/2016	Addressed in Sector Chapter of BP	Workforce Education & Training offerings will make appropriate training available to targeted market actors in support of sector goals.

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		carried out as collaborative programs with the state's main training institutions of the apprenticeship programs, community colleges, community based organizations, and state universities.			
1048	WT	CEE - 23 (?) Observations Coalition disagrees with the premise that the biggest barrier to WE&T is lack of training opportunities. The biggest barrier is the lack of investment in workforce training by contractors due to the economic disincentive of the low cost bidding framework. The discussion on WE&T Barriers should acknowledge that the current lowest price contracting framework for incentive measures creates a structural economic disincentive for contractors to invest in training and retain a skilled and qualified workforce. Recommended Action: Under Market Barriers add: "Lowest price bidding framework without minimum workforce quality standards can create economic disincentive to invest in worker training."	11/27/2016	Addressed in Sector Chapter of BP	WE&T chapter addresses competing priorities making energy efficiency training a low priority for organizations.
1049	WT	CEE - 16 Observations Discussion of benefit to customers is missing key benefits of WE&T: increased energy efficiency outcomes, lower energy bills, greater cost-effectiveness and increased satisfaction with performance. Recommended Actions: Amend discussion to identify additional benefits of WE&T to include: increased energy efficiency outcomes, lower energy bills, greater cost-effectiveness and increased satisfaction with performance.	11/27/2016	Addressed in Sector Chapter of BP	The WE&T chapter is revised to include a sector vision "to offer a suite of solutions that incorporates the best available technologies and services valued by our customers, contributes to achievement of energy efficiency goals, and that ultimately aligns with the State's overarching energy and environmental goals."
1050	WT	CEE - 17 Observations Appendix A fails to identify key barriers, strategies and interventions to address, including: (1) lost/stranded energy savings from poor installation; (2) stranded savings from shallow retrofits that make deeper retrofits less likely; (3) free ridership, and (4) low levels of permit and code compliance and enforcement. See Global Comments CEE-1, CEE-2, CEE-3, CEE-4, and CEE-5. Recommended Action: Add additional problems and intervention strategies set forth in Global Comments CEE-1, CEE-2, CEE-3, CEE-4, and CEE-	11/27/2016	Addressed in Sector Chapter of BP	The WE&T goals and strategies align with customer sector goals by engaging the broadest participation of willing and qualified market actors in pertinent training. The customer goals focus on achieving deeper energy efficiency levels. The sectors encourage customer compliance with

Ref.	Ch.	Issue/Recommendation	Date	Resolution Type	Resolution Discussion
		5.			applicable local codes and adherence to manufacturer recommendations on applicable energy efficiency retrofits and maintenance activities.
1051	WT	CEE - 18 Observations Appendix A, Stakeholder Feedback, fails to describe or acknowledge the comments of the Coalition members during the CAEECC process. Recommended Actions: Amend to address comments submitted on draft chapters and issued raised during CAEECC	11/27/2016	Addressed in Sector Chapter of BP	Response to stakeholder input is provided in the Business Plan.
1259	WT	CSE - 1 While PG&E is the assigned statewide program administrator for WE&T specific to K-12 Connections and Career and Workforce Readiness, local WE&T efforts, as proposed in other plans, do not focus on similar elements for outreach and engagement, making it very difficult to compare and understand how the different WE&T offerings in IOU territories will complement one another.	11/28/2016	Addressed in Sector Chapter of BP	See WE&T chapter for discussion on outreach efforts.
1418	WT	ORA - 6 Workforce Education & Training (WE&T) chapter should include discussion of impact of statewide administration, timeline for SW transition, SW roles and responsibilities, or how SW WE&T work will be bid out. o WE&T chapter should have a robust discussion of the new SW structure and its impact on WE&T Connections administration, activities, and structure. o Failure to substantively address SW WE&T Connections issues in the business plan draft means that a crucial element of the WE&T plan will not be adequately vetted with stakeholders prior to filing.	11/28/2016	Addressed in general section of BP or Testimony in Application	See the Statewide Program discussion in the Executive Summary chapter.

Appendix E: Review Checklist and CPUC Guidance

CPUC Regulatory Directives		
Sector-specific CPUC Regulatory Directives	Cite	Response
<p>Program administrators shall ensure a smooth transition between existing energy efficiency program activities and the changes outlined in this decision, to be proposed in the business plans due January 15, 2017, minimizing program disruptions and avoiding any funding hiatus for ongoing efforts or partnerships.</p>	D.16-08-019, OPN 14, p. 112	<p>See, Program Delivery discussion. During the transition to a new programs and structure, SoCalGas will continue existing programs until newer programs can replace existing programs. In some cases, multiple programs may co-exist in the market for a limited time.</p>
<p>As discussed above, we will require all of the upstream and midstream program delivery types to be administered according to the statewide definition adopted in this decision. These sub-programs include, but are not necessarily limited to:</p> <p>Residential [Emphasis added]</p> <ul style="list-style-type: none"> • Plug Load and Appliances Midstream • Residential Heating Ventilation and Air Conditioning (HVAC) <p>- Upstream/Midstream</p> <ul style="list-style-type: none"> • Residential New Construction <p>Commercial</p> <ul style="list-style-type: none"> • Commercial HVAC – upstream and midstream • Savings by Design <p>Lighting (even if moved to sectoral program area)</p> <ul style="list-style-type: none"> • Primary Lighting • Lighting Innovation • Lighting Market Transformation <p>Financing</p> <ul style="list-style-type: none"> • New Finance Offerings <p>Codes and Standards</p> <ul style="list-style-type: none"> • Building Codes Advocacy • Appliance Standards Advocacy <p>Emerging Technologies</p> <ul style="list-style-type: none"> • Technology Development Support • Technology Assessments • Technology Introduction Support <p>Workforce, Education, and Training Programs</p>	D.16-08-019, pp. 62-64	<p>See, Program Delivery discussion. SoCalGas will work with other investor-owned utilities to create a single statewide program, consistent with the CPUC’s statewide definition, for the following residential program offerings:</p> <ul style="list-style-type: none"> • Plug Load and Appliances Midstream • Residential Heating Ventilation and Air Conditioning (HVAC) • Residential New Construction

CPUC Regulatory Directives		
Sector-specific CPUC Regulatory Directives	Cite	Response
<ul style="list-style-type: none"> • Connections <p>Government Partnerships</p> <ul style="list-style-type: none"> • California Community Colleges • UC/CSU • State of California • Department of Corrections and Rehabilitation <p>Marketing, Education, and Outreach Energy Upgrade California campaign [not part of the SW requirement]</p>		
<p>8. All upstream and midstream programs, including but not necessarily limited to the following programs and/or subprograms from the existing portfolio, plus new programs proposed in business plans that are market transformation, upstream, or midstream, shall be delivered statewide according to the definition in Ordering Paragraph 5 above: Residential: Plug Load and Appliance Midstream, Heating Ventilation and Air Conditioning (HVAC) Upstream/Midstream, New Construction [Emphasis added]; Commercial: HVAC Upstream/Midstream, Savings by Design; Lighting: Primary Lighting, Lighting Innovation, Market Transformation; Financing: New Finance Offerings; Codes and Standards: Building Codes Advocacy, Appliance Standards Advocacy; Emerging Technologies: Technology Development Support, Technology Assessments, Technology Introduction Support; Workforce, Education, and Training: Connections; Government Partnerships: California Community Colleges, University of California/California State University, State of California, Department of Corrections and Rehabilitation.</p>	D.16-08-019, OPN 8, pp. 110-111	<p>See, Program Delivery discussion. SoCalGas will work with other IOUs to create a single statewide program, consistent with the CPUC’s statewide definition, for the following residential program offerings:</p> <ul style="list-style-type: none"> • Plug Load and Appliances Midstream • Residential Heating Ventilation and Air Conditioning (HVAC) • Residential New Construction
<p>1. Each energy efficiency program administrator must file an initial business plan in 2016, as an application. Business plans must contain the information described in Appendix 4 to this decision.</p>	D.15-10-028, OPN 1, p. 123	<p>Business plan is presented as an application before the CPUC and consistent with business plan outline provided in D.15-10-028.</p>
<p>Business Plan Guidance</p> <p>1) Overview</p> <p>For the portfolio, and for each sector within the portfolio, overview of:</p> <ol style="list-style-type: none"> a) Proposed budget, b) Projected savings and performance metrics, c) Cost effectiveness, d) Narrative description of changes from existing portfolio, including <ol style="list-style-type: none"> (1) budget changes 	D.15-10-028, Appendix 3	<p>The business plan addresses each of these requirements. (See, Executive Summary)</p>

CPUC Regulatory Directives		
Sector-specific CPUC Regulatory Directives	Cite	Response
<p>(2) program/intervention strategy changes (3) justifications for the above e) Description of how the portfolio meets portfolio guidance</p>		
<p>2) Sector Chapters Provide a chapter for each of six sectors (residential, commercial, industrial, agriculture, public, cross-cutting) for which a Program Administrator (PA) is taking action.</p> <p>Each chapter should discuss the following:</p> <p>a) Sector-Specific Intervention Strategies:</p> <ul style="list-style-type: none"> (i) overarching goals, strategies and approaches; (ii) near-, mid- and long-term strategic initiatives; (iii) how the sector approach(es) advances the goals, strategies and objectives of the strategic plan and other Commission policy guidance. <p>b) Statewide Coordination: Description of which and how strategies are coordinated statewide and regionally among PAs and/or with other demand-side options.</p> <p>Discussion should address the following, as applicable:</p> <ul style="list-style-type: none"> i) Investor Owned Utility (IOU) and Regional Energy Network (REN) programs within a PA’s geographic territory ii) Statewide programs iii) Coordination with other state and local government activities <p>c) Cross-Sector Coordination: Description of how cross cutting activities are addressed in customer sectors strategies. Include as applicable:</p> <ul style="list-style-type: none"> i) Emerging Technologies program ii) Codes and Standards program iii) WE&T efforts iv) Program-specific marketing and outreach efforts (provide budget) <p>d) Pilots and Innovation: Describe any unique or innovative aspects of program not previously discussed, and describe any pilots contemplated or underway for the sector.</p> <p>e) EM&V Considerations: Statement of evaluation needs that must be built into program designs. Identify which programs will need to consider and build evaluation methods into the program design. These might include:</p>	<p>D.15-10-028, Appendix 3</p>	<p>The business plan includes sector-level chapters for residential, commercial, industrial, agricultural, public and cross-cutting.</p>

CPUC Regulatory Directives		
Sector-specific CPUC Regulatory Directives	Cite	Response
<p>i) data collection strategies embedded in the design of the program or intervention to ensure ease of reporting and near term feedback, and ii) internal performance analysis during deployment</p>		
<p>3) Portfolio Budget and Savings Tables Portfolio budgets should be submitted via EE Stats, guidance and templates are posted in the Regulatory/Guidance Documents section at http://eestats.cpuc.ca.gov/StandardTables/GuidanceDocument.aspx. While the tables below should be attached to the business plan filings, budgets and savings will be reviewed and approved through the advice letter filing process, which should be filed at the same time as the Business Plan application.</p> <p>Updated data table templates will be posted to EE Stats once the filing system has been developed.</p> <p>Data inputs will include:</p> <ul style="list-style-type: none"> a) Program level proposed budgets that meet portfolio savings and cost effectiveness requirements (Placemats) b) Cost effectiveness showing outputs, with cost calculator submittals posted in EE Stats c) Program Performance Metrics 	D.15-10-028, Appendix 3	The business plan includes portfolio budgets and energy savings tables consistent with the guidance.
<p>There shall be a stakeholder process associated with business plan, Tier 2 advice letter budget filing, and implementation plan preparation. Participants in that stakeholder process may be eligible for intervenor compensation, subject to generally applicable requirements applicable for intervenor compensation claims. There shall be one statewide coordinating committee, with a chairperson or two co-chairpersons. The coordinating committee shall select the chairperson(s) for the coordinating committee, and also shall select the chairperson(s) for each subcommittee.</p>	D.15-10-028, OPN 8, p. 125	The business plan development included the external stakeholder process created by the California Energy Efficiency Coordinating Committee (CAEECC). The CAEECC includes a co-chairpersons, committee and chairpersons for each subcommittee. See, www.caeccc.org for more detail.
<p>Business plans will explain at a relatively high level of generality how PAs will effectuate the strategic plan.⁸⁵ Footnote 85 - As discussed below, we are redefining sectors versus those in the 2011/2008 Strategic Plan. Hence we are not directing here that the business plans precisely track the strategic plans sectors.</p>	D.15-10-028, p. 46	The business plan references the California Long-term Energy Efficiency Strategic Plan (CLTEESP) but does not precisely track the CLTEESP sectors.

CPUC Regulatory Directives		
Sector-specific CPUC Regulatory Directives	Cite	Response
<p>PAs must establish up-front expectations for their activities. To that end, business plans shall contain sector-level metrics (not necessarily PPMs or MTIs).</p> <p>PAs will still need to set more granular metrics than just sector-level metrics, but they will do so in implementation plans, not business plans. It is in the implementation plans that we want to see at least one metric for each program/strategy/sub-sector/intervention strategy; more than one where appropriate. The business plan is not the place for that additional level of detail.</p> <p>The metrics PAs adopt can be PPMs or MTIs (defined terms, per D.09-09-047), but do not have to be. They will just be metrics – appropriate benchmarks against which to measure program/strategy/intervention performance, and should be designed to be valuable to implementers as well as other stakeholders to improve the chances of longevity of the metric and associated perspective of measuring it over time. In the business plans, we want to know what a PA intends to accomplish in a given sector in the short term and the long term. For example, we want to be able to tell that for investment of Y dollars we can expect to see X achievement(s) towards Strategic Plan objectives from Z programs/strategies/interventions in a sector. On subsequent review, we want to know where those programs/strategies/interventions fall on the continuum of success through failure. The same is true for both the general metrics in the business plans and for the more granular metrics in the implementation plans.</p> <p>We are not going to require any particular number of metrics, such as Commission Staff’s requested three metrics per sector. Requiring any number other than a non-zero one would be arbitrary. PAs will have to tie their metrics back to the Strategic Plan. As with so much that we do here, there is going to be an element of trial and error in determining the right type of, number of, and level of abstraction for metrics. This is an excellent place for stakeholder involvement, via the Coordinating Committee that we discuss more in section 3.2.2.2 below. The past experience in developing the PPM and MTIs should not be lost. The principles and frameworks for considering and developing the metrics and discussed in</p>	<p>D.15-10-028, pp. 53-54</p>	<p>The business plan includes sector-level metrics.</p>

CPUC Regulatory Directives		
Sector-specific CPUC Regulatory Directives	Cite	Response
Workshops and meetings are still relevant today, even if the metrics themselves may need to be updated. In addition, experts in EM&V should contribute their expertise on process and impact evaluations to development of metrics.		
<p>Business Plan Budgets</p> <p>Some commenters on the proposed decision expressed confusion about the interaction of the business plan budgets and the annual advice letter budget filings.</p> <p>To clarify, the business plans are to provide <i>general</i> information on the expected levels of annual spending for the duration of the business plan (i.e., “under the business plan, we expect spending to be \$X per year for up to ten years”). The decision on the business plan will provide guidance for PAs on funding levels to use in developing the more detailed annual budgets that PAs will file via advice letter. The decision on the business plan will also provide guidance to Commission Staff in reviewing those annual filings.</p> <p>The decision on the business plans will not establish a particular amount for cost recovery (for IOUs) or for transfers from IOUs (for CCAs) or for contracting purposes (for RENS). It will establish a “ballpark” figure for spending for the life of the business plan. The annual advice letter filings, not the business plans, will propose detailed budgets for cost recovery, transfer, and contracting purposes.</p> <p>The goal is to give flexibility to PAs to adjust spending during the life of the business plan. Giving PAs this flexibility necessarily entails some discretion for staff in reviewing the annual advice letters. Hence those advice letters are properly Tier 2 rather than Tier 1, as discussed later in this decision.</p>	D.15-10-028, pp. 55-56	The business plan includes a forecast of annual budgets (i.e., actual spending) for the duration of the business plan (2018 – 2025).
We delegate to Commission Staff responsibility for developing additional business plan guidance. Commission Staff should balance the need for information from PAs with the need to keep business plans compact and focused, and to reduce PA administrative costs.	D.15-10-028, p. 57	The business plan follows the Energy Division checklist provided during the planning process.

Appendix E: Review Checklist

Business Plan Review Checklist – Executive Summary			
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Executive Summary
0	Executive Summary		
	Company description	Yes	ES-Introduction
	Definition of market	Yes	ES-Introduction
	Mission Statement	Yes	ES-Introduction
	Purpose of Business Plan	Yes	ES-Vision & Goals
I.A.1, II.D.2	Overview		
	About EE/DSM	Yes	ES-Overview & Approach
	CA Energy Needs	Yes	ES-Overview & Approach
	Regulatory Requirements	Yes	Appendix E
	Strategic Plan	Yes	ES - Vision & Goals
	Legislation (e.g., AB 758, SB 350, AB 802, AB 793)	Yes	ES -Overview & Approach, Appendix A
	IOUs/PAs/CPUC/etc. overall role	Yes	ES -Market Characterization graphic, Portfolio Management & Oversight
I.A.2	Broad socioeconomic and utility industry trends relevant to PA's EE programs (population, economics and markets, technology, environment/climate)	Yes	ES-Key Trends
I.B.1	Vision (e.g., How PA thinks about and uses EE over next 10 years)	Yes	ES-Vision & Goals
I.5	Compare/contrast to past cycles	Yes	ES-Comparison to Past Cycles
I.B.2	Goals & Budget		
I.B.2 & I.C.2.a	Energy Saving Goals	Yes	ES - Vision & Goals
I.C.2.a	Portfolio Budget (sector and portfolio level per xls checklist)	Yes	ES - Vision & Goals
I.C.2.a, I.C.2.d	Cost-effectiveness (sector and portfolio level per xls checklist)	Yes	ES - Vision & Goals
I.C.2.b	Explanation of Admin Budgets (e.g., Direct/Indirect Labor, Professional/Admin personnel)	Yes	ES - Vision & Goals
I.C.2.c	Explanation of accounting practices	Yes	ES - Vision & Goals

Appendix E: Review Checklist

Business Plan Review Checklist – Executive Summary			
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Executive Summary
I.C.3 and I.C.4	Intervention strategies (high level)		
	Overall issues/challenges/barriers	Yes	ES - Key Challenges
	High level summary of strategies and tools (e.g., AMI data, AB 802, procurement model, up/mid/downstream, etc.)	Yes	ES - Overview of Intervention Strategies
I.C.4; I.D	Solicitation plan		
I.C.4	Solicitation strategies/areas that could be SW	Yes	ES - Transition Plan
I.D; II.F	Proposal for transitioning the majority of portfolios to be outsourced by the end of 2020.	Yes	ES-Transition Plan
	SW Framework Description - Upstream/Midstream Programs and Downstream Pilots		ES - Statewide Programs

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
II.A	Summary tables										
II.A	Table with CE, TRC, PAC, emissions, savings, budget	Yes	Approach to Achieve Residential Sector Goals Section	Approach to Achieve Industrial Sector Goals Section	Approach to Achieve Commercial Sector Goals Section	Approach to Achieve Agricultural Sector Goals Section	Approach to Achieve Public Sector Goals Section	Savings, Budget & Cost-Effectiveness	ETP Vision, Budget, Trends, and Challenges	Approach to Achieve Finance Vision	Approach to Achieve WE&T Sector Goals
I.C.7; II.E.1.b	Metrics for sector	Yes	Performance Sector Metrics Section	Performance Sector Metrics Section	Performance Sector Metrics Section	Performance Sector Metrics Section	Performance Sector Metrics Section	Metrics and EM&V	Metrics & Targets	Reference PG&E Statewide Language	Performance Sector Metrics
II.D	Market characterization (overview and market/gap and other analysis)										
II.D.1	Electricity/NG	Yes	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	C&S Landscape	Market Characterization	Market Characterization	WE&T Sector Market Characterization
II.D.2	State goals include acknowledgement of goals set by Strategic Plan, SB 350, AB758, guidance as appropriate)	Yes	Legislative Impacts on Strategy Section	Legislative Impacts on Strategy Section	Legislative Impacts on Strategy Section	Legislative Impacts on Strategy Section	Legislative Impacts on Strategy Section	C&S Landscape	Value of ETP	Approach to Achieve Finance Vision	WE&T Sector Market Characterization

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
II.D.3	EE potential and goals	Yes	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	C&S Landscape	Not Applicable	Not Applicable	Not Applicable
II.D.5	Customer landscape (e.g., segments/subsegments, major end uses, participation rates, etc.)	Yes	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	C&S Landscape	Market Characterization	Market Characterization	WE&T Sector Market Characterization
II.D.6	Major future trends that are key for the PA and its customers	Yes	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	Sector Market Characterization Section	C&S Landscape	ETP Vision, Budget, Trends, and Challenges	Market Characterization	WE&T Sector Market Characterization
II.D.7	Barriers to EE and other challenges to heightened EE (e.g., regulatory, market, data)	Yes	Approach to Achieve Residential Sector Goals Section	Approach to Achieve Industrial Sector Goals Section	Approach to Achieve Commercial Sector Goals Section	Approach to Achieve Agricultural Sector Goals Section	Approach to Achieve Public Sector Goals Section	Approach to Achieving C&S Goals	ETP Vision, Budget, Trends, and Challenges	Market Characterization	Approach to Achieve WE&T Sector Goals
II.2.a	Description of overarching approach to the sector										
	Goals/strategies/approaches	Yes	Goals, Strategies, and Tactics for the Residential Sector Section	Goals, Strategies, and Tactics for the Industrial Sector Section	Goals, Strategies, and Tactics for the Commercial Sector Section	Goals, Strategies, and Tactics for the Agricultural Sector Section	Goals, Strategies, and Tactics for the Public Sector Section	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the WE&T Sector
I.C.6; I.D	How portfolio meets Commission	Yes	Appendix E	Appendix E	Appendix E	Appendix E	Appendix E	Appendix E	ETP Value and	Appendix E	Appendix E and Sector

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
	guidance								Appendix E		Market Characterization
II.C	Description of how this chapter addresses the performance challenges/ barriers	Yes	Goals, Strategies, and Tactics for the Residential Sector Section	Goals, Strategies, and Tactics for the Industrial Sector Section	Goals, Strategies, and Tactics for the Commercial Sector Section	Goals, Strategies, and Tactics for the Agricultural Sector Section	Goals, Strategies, and Tactics for the Public Sector Section	Approach to Achieving C&S Goals	ETP Vision, Budget, Trends, & Challenges and ETP Strategies	Program Strategies and Delivery	Approach to Achieve WE&T Sector Goals
I.C.4 a-c	Intervention strategies (detailed)										
II.D.2.a; II.E.3	What specific strategies are being pursued (e.g., near, mid, long AND existing, modified, new)	Yes	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the WE&T Sector
I [cmt with excerpt]	Why specific strategies were chosen (e.g., ID current weaknesses, best practices, or other rationale to support choice)	Yes	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the WE&T Sector
II.E.1.a; II.E.4	How approaches advance goals discussed above	Yes	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Program Intervention Strategies Section	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the WE&T Sector

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
I.C.4; I.E; II.D.4	How strategies use lessons learned from past cycles and EM&V	Yes	Program Intervention Strategies Section	C&S Proposal Compared to Prior Program Cycles	ETP Strategies	Program Strategies and Delivery	Evaluation, Measurement, and Verification Considerations				
I	How will interventions support/augment current approaches or solve challenges	Yes	Program Intervention Strategies Section	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the WE&T Sector				
II.D.2	Explanation for how these strategies address legislative mandates from AB 802, SB350, and AB 793, as well as other Commission directives for this sector, including strategic plan.	Yes	Legislative Impacts on Strategies Section, Appendix A, and Appendix E	Legislative Impacts on Strategies Section, Appendix A, and Appendix E	Legislative Impacts on Strategies Section, Appendix A, and Appendix E	Legislative Impacts on Strategies Section, Appendix A, and Appendix E	Legislative Impacts on Strategies Section, Appendix A, and Appendix E	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Approach to Achieve WE&T Sector Goals
I.C.4	Future expectations for intervention strategies	Yes	Overview of New Program Strategies and Tactics	Approach to Achieving C&S Goals	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the WE&T Sector				
I.C.1; II.E.6	Description of pilots	Yes	Goals, Strategies, and Tactics for the Residential Sector Section	Goals, Strategies, and Tactics for the Industrial Sector Section	Goals, Strategies, and Tactics for the Commercial Sector Section	Not Applicable	Goals, Strategies, and Tactics for the Public Sector Section	Not Applicable	Not Applicable	Program Strategies and Delivery	Goals, Strategies, and Tactics for the Public Sector Section

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
II.F	Key Partners	Yes	Key Partners Section	Key Partners Section	Key Partners Section	Key Partners Section	Key Partners Section	Approach to Achieving C&S Goals	ETP Key Collaborators	Program Strategies and Delivery	Key Partners Section
I.C.5; I.D; II.B; II.C	Compare/contrast to past cycles										
	Budget changes as appropriate	Yes	Approach to Achieve Residential Sector Goals Section	Approach to Achieve Industrial Sector Goals Section	Approach to Achieve Commercial Sector Goals Section	Approach to Achieve Agricultural Sector Goals Section	Approach to Achieve Public Sector Goals Section	C&S Proposal Compared to Prior Program Cycles	Not Applicable (No budget changes)	Program Strategies and Delivery	Not Applicable (No budget changes)
	Modification to sector strategies	Yes	Overview of New Program Strategies and Tactics	Overview of New Program Strategies and Tactics	Overview of New Program Strategies and Tactics	Overview of New Program Strategies and Tactics	Overview of New Program Strategies and Tactics	C&S Proposal Compared to Prior Program Cycles	ETP Strategies	Program Strategies and Delivery	Goals, Strategies, and Tactics for the Public Sector Section
	Cross-cutting (sector chapters and ME&O)										
II.E.2; II.H, II.K	Program Administrator marketing and integration with SW MEO as applicable	Yes	Cross-Cutting Sector Coordination Section	Cross-Cutting Sector Coordination Section	Cross-Cutting Sector Coordination Section	Cross-Cutting Sector Coordination Section	Cross-Cutting Sector Coordination Section	Not Applicable	Not Applicable	Hybrid Chapter - Not Applicable	Not Applicable

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II.E.5; II.H	Workforce, education, and training	Yes	Cross-Cutting Sector Coordination Section	Approach to Achieving C&S Goals	Coordination with Other Programs	Hybrid Chapter - Not Applicable	Not Applicable				
II.H	Emerging Technologies	Yes	Cross-Cutting Sector Coordination Section	Approach to Achieving C&S Goals	Not Applicable	Hybrid Chapter - Not Applicable	Cross-cutting Sector Coordination				
II.H	Codes & Standards	Yes	Cross-Cutting Sector Coordination Section	Not Applicable	Coordination with Other Programs	Hybrid Chapter - Not Applicable	Cross-cutting Sector Coordination				
II.G	Cross PA and Offering Coordination										
II.G	How strategies are coordination among regional PAs	Yes	Local Implementation Section	Approach to Achieving C&S Goals	ETP's Key Collaborators	Program / Program Administrator Coordination	Goals, Strategies, and Tactics for the Public Sector Section				
II.G	Proposal of statewide program administrator/approaches for this sector	Yes	Statewide Implementation Section	Statewide Administration Section	Coordination with Other Programs	Program / Program Administrator Coordination	Cross-cutting Sector Coordination				
II.G	How the sector strategies are coordinated with statewide program activities	Yes	ES - Statewide Programs Section	Statewide Administration and Transition Timeline	Coordination with Other Programs	Program / Program Administrator Coordination	Cross-cutting Sector Coordination				

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
II.G	How are strategies coordinated with other state agencies and initiatives (e.g., AB 758)	Yes	Appendix A	Appendix A	Appendix A	Appendix A	Appendix A				
II.I	EM&V Considerations (statement of needs)										
II.I	Data collection needs	Yes	EM&V Considerations Section	Metrics and EM&V	Evaluation, Measurement, & Verification Considerations	Evaluation, Measurement, & Verification Considerations	Evaluation, Measurement, & Verification Considerations				
II.I	Anticipated study needs	Yes	EM&V Considerations Section	Metrics and EM&V	Evaluation, Measurement, & Verification Considerations	Evaluation, Measurement, & Verification Considerations	Evaluation, Measurement, & Verification Considerations				
II.J	Demand Response										
ED Guidance (p.8)	How EE measures use up-to-date DR enabling technologies to be "DR ready"	Yes	Cross-Cutting Sector Coordination Section	Approach to Achieving C&S Goals	Coordination with Other Programs	Hybrid Chapter - Not Applicable	Not applicable				

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Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
ED Guidance (p.8)	How duplication of costs for ME&O, site visits, etc. is avoided for dual-purpose technologies	Yes	Cross-Cutting Sector Coordination Section	Not Applicable	Not Applicable	Hybrid Chapter - Not Applicable	Not applicable				
ED Guidance (p.9)	How strategies facilitate customer understanding of peak load, cost, and opportunities to reduce	Yes	Cross-Cutting Sector Coordination Section	Not Applicable	Coordination with Other Programs	Hybrid Chapter - Not Applicable	Not applicable				
II.K	Residential Rate Reform										
ED Guidance (p.9)	How BPs will help reduce load during TOU periods	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				
ED Guidance (p.9)	How BP will diminish barriers to load reduction during TOU periods	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				
ED Guidance (p.9)	How strategies will provide info to customers and/or provide a tool to show how program may impact customer energy usage during different TOU periods	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
ED Guidance (p.9)	How strategies will analyze whether a customer may experience greater savings by switching to a different, opt-in TOU rate	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				
ED guidance (p.9)	ME&O re: rate reform	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				
II.L	Integrated Demand Side Resources	Yes	Cross-cutting Coordination Sector Section	Not Applicable	Coordination with Other Programs	Hybrid Chapter - Not Applicable	Not Applicable				
II.M	Zero-Emission Vehicles (EVs)	Yes	Cross-cutting Coordination Sector Section	Not Applicable	Coordination with Other Programs	Hybrid Chapter - Not Applicable	Not Applicable				
II.N	Energy Savings Assistance (Multi-family Focused)	Yes	Cross-cutting Coordination Sector Section	Not Applicable	Not Applicable	Hybrid Chapter - Not Applicable	Not Applicable				
	Appendices										
	Legislation	Yes	Appendix A	Appendix A	Appendix A	Appendix A	Appendix A				

Appendix E: Review Checklist

Business Plan Review Checklist – Sector Chapters											
Map to NRDC Compilation Document	Business Plan Element	Indicate Complete	Residential	Industrial	Commercial	Agricultural	Public	Codes & Standards	Emerging Technology	Finance* *Hybrid	Workforce Education & Training
	EM&V Studies	Yes	Appendix B	Appendix B	Appendix B	Appendix B					
	Cited Research	Yes	Appendix C	Appendix C	Appendix C	Appendix C					
	CAEECC stakeholder input resolution	Yes	Appendix D	Appendix D	Appendix D	Appendix D					
	BP Review Checklist and Regulatory Directives	Yes	Appendix E	Appendix E	Appendix E	Appendix E					
	Additional Customer Data	N/A	Not Applicable	Not Applicable	Not Applicable	Not Applicable					
	Policy Considerations	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable					
	Witness Qualifications	Yes	Not Applicable	Not Applicable	Not Applicable	Not Applicable					
	Cost-Effectiveness	Yes	Appendix H	Appendix H	Appendix H	Appendix H					

Appendix F: Policy Considerations for a Successful Business Plan

In the development of the Energy Efficiency Business Plan, Southern California Gas Company (SoCalGas) identifies six discreet areas that SoCalGas requests Commission guidance, clarity, and approval, with respect to Commission's energy efficiency policies. While adoption of its Business Plan is the primary goal in this application, addressing these "policy considerations" is also necessary in SoCalGas' view to allow for the successful execution of its Business Plan and to ultimately facilitate in meeting California's aggressive energy efficiency goals as envisioned in Senate Bill 350 while improving program delivery and administration.

A. Confirm Cost-Effectiveness Threshold of 1.0

The Total Resource Cost (TRC) and Program Administrator Cost (PAC) test estimates that exceed a 1.0 should be deemed cost-effective for the program years covered by the energy efficiency Business Plan under the cost-effectiveness ratio threshold.

Discussion:

In Decision (D.) 14-10-046, the Commission specified that the 2015 prospective showing of energy efficiency portfolio cost-effectiveness, the TRC and PAC ratios are to exceed a 1.0 cost-effectiveness, rather than 1.25. Specifically, the Commission stated that,

"The TRC and PAC estimates are to exceed a 1.0 cost-effectiveness threshold for 2015; rather than the 1.25 we usually require, and will require for subsequent years."⁴⁵⁶

The decision further clarifies that it "recognizes there is a tension between that expectation and this decision setting spending levels until 2015 or we change them. We do not resolve that tension, which is a 2016 and beyond issue here."⁴⁵⁷

SoCalGas requests that the Commission clarify that its guidance above allows for a finding of cost-effectiveness, rather than an absolute requirement that SoCalGas must meet the TRC and PAC 1.25 ratio threshold (without codes and standards) for the program years covered by the Energy Efficiency Business Plan. There are several new developments observed in this business planning process. First, given the change from a multi-year program cycle to an annual prospective cost-effectiveness showing, as part of the new rolling portfolio, an additional 1.25 threshold requirement is not necessary. The rolling portfolio allows for continuous updates to measure assumptions based on Commission-adopted load impact studies thereby providing the Program Administrators and the Commission a far more accurate forecast of portfolio cost-effectiveness, annually. Secondly, with the requirement to solicit for statewide programs and increase reliance on third-party programs, the specific program designs, budgets, and savings

⁴⁵⁶ California Public Utilities Commission. (2014, October 16). D.14-10-046, p. 109.

⁴⁵⁷ *Id.* at 110.

are still unknown.⁴⁵⁸ Also, the 2017 avoided costs are significantly less than the previous years' avoided costs. If the 2017 avoided costs were applied to earlier portfolios, keeping all other inputs constant (e.g., measure assumptions, budgets, etc.) would result in a significant reduction in portfolio cost-effectiveness.⁴⁵⁹ Lastly, continued advancements in California's codes and standards (C&S), will significantly reduce the reportable energy savings by non-C&S programs in 2018, thereby reducing forecasted energy savings benefits. Therefore SoCalGas requests that the Commission clarify that the 1.25 ratio threshold not be deemed an absolute requirement, but rather, apply the cost-effectiveness threshold ratio of 1.0 to the annual prospective showing of the energy efficiency portfolio's cost-effectiveness for the program years covered by the energy efficiency Business Plan.

B. Statewide Program Budgets

In the determination of the requirement that statewide programs should comprise at least 25% of the program administrator portfolio budgets, SoCalGas seeks Commission recognition that the following exceptions be allowed:

1. The statewide program 25% budget requirement should be modified for gas-only program administrators.
2. Functional activities that are administered statewide should count toward the requirement that 25% of program administrators' budget be devoted to statewide activities.

Discussion:

1. The statewide program 25% budget requirement should be modified for gas-only program administrators

D.16-08-019 requires that at least 25% of the program administrators' budgets in the business plans be devoted to statewide programs or subprograms, noting that the statewide programs specifically listed in the decision would compromise approximately 30 percent of current (2016) portfolio expenditures.⁴⁶⁰ However, the list of statewide programs includes Lighting programs (Primary Lighting, Lighting Innovation, Lighting Market Transformation) and other electric measures, which SoCalGas does not offer to its customers. In the 2016 authorized program budgets, Lighting programs account for 12% of Southern California Edison Company's program portfolio, 6% of San Diego Gas & Electric Company's program portfolio, and 3% of PG&E's

⁴⁵⁸ SoCalGas applied its 2017 energy efficiency program portfolio data, based on the current program designs, as a basis for estimating the 2018 cost-effectiveness.

⁴⁵⁹ Horii, B., Price, S., Cutter, E., Ming, Z., & Chawla, K. (2016, August 1). *Avoided costs 2016 interim update*. Energy and Environmental Economics, Inc., pp. 41-44. Retrieved from <http://www.energydataweb.com/cpucFiles/pdaDocs/1591/Avoided%20Cost%202016%20Update-OUT.pdf>

⁴⁶⁰ California Public Utilities Commission. (2016, August 25). D.16-08-019, p.65.

program portfolio. Without statewide electric lighting programs, SoCalGas is disadvantaged to achieve a 25% requirement for statewide programs, and the Commission should modify this policy to allow gas-only program administrators to devote at least 15% of the IOU program administrator program budget to statewide programs.

2. Functional activities that are administered statewide should count toward the requirement that 25% of program administrators' budget be devoted to statewide activities

The Commission supported the idea that certain functional activities or “‘back office’ types of work, such as rebate fulfillment, data capture and management, and even marketing”⁴⁶¹ could be performed on a statewide basis. Some IOUs suggested similar treatment in its comments in response to the Ruling of the Assigned Commissioner and Administrative Law Judge, dated May 25, 2016 (Ruling). While not considered “statewide” by the terms of the definition as set forth in D.16-08-019, any functional activities that the IOUs determine should be performed on a statewide basis should count toward the requirement that 25% of Program Administrators’ budgets be devoted to statewide activities. Such program activities, if performed on a statewide basis, support the Commission’s desire “to take advantage of uniform opportunities across the state for customers or market actors whose operations do not vary significantly geographically within California.”⁴⁶² By including such functional program activities in the 25% threshold calculation, it will also further advance the Commission’s desire “to prioritize easy program access to customers, and in part, lower transaction costs for administrators and implementers.”⁴⁶³

C. Third-Party Budget Requirement

The third-party minimum 60% budget requirement should be based on total IOU portfolio budget, including Regional Energy Networks (RENs), EM&V, Statewide Marketing, Education & Outreach (EE only), and Finance Pilots.

Discussion:

D.16-08-019 requires that as part of the Business Plan, the IOUs present a plan to transition to at least 60% of their portfolios to be outsourced to third-parties by the end of 2020.⁴⁶⁴ SoCalGas requests that the Commission clarify that the 60% threshold calculation be based on the funding of the entire portfolio total, including RENs, Statewide Marketing, Education & Outreach (ME&O) (EE only), and EE Finance Pilots budgets, as well as EM&V budgets. This

⁴⁶¹ *Id.* at 73.

⁴⁶² *Id.* at 50-51.

⁴⁶³ *Id.*

⁴⁶⁴ *Id.* at 111.

approach is consistent with the Commission’s prior direction that the total portfolio budget be applied in the calculation of the third-party funding requirement.⁴⁶⁵

Additionally, the new definition of third-party applies to these budget items that are included in the total portfolio budget. D.16-08-019 defines third-party programs as those that are “proposed, designed, implemented, and delivered by non-utility personnel under contract to a utility program administrator.”⁴⁶⁶ RENS, by default, operate programs that are proposed, designed, implemented and delivered by non-utility personnel. Statewide ME&O (EE only) also fits that definition. The Finance Pilots and the Commission-portion of EM&V budgets are also dedicated to efforts that are proposed, designed, implemented, and delivered by non-utility personnel. In its Business Plan, SoCalGas presents a plan to transition to at least 60% of its portfolio to meet this new third-party requirement by the end of 2020, and it is inclusive of these program activities. The formula used to determine the minimum 60% threshold is presented below.

$$\frac{[Third\ Party\ Programs]+[RENS]+[SW\ ME\&O]+[CPUC\ EM\&V]}{[Total\ Portfolio\ Budget]} \geq 60\%$$

D. Third-Party Contracts

Ordering Paragraphs 11 and 14 of D.16-08-019 authorize program administrators to begin solicitations for third-party programs under the new definition of third-party, to maintain the third-party minimum 20% requirement and ensure a smooth transition into the rolling portfolio.

Discussion:

As discussed in Section C, D.16-08-19 requires that as part of the Business Plan, the IOUs present a plan to transition to at least 60% of their portfolios to be outsourced to third-parties by the end of 2020. Ordering Paragraph 14 of that decision states, that “Program administrators shall ensure a smooth transition between existing energy efficiency program activities and the changes outlined in this decision, to be proposed in the business plans due January 15, 2017, minimizing program disruptions and avoiding any funding hiatus for ongoing efforts or partnerships.”⁴⁶⁷

⁴⁶⁵ California Public Utilities Commission. (2012, November 8). D.12-11-015, pp. 81-82.

⁴⁶⁶ California Public Utilities Commission. (2016, August 25). D.16-08-019, OP10, p. 111.

⁴⁶⁷ *Id.* at 112 (OP 14).

As outlined in the third-party transition plan included in its Business Plan, SoCalGas intends to begin issuance of third-party solicitations in the second quarter of 2017.⁴⁶⁸ This is based on the following considerations:

- to ensure a smooth transition from SoCalGas’ current portfolio into the rolling portfolio, as directed by Ordering Paragraph 14;
- that it complies with the requirement in Ordering Paragraph 11 that “going forward,” each IOU program administrator must maintain its existing 20% third-party program requirement under the new definition of third-party; and,
- an ongoing requirement to administer a portfolio that achieves savings goals, and provides the best energy efficiency programs and solutions to ratepayers.

Many of SoCalGas’ current third-party programs were solicited several program cycles ago. In order to ensure that program offerings provide relevant, valuable, and cost-effective energy efficiency solutions to customers, SoCalGas intends to re-solicit these programs. SoCalGas proposes that Ordering Paragraph 14 be interpreted as authorizing program administrators to begin solicitations of new contracts that fit the new definition of third-party in order to ensure a smooth transition into the new third-party paradigm, so that SoCalGas is in compliance with the 20% third-party requirement outlined in Ordering Paragraph 11, and to maintain prudent administration of its energy efficiency portfolio.

E. Statewide Administration Assignments

SoCalGas proposes that it be the statewide Lead Program Administrator for the following four programs:

1. Residential New Construction;
2. Gas Emerging Technologies;
3. Foodservice Point-of-Sale (POS) Rebates; and
4. Midstream Commercial Water Heating

Discussion:

1. Residential New Construction

SoCalGas is committed to administering dual-fuel energy efficiency program offerings on behalf of all program administrators and many publicly-owned utilities in its shared service territories. SoCalGas has demonstrated that it has been the most cost-effective administrator of the Residential New Construction program, on a \$/therm basis. SoCalGas has also demonstrated experience of successfully managing dual-fuel energy efficiency programs to customers, coupled with the discipline on cost-effective implementation, well positions SoCalGas to assume statewide leadership of the Residential New Construction program.

⁴⁶⁸ See “Transition Plan” section of the Executive Summary.

SoCalGas has the infrastructure, systems, and discipline in place to manage complex, multi-dimensional energy efficiency programs across multiple service territories. For example, SoCalGas has 28 joint programs with municipal electric utilities and water agencies, such as Los Angeles Department of Water and Power (LADWP), including the Residential New Construction Program. SoCalGas also has long-standing partnerships with Pacific Gas and Electric Company (PG&E), SDG&E, SCE in delivering joint gas and electric programs throughout the shared service territory. Since 2013, SoCalGas' California Advanced Homes Program has enrolled more than 25,000 new home units in its shared service area with combined builder project incentives of over \$15 million, the most in California.

In addition to partnerships with other utilities, SoCalGas has strong relationships with manufacturers, distributors, and builders to deliver the Residential New Construction program. SoCalGas works together with all its market actor partners to help the building industry design and develop more environmentally-friendly communities and support California's efforts for new single family homes to reach zero net energy by 2020. SoCalGas seeks to leverage its learning from active partnerships with Metropolitan Water District's and LADWP's Water Conservation teams to increase the speed to market as water conservation becomes an increasingly important component of the Residential New Construction equation throughout California. SoCalGas intends to administer a program with a cross-cutting focus on sustainable design and construction, green building practices, energy efficiency, and emerging technologies. SoCalGas' experience in delivering dual-fuel programs by bringing all market actors together in an engaged partnership, positions it to implement this vision.

2. Gas Emerging Technologies Program (ETP)

As a gas-only utility, SoCalGas is focused on developing efficient new natural gas technologies to fit the needs of California customers. The Statewide ETP initiative has been successful in bringing new and underutilized technologies into the utility energy efficiency portfolios based on the strong, collaborative network (the Emerging Technologies Coordinating Council) formed among the ETP staff at the four IOUs, as well as Sacramento Municipal Utility District and LADWP. These relationships will not disappear in the new statewide administration model, but rather will be enhanced under SoCalGas' administrative leadership. As described for the Residential New Construction program, SoCalGas has a strong reputation for collaborative leadership among a wide range of market actors and key ET information and policy organizations, such as the American Council for an Energy-Efficient Economy (ACEEE), Consortium for Energy Efficiency (CEE), and Energy Solutions Center (ESC). This leadership will extend to Gas Emerging Technologies.

Creating two distinct gas and electric Emerging Technologies Programs (ETP) will allow for greater focus on a wider range of energy-specific new technologies. SoCalGas is a recognized leader in bringing new efficient gas technologies to market. Gas ETP will build on the existing statewide program framework, such as using the Emerging Technology Coordinating Council collaboration structure, in-house and external testing facilities and the experience of more than a hundred heating technology assessments delivered in the past five years. SoCalGas has close relationships with the California Energy Commission natural gas Public Interest Energy Research

programs and the Gas Technology Institute, to bring new, energy-efficient gas technologies into the portfolio. As the statewide ET program currently operates, natural gas technologies can often be a secondary focus to electric technologies given the higher portion of electric energy efficiency budgets among the IOUs. With two distinct electric and gas ETPs, the programs can laser focus on the development, assessment, and introduction of more new and underutilized technologies, without regard to fuel prioritization. It will also enable a more relevant engagement with stakeholder organizations, given the manufacturers, distributors, trade allies, and member organizations associated with natural gas technologies are significantly different than the electric counterparts. Recognizing the importance for technologies with dual benefits, such as energy management systems, the two ETPs will closely collaborate with SoCalGas and SCE as the Lead Program Administrators, the two programs will benefit from their long running partnership to effectively collaborate to ensure that program administration, technology strategy, and product and process quality controls are consistent.

3. Foodservice POS Rebate and Midstream Commercial Water Heating Programs

D.16-08-019 requires that all upstream and midstream programs in the existing portfolio, including but not limited to those listed in the Decision, plus new programs proposed in business plans that are market transformation, upstream, or midstream, shall be delivered statewide.⁴⁶⁹ SoCalGas currently offers two midstream programs: Foodservice POS Rebate and Midstream Commercial Water Heating, which SoCalGas intends to continue to offer as part of the rolling portfolio. In this new paradigm, these programs will be delivered statewide, led by SoCalGas.

The Foodservice POS Rebate program seeks to increase the sales of high efficiency commercial foodservice equipment by engaging midstream market actors to stock and actively market high efficiency equipment. The Midstream Commercial Water Heating program's objective is to push higher efficiency water heaters into the non-residential market by leveraging the distributor and contractor communities. SoCalGas will leverage its experience in administering these programs to expand their delivery statewide.

F. Roles and Responsibilities of Statewide Administration

In response to direction from D.16-08-019, the IOUs have developed a governance process that represents a joint collaborative commitment to the success of statewide program administration.

Discussion:

D.16-08-019 recognizes that once lead program administrator assignments are developed, the remaining program administrators still play an important role in the administration of statewide

⁴⁶⁹ California Public Utilities Commission. (2016, August 25). D.16-08-019, OP 8, pp. 110-111.

programs.⁴⁷⁰ The Commission calls for a consultative and collaborative relationship between the lead program and other administrators on key aspects of the portfolio, and states that they “are deliberately not specifying in this decision the exact form such collaboration should take.”⁴⁷¹ With this direction, the IOUs describe a governance process that presents the consultative and collaborative relationship in the statewide administration model.

Roles and Responsibilities of Statewide Administration

In response to direction from D.16-08-019, the IOUs have developed a governance process that represents a joint collaborative commitment to the success of statewide program administration.

Discussion:

D.16-08-019 recognizes that once lead program administrator assignments are developed, the remaining program administrators still play an important role in the administration of statewide programs.⁴⁷² The Commission calls for a consultative and collaborative relationship between the lead program and other administrators on key aspects of the portfolio, and states that they “are deliberately not specifying in this decision the exact form such collaboration should take.”⁴⁷³ With this direction, the IOUs describe a governance process that presents the consultative and collaborative relationship in the statewide administration model, presented in Appendix A to the Executive Summary.

⁴⁷⁰ *Id.* at 54.

⁴⁷¹ *Id.*

⁴⁷² *Id.* at 54.

⁴⁷³ *Id.*

Appendix G: Witness Qualifications

Daniel J. Rendler

(Appendix F, to Business Plan, "Policy Considerations")

My name is Daniel J. Rendler. My business address is 555 West Fifth Street, Los Angeles, California, 90013-1011. I am employed by Southern California Gas Company (SoCalGas) as Director, Customer Programs and Assistance. I have 30 years of experience in the utility industry, and have been employed at SoCalGas since 1984. While at SoCalGas I have held various staff and line positions of increasing responsibility in the functional areas of Marketing, Customer Contact and Services, Environmental, Safety, Emergency Services, Technology & New Product Development, and Gas Field and Technical Operations.

My present responsibilities include directing the development and implementation of energy efficiency and low-income assistance policy and programs for SoCalGas' diverse customer base including, commercial and industrial businesses and the residences of over 21 million people in southern California. I earned a Bachelor of Science degree in Mechanical Engineering from California State University, Northridge and a Master in Business Administration degree with honors from the University of Redlands.

Darren M. Hanway

(Chapters 1-10 of Business Plan, with the exception of Chapter 7)

My name is Darren M. Hanway. My business address is 555 West Fifth Street, Los Angeles, California, 90013-1011. I am employed by SoCalGas as the Energy Efficiency Operations Manager in the Customer Programs and Assistance Department.

I joined SoCalGas in October of 2012 to lead the energy efficiency policy support team. In December 2015, I assumed my current position. My responsibilities include the

management of all of the company's residential, commercial, industrial, agricultural, and third-party energy efficiency programs, including operational support functions.

Prior to joining SoCalGas, I held positions of increasing responsibility at Southern California Edison working on their demand-side program offerings. I received a Bachelor of Science degree in Business Administration and a Bachelor of Arts degree in International Relations from the University of Southern California in 2003.

Sue Kristjansson

(Chapter 7 of Business Plan, "Cross-Cutting: Codes and Standards")

My name is Sue Kristjansson. My business address is 555 West Fifth Street, Los Angeles, California, 90013-1011. I am employed by SoCalGas as the Codes and Standards and Zero-Net Energy Manager in the Customer Programs and Assistance Department.

I have a Master in Business Administration degree with a specialization in Organizational Leadership from National University. I have been employed by SoCalGas for 17 years in a variety of positions, including Clean Energy Strategy Manager, Brand and Creative Services Manager, and Account Executive. My current responsibilities include overseeing the codes and standards for SoCalGas, for both operations and energy efficiency as well as managing the company's zero-net energy involvement.

Appendix H: Cost-Effectiveness

2018-2020 Cost-Effectiveness Outputs					
Sector	Avoided Cost Benefits	TRC Cost	PAC Cost	TRC Ratio	PAC Ratio
Residential	\$ 84,850,516	\$ 112,499,362	\$ 85,095,105	0.75	1.00
Commercial	\$ 79,833,173	\$ 62,131,287	\$ 43,989,755	1.28	1.81
Industrial	\$ 154,934,578	\$ 60,881,329	\$ 36,412,374	2.54	4.25
Agricultural	\$ 40,445,364	\$ 20,495,303	\$ 12,237,727	1.97	3.30
Public	\$ 33,347,557	\$ 33,187,812	\$ 25,555,824	1.00	1.30
Codes & Standards	\$ 754,218,305	\$ 396,952,601	\$ 2,586,000	1.90	291.65
Other	\$ -	\$ 61,315,000	\$ 61,315,000	-	-
Total	\$ 1,147,629,494	\$ 747,462,695	\$ 267,191,786	1.54	4.30

Note: The Other category includes WE&T, ET, Financing, Pensions and Benefits, Efficiency Savings and Performance Incentive (ESPI), and EM&V.