Angeles Link Q4 Quarterly Report Appendices (Phase One)

For the Period October 1, 2023, through December 31, 2023

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APPENDIX 1 – REDLINE TO TECHNICAL APPROACH DOCUMENT

Angeles Link
Technical Approach for Phase One Studies

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INTRODUCTION

SoCalGas is undertaking a series of studies consistent with the California Public Utilities Commission's (CPUC) Decision Approving the Angeles Link Memorandum Account to Record Phase One Costs (Decision 22-12-055) (Decision).

As part of SoCalGas' effort to provide transparency to the Planning Advisory Group (PAG) and Community Based Organization Stakeholder Group (CBOSG) members, we have proposed a study milestone review and feedback process. PAG and CBOSG members have been provided the opportunity to review descriptions of work for each Phase One feasibility study (Milestone or Step 1) and will be provided with the opportunity to review and provide feedback on technical approaches (i.e., methodology), data and preliminary findings, and study draft reports. This document provides the second step in the review and feedback process, which is the technical approach for each study being conducted under Phase One of the Angeles Link Project (Project). Technical approaches presented reflect feedback provided by PAG and CBOSG members on Phase One descriptions of work. Each technical approach has~~is~~ been~~ing~~ provided to both PAG and CBOSG members for feedback and insights and has been updated to incorporate relevant input received to date. SoCalGas views the work being conducted for each of the studies to be part of an iterative process, and will continue to seek feedback from the PAG, CBOSG, and other stakeholders as the work progresses. The work may be modified and adapted as feedback is received and additional information is generated, as appropriate.

The technical approach for each study is categorized by three workstreams: Market Assessment & Alternatives, Regulatory, Policy & Environmental, and Engineering Design. This follows the same format that was provided in the Phase One Study Description to PAG/CBOSG members on July 6th, 2023.

MARKET ASSESSMENT & ALTERNATIVES TECHNICAL APPROACH

Project Options & Alternatives

Overview

The Decision provides for Order Paragraph (OP 6 (d)) SoCalGas to consider and evaluate Project options and alternatives, including a localized hydrogen hub or other decarbonization alternatives such as electrification. SoCalGas is also required (OP 3 (c)) to study a localized hydrogen hub solution under the specifications required to be eligible for federal funding as part of Phase One. This study will evaluate Project options, hydrogen pipeline alternatives, including a localized hydrogen hub, and other alternatives, including electrification and hydrogen delivery alternatives like trucking.

Technical Approach

SoCalGas will 1) identify and evaluate a range of options to the proposed Project that may meet the Project's purpose, need, and objectives (including compatibility with state climate policies), and 2) compare the Project to hydrogen pipeline alternatives and other alternatives. Other alternatives include:

- Non-hydrogen alternatives (e.g., electrification)
- Hydrogen delivery alternatives (e.g., trucking, in-basin production).

The underlying purpose of the Project, along with potential project options and alternatives that may be studied, are set forth within the Scope of Work Descriptions for Phase One Studies.

1) Hydrogen pipeline system options and alternatives

Information for the *Project Options & Alternatives Study* will be compiled from work being completed within other Angeles Link Phase One~~1~~ studies including:

- *Preliminary Routing / Configuration Analysis*
- *Pipeline Sizing & Design Criteria*
- *High-Level Economic Analysis & Cost Effectiveness*
- *Environmental & Social Justice Analysis*.

To see how the different information will be gathered within the individual studies – please reference the specific study.

Engineering & Design Alternatives

SoCalGas will evaluate engineering and pipeline design alternatives as part of its work in the *Preliminary Routing/Configuration Analysis* and *Pipeline Sizing and Design*. That analysis will be incorporated into this study.

Data developed as part of the Angeles Link Phase One *Production Planning & Assessment* and other studies conducted as part of the Market Assessment & Alternatives workstream, coupled with the *Preliminary Routing / Configuration Analysis* and *Pipeline Sizing & Design Criteria* analysis, will inform review of a potential phased approach for implementation of Angeles Link.

- This approach will consider production capacity and demand availability at various points in time (e.g., 2030, 2035, 2040, 2045) and will identify the infrastructure required to meet those needs at that specific point in time.
- The analysis will also consider future scalability and appropriate pre-investment for future implementation.
- Next, options will be developed and evaluated for a clean renewable hydrogen pipeline system, considering factors such as sustainability, constructability, permitting, environmental considerations, equity, along with operability, maintenance and other factors.
- Lastly, options and alternatives to the pipeline system including hydrogen pipeline alternatives, such as a localized hub, and other alternatives, such as non-hydrogen alternatives and hydrogen delivery alternatives, will be developed and evaluated.

2) Other Alternatives

Non-Hydrogen Alternatives

SoCalGas will identify, build upon, and evaluate non-hydrogen alternatives (e.g., electrification, energy efficiency, renewable natural gas (RNG), natural gas with carbon management) across mobility, power, and industrial use cases. This will require the establishment of defined criteria and factors that could impact the viability of the alternative, such as:

- The ability for the alternative to meet specific end user requirements
- The propensity to adopt alternatives economically at scale
- The ability for the alternative to be implemented in a timely manner
- The technical feasibility to the extent this has not been determined in other studies.

Hydrogen Delivery Alternatives

SoCalGas will identify, build upon, and evaluate hydrogen delivery alternatives (e.g., trucking, in-basin hydrogen production) across mobility, power, and industrial end use cases. This will require the establishment of defined criteria and factors that could impact the viability of the assessed alternatives, such as:

- The ability for the alternative to meet specific end user requirements
- The propensity to adopt alternative delivery options economically at scale
- The ability for the alternative to be implemented in a timely manner
- The technical feasibility to the extent this has not been determined in other studies.

Note: Cost-effectiveness, which will aim to compare the cost-effectiveness and economic feasibility of clean renewable hydrogen delivery via the Project, pipeline alternatives, hydrogen delivery alternatives and ~~and~~ non-hydrogen alternatives across power, mobility, and industrial use cases, will be addressed in the *High-Level Economic Analysis & Cost Effectiveness* study.

The *Environmental Analysis* study will include a high-level desktop analysis of the potential environmental impacts of alternatives to the Project.

Demand Study

Overview

The Decision requires (OP 6 (a) and OP 6 (c)) SoCalGas to identify hydrogen demand, end uses, and end-users (including current natural gas customers and future customers) of the Project. This study will evaluate potential clean renewable hydrogen demand and assess adoption in the Mobility, Power Generation, and Industrial sectors.

Technical Approach

Technical Approach – Demand Model Methodology

Modeling for the demand study begins with assessment and prioritization of sub-sectors. This assessment takes into account historical fuel consumption and existing public data sets. Part of the technological feasibility is analyzed by gathering inputs from original equipment manufacturers (OEMs) where possible. These inputs then inform the actual modeling of demand. Modeling methodology includes:

- Modeling the total addressable market of hydrogen demand
- Applying zero-emission adoption rates
- Assessing the viability of clean renewable hydrogen against alternatives to estimate clean renewable hydrogen adoption rates.

The next step in the process is to validate and refine the preliminary model outputs. This is done in part through PAG and CBOSG feedback and in part through interviews with market participants to help validate model assumptions and overall outputs including:

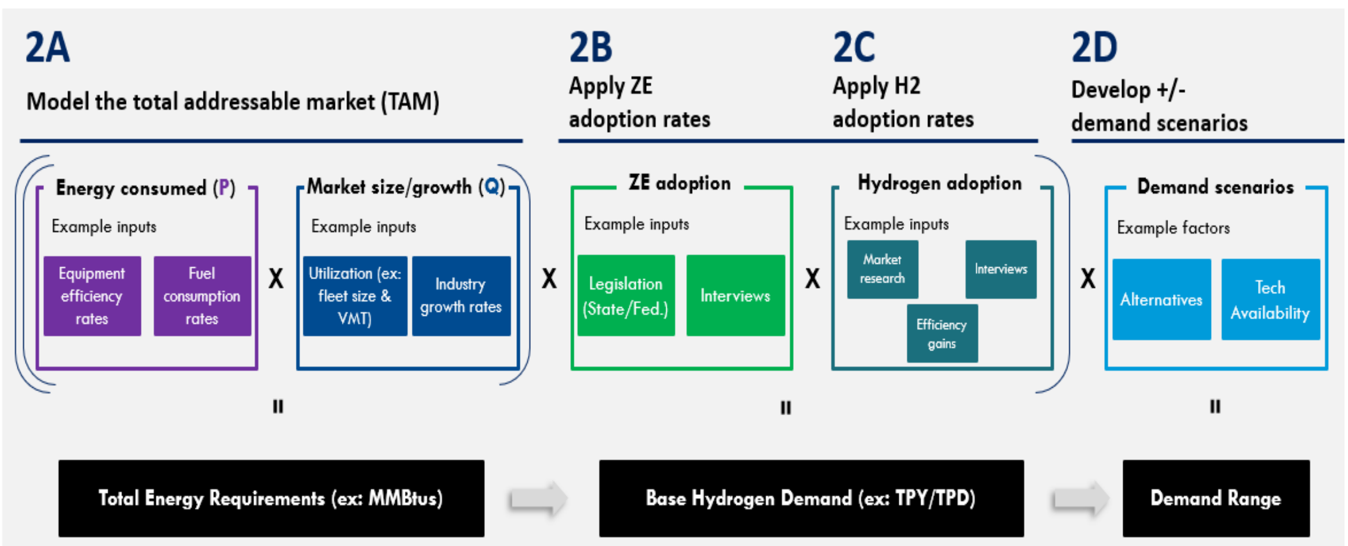
- Availability of clean renewable hydrogen technology
- Identification of potential end users including current and future natural gas customers
- Consideration of end-use viability
- Capital expenditure and operational expenditure costs.

Peer-reviews may also be conducted to help validate approach, assumptions, and preliminary outputs. Feedback from these interviews and interactions are incorporated into the model and *Demand Study* as appropriate.

Technical Approach – Demand Model Development Details

The graphic below illustrates demand modeling methodology and information flow in more detail.

- The approach begins with assessing the total addressable market of hydrogen demand, which involves determining energy consumption inputs such as equipment efficiency rates or fuel consumption rates and applying them to market inputs such as existing fleet sizes and industry growth rates.
- The next steps are to apply zero-emission adoption rates, which are informed by data such as existing regulations and legislation, and then determining estimated hydrogen adoption rates, which are informed by data such as market research, forecasted technology efficiency gains, and further market interviews.
- The final step in developing the model and developing different demand scenarios is to apply variables such as demand alternatives and technology availability.



Technical Approach - Demand Scenarios Details

In the development of potential demand forecasts, different scenarios may have assumptions (e.g., legislative and regulatory drivers) that will influence the calculated modeling output. This Study will focus on developing three scenarios: conservative, moderate, and ambitious, as detailed below for each of the primary sectors:

Description of Scenarios*

Conservative	Scenario assumes lower adoption rates for hydrogen across a limited set of use-cases within prioritized sectors and sub-sectors, primarily driven by existing legislation. **Mobility:** On-Road Vehicles – Heavy-Duty Vehicles (HDV), Medium-Duty Vehicles (MDV); Off-Road Vehicles – Cargo Handling Equipment (CHE), Ground Support Equipment (GSE), Agricultural (Ag), Construction & Mining (C&M), Commercial Harbor Craft (CHC), Ocean Going Vessels (OGV)** **Power:** Peaker, Baseload **Industrials:** Cogen***, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense
Moderate	Scenario assumes increased hydrogen adoption across an expanded set of use-cases within prioritized sectors and sub-sectors, driven by existing legislation. **Mobility:** HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV** **Power:** Peaker, Baseload, Cogen **Industrials:** Cogen***, Food & Bev, Metals, Stone, Glass, Cement, Paper, Chemicals, Aerospace and Defense
Ambitious	Scenario assumes more ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption within prioritized sectors and sub-sectors. **Mobility:** HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV**, Aviation **Power:** Peaker, Baseload, Cogen **Industrial:** Refineries, Cogen, Food & Bev, Metals, Stone, Glass, Cement, Paper, Chemicals, Aerospace and Defense

**Base market growth rate approach and assumptions vary per sector and per scenario*

***Diesel consumption only, not main engine heavy fuel*

****Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries*

Technical Approach – Primary Factors Driving Adoption Rates

Estimating and forecasting hydrogen adoption rates for the Mobility, Power Generation, and Industrial sectors will be assessed primarily against four factors. These factors are Policy and Legislation, Technology Feasibility, Commercial Availability, and Business Readiness. Descriptions of these four factors are below:

1. Policy and Legislation – This factor considers if there is a legislative or policy mandate that would accelerate the transition to hydrogen. It also looks at any incentives that would drive

adoption.

2. Technology Feasibility – This factor considers if hydrogen is technically and/or operationally feasible for adoption in that sector and includes comparisons against alternatives to hydrogen.
3. Commercial Availability – This factor considers if hydrogen enabled equipment is commercially available, the cost to own, and includes comparisons against alternatives to hydrogen.
4. Business Readiness – This factor considers the industry's or sub-sector's overall disposition or readiness for adoption of hydrogen technology.

Market Validation

The demand assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisors. Below is a summary of groups to be engaged and key objectives.

Group	Engagement Goals	Potential Sector Participants
Industry	- Validate cost, equipment, and supply chain assumptions with sector experts - Confirm demand assumptions - Conduct interviews to understand technology availability, conversion costs and alternatives	**Mobility Sector** - Ports & key tenants - Transit agencies - Fleet operators - Fuel station operators - Car and truck manufacturers - Cargo-handling equipment manufacturers **Power Generation Sector** - Power generation operators - Gas Turbine, microgrid, and fuel-cell manufacturers **Industrial Sector** - Steel - Cement - Food/Beverages - Refineries - Other industrial facilities - Industrial equipment manufacturers
Research & Academia	- Engage technical experts to validate assumptions and integrate sub-sector deep dive knowledge	**Potential sources:** - University of California - National Laboratories

Public Agencies & Consortiums	- Compare findings against research published by public agencies - Engage agencies and consortiums	**Potential sources:** - CARB - South Coast Air Quality Management District (SCAQMD) - Hydrogen Fuel Cell Partnership (H2FCP) - California Energy Commission (CEC) - Department of Energy (DOE) - PAG/CBOSG (including CPUC) feedback

Production Planning & Assessment

Overview

The Decision requires SoCalGas to identify the potential sources of hydrogen generation for the Project (OP 6 (b)) and its plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision (OP 6 (j)). This study will evaluate potential sources of clean renewable hydrogen production from renewable energy resources such as solar and wind, input requirements, estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards.

Technical Approach

Following up on the Study Descriptions, the discussion below provides more detail on the work that is planned to be performed. The specific approach continues to evolve based on on-going feedback and discussion.[1]

Technical Approach – Renewable Energy Technologies

The approach for assessing renewable energy technologies and costs will include the following steps:

- Potential generation technology resources that may be suitable to producing clean renewable hydrogen (as defined in the Decision) will be identified. These resources will include but may not be limited to solar, wind, hydroelectric, biomass, and geothermal.
- The feasibility and maturity of potential renewable technologies identified will be assessed for clean renewable hydrogen production.
- Technology operating characteristics will be developed for technologies deemed suitable to support Angeles Link hydrogen production. Operating characteristics and limitations, including representative manufacturers and sizing will be developed based on public sources.

[1] The scope of the Production Planning & Assessment Study has been further adjusted over time as the needs of the analysis have been refined. Those adjustments are highlighted through the redlines in this section.

- Storage technology operating characteristics and capabilities will be evaluated in the context of being able to move energy from intermittent renewable resources to meet operating requirements needed for hydrogen production.
- For suitable technologies, production estimates for intermittent resources will be developed using the NREL's System Advisory Model.
- For renewable generation, technology costs will be developed using NREL's ATB data, and potentially other sources such as EIA. These sources are consistent with sources used for the CPUC 2022-2023 IRP. Costs by resource type will be included.

Technical Approach – Clean Renewable Hydrogen

The approach for assessing clean renewable hydrogen production technologies and costs will include the following steps:

- Potential hydrogen production resources that may be suitable to producing clean renewable hydrogen (as defined in the Decision) will be identified. These resources will include, but may not be limited to, different electrolyzer types (Alkaline, PEM, AEM, SOEC), production of clean renewable hydrogen from biogas, and naturally occurring hydrogen. A general discussion will be included for each potential technology addressing the operating characteristics, potential benefits, safety, and technology readiness level (TRL).
- The technology assessment will focus on an evaluation of current technologies (mature and emerging) that are approaching a maturity point and potential state of availability during the Angeles Link Phase One~~1~~ planning horizon (through 2045) to help optimize production processes.
- The technologies will be compared on a qualitative basis evaluating key parameters including land usage, efficiency, scalability, and technology maturity
- Costs will be presented considering expenses (e.g., capital, operating) and will inform potential selections of technology with clear benefits relative to other technologies to use as a potential basis for the Phase One~~1~~ study. Costs will be sourced from publicly available data where available. Where necessary, in-house data and data obtained from vendors will be used.

Technical Approach – Production Capacity Modeling

The approach to be used to develop the production capacity modeling, including the available renewable capacity to serve hydrogen production, will include the following steps:

- Identify existing, planned, and potential renewable resources that will be expected to serve system electricity load per the CPUC 2022-2023 IRP.
- Use GIS tools to identify land available for hydrogen production development (discuss land required for existing or planned renewable generation).
- Assess where feasible areas with hard constraints (e.g., national parks, road/railroad easements).
- Develop MW and MWh of renewable energy production potential available for future development to serve hydrogen~~H2~~ production. Land requirements by renewable technology will come from NREL renewable land requirement assumptions.

- Translate renewable energy production potential to a potential hydrogen~~H2~~ production.
- To develop available hydrogen production capacity, the renewable generation load curve will be used to determine the potential hydrogen supply based on design parameters and inputs from other studies that may impact hydrogen production potential.

Technical Approach – Demand/Supply Balancing

The approach to be used to perform the analysis of demand/supply balancing and optimization will include the following steps:

- General: Utilize a spreadsheet model that will calculate hydrogen production and renewable power supply relative to demand
- Convert hydrogen demand needs into electricity needs to support hydrogen production.
- Develop renewable power hourly portfolio model with various resources.
- Develop the pro forma and financial assumptions to quantify development and operating costs for renewable technologies for each year over the life of renewable resources.
- Optimize portfolio capacity factor by evaluating renewable generation profiles relative to demand load factors.
- Size production to demand quantities considering the *Demand Study*. Hydrogen production will initially be sized to demand (spread across various regions). The size of electrolyzers will be optimized considering potential storage based on the demand shape, hydrogen production capability (ramping, cycling), and renewable portfolio generation profile (which will be shaped to the hydrogen demand as best as possible).
- Various durations of storage will be considered.
- Quantify curtailed energy from the portfolio.
- Renewable energy costs may need to be updated to adjust for substation and transmission line costs should the energy generation location be further from the hydrogen production facility than initially conceptualized.
- The process to determine the size of hydrogen electrolyzers, hydrogen storage, and renewable energy generation will be iterative in nature.

Technical Approach – Market Analysis for Renewable Energy

The approach to perform the market analysis for renewable energy will include the following steps:

- Develop geographical representation of renewable energy potential in the SoCalGas territory for solar and wind. Sources will include NREL and EIA.
- Develop listing of existing and planned renewable projects in territory considering publicly available information (e.g., CPUC 2022-2023 IRP, CAISO resources, WECC resources).
- Summarize existing, planned, and potential renewable energy buildouts by technology and provide insights on future renewable resource supply and costing.

Technical Approach – Market Analysis for Hydrogen Production

The approach to perform the market analysis for hydrogen production will include the following steps:

- Look at SoCalGas hydrogen *Demand Study* and production estimates
- Identify potential supply constraints, or accelerators.
- Research and quantify the plans of the leading electrolyzer manufacturers through 2045, including electrolyzer projects greater than 1 MW through 2045 with a focus on major countries. Also consider biomass availability in SoCalGas service territory.
- Summarize the gap between planned electrolyzer projects and manufacturing.
- Include focus in the SoCalGas region.

Technical Approach – 3rd Party Evaluations

The approach to conduct 3rd party evaluations of the market analysis will include the following steps:

- Provide SoCalGas with a listing of potential 3rd parties.
- Setup interview dates.
- Conduct interviews.
- Evaluate if market analyses need to be modified.
- Update market analyses as appropriate.

Technical Approach – Meet/Exceed Clean Renewable Hydrogen Standard

The approach to identify procedures and methods to support hydrogen production to meet/exceed the Decision's clean renewable hydrogen definition will include the following steps:

- Assess each system input and the system as a whole through the lens of a life- cycle analysis for adherence to the Decision's clean renewable hydrogen definition, including achieving 4 kg-CO2e/kg-H2 on a life cycle basic. These requirements will be incorporated into the analysis of the various hydrogen generation technologies. Therefore, any combined power generation and hydrogen production resulting in greater than 4 kg- CO2e/kg-H2 or that is otherwise inconsistent with the Decision's clean renewable hydrogen definition will be noted and flagged as deficient.
- The completed production analysis will include the ability to generate hydrogen powered by sufficient renewable resources. If during different five-year increments, the system is incapable of generating sufficient hydrogen within the emissions threshold, the emissions associated with any remaining hydrogen will be noted.
- Report on potential options (e.g., power purchase agreements (PPA), virtual PPAs, renewable energy certificates (RECs)) that may be available to ensure all hydrogen received by the Angeles Link Pipeline is supplied by hydrogen that meets the Decision's[2] clean renewable hydrogen definition.
- Report on current state of methods to verify hydrogen meets the Decision's[2] clean renewable hydrogen definition. Consider countries with existing certification (e.g.,

Germany (renewable only), France (both renewable and low-carbon), and the UK (both renewable and low-carbon) to understand the frameworks being used.

High-Level Economic Analysis & Cost Effectiveness

Overview

The Decision requires (OP 6 (d)) SoCalGas to evaluate the cost-effectiveness of the Project against alternatives and determine a methodology to measure cost effectiveness between alternatives. This study will determine a methodology to measure cost effectiveness that includes gathering cost estimates, performing an economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end-users, and comparing the cost effectiveness of the Project against various project alternatives. This study will calculate the potential levelized cost of clean renewable hydrogen that could be used as the initial basis to assess affordability as directed by the Decision (OP 6 (k)). Further analysis of affordability related to rate impacts and cost allocation are outside the scope of this study.

Technical Approach

- Utilize potential Angeles Link Project configurations (informed by other studies as needed, including *Production Planning & Assessment*, and *Preliminary Routing/Configuration Analysis*) for analysis and identify critical assumptions for modeling alternative approaches.
- Utilize Class 5 cost estimates from other studies (*Production Planning & Assessment*, and *Preliminary Routing/Configuration Analysis*) to develop economics of the Angeles Link Project. Class 5 cost estimates will include capital expenditures for total installed costs as well as operation and capital maintenance expenses to operate the facilities th~~o~~rough its useful life. The project economics will be based on a normalized timeframe taking into consideration the different useful lives for each of the value chain components for delivering hydrogen. The project economics will also include the evaluation of cost of capital in order to evaluate investment returns.
- Calculate the levelized cost of delivering hydrogen (including inputs from other studies as needed for production, transportation, compression, and storage) as a reasonable range in $/kg for the Angeles Link Project. The levelized cost of delivering hydrogen will also take into consideration the different federal and state financial support mechanisms such as tax credits, LCFS, etc.
- Perform a cost effectiveness evaluation comparing the Angeles Link Project to hydrogen pipeline alternatives, such as the localized hub, and other alternatives, such as non-hydrogen alternatives (e.g., electrification) and hydrogen delivery alternatives (e.g., trucking), as described in *Project Options & Alternatives Study* above. Cost effectiveness comparison will include project costs and other costs related to emissions as informed by the studies in the Environmental workstream.

REGULATORY, POLICY & ENVIRONMENTAL WORKSTREAM TECHNICAL APPROACH

Water Resources Evaluation

Overview

The Decision requires (OP 6 (b)) SoCalGas to identify the potential sources of clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project. This study will evaluate the availability of water resources for clean renewable hydrogen production in Central and Southern California regions.

Technical Approach

The *Water Resources Evaluation* study is broken up into six main tasks to evaluate the availability of water resources for clean renewable hydrogen production.[2] The tasks generally fall within two components of the Water Evaluation Study: (1) an evaluation of various types of water availability for clean renewable hydrogen production in Central and Southern California; and (2) an evaluation of the potential risks and opportunities associated with water availability that may impact the production of clean renewable hydrogen.

An overview of the approach taken for each key task of the *Water Resources Evaluation* study is provided below.

Water Resources Availability Analysis

Agency Outreach Task

The purpose of agency outreach is to validate approach and conclusions, as well as to facilitate development of further conclusions, to the extent possible, regarding water supply reliability. The approach for this task is as follows:

- Create a list of key water agencies and managers that could support the production of clean renewable hydrogen that would be transported by the project, based on current and planned projects, and proximity to potential production areas.
- Develop global questions for all parties identified for outreach.
- Define communication protocols and develop responses for anticipated questions.
- Send initial outreach emails and schedule virtual meetings with respondents.
- Conduct virtual meetings with outreach contacts and collect information verbally regarding water supply availability or potential to develop water supply.
- Investigate suggestions made by outreach contacts regarding potential supply sources.

Water Resources Availability Task

This task will provide discussion of the baseline conditions for water resources, including identification of potential water supply sources and the management structure applicable to

[2] The scope of the Water Study has been further adjusted over time as the needs of the analysis have been refined. Those adjustments are highlighted through the redlines in this section.

each, to provide context/baseline for the analysis of water feasibility for the proposed project. The approach for this task is as follows:

- Identify any potential water sources that could support the production of clean renewable hydrogen that would be transported by the Project.
- Conduct research of specific water supply sources including recycled water, advanced water treatment concentrate, brine line flow, oil and gas industry water, surface water (i.e., exchange agreements), inland brackish groundwater, and dry weather flows. Water supply sources will include potential in-basin water sources.
- Review current (2020) Urban Water Management Plans (UWMPs) for water agencies responsible for management of the identified water supply sources.
- Consider input received from outreach contacts identified in Agency Outreach Task.
- Quantify potential supply availability for each source, to the extent of data availability.
- Identify sources suggested for consideration by water agencies and managers where there may be opportunities for mutual benefit (such as reuse of flows that are currently managed as waste or nuisance (e.g.~~x.~~, water quality treatment discharge, brine line flows, dry weather flows)).

Water Quality Requirements for Clean Renewable Hydrogen Production Task

The purpose of this task is to assess the minimum water quality requirements and efficiency of the electrolysis process and determine the total potential capacity of the electrolyzers that could be supported by the available water resources. This information will inform the Acquisition and Purification Cost Estimate Task of the *Water Resources Evaluation* study. The approach for this task is as follows:

- Collect water quality specifications for the electrolyzers that could be used to produce the clean renewable hydrogen that would be transported by the Project from vendors and conduct a desktop review to evaluate the efficiency of these systems.
- Assess the pretreatment requirements for potential water supply sources, including consideration of electrolyzer efficiencies.
- Establish water quality requirements of the electrolyzers based on electrolyzer type (e.g., alkaline, polymer electrolyte membrane or solid oxide).

Acquisition and Purification Cost Estimate Task

The purpose of this task is to provide a high-level engineering evaluation to identify treatment and supporting infrastructure needs (including conveyance options), identify collocated opportunities, and develop rough-order-of-magnitude (ROM) cost estimates. This task considers the findings of the *Water Resources Availability ~~Evaluation~~ Task* and the *Water Quality Requirements for Clean Renewable Hydrogen Production Task*.

The approach for this task is as follows:

- Evaluate treatment process(es) for potential water sources identified in *Water Resources Availability ~~Evaluation~~ Task*.

- Analyze the recovery of water through the treatment process and evaluate strategies for residual management and disposal.
- Estimate total water demand needed to meet the potential production target of clean renewable hydrogen production target that would be transported by the Project.
- Develop a preliminary conceptual sizing of treatment facilities.
- Calculate ROM cost estimates for required infrastructure using a proprietary cost estimation tool to develop the cost estimates and conceptual layouts for treatment facilities.
- Estimate life cycle costs of acquiring and producing water, based upon published information on water pricing.

Prioritization, Risk Identification, Risk Management Analysis

Risk and Opportunities Identification and Management Task

The purpose of this task is to identify potential risks and opportunities associated with access to water supply and treatment for clean renewable hydrogen production ~~the Project (including water rights and water quality)~~ and develop strategies to manage potential risks. The ~~A~~approach for this task includes two main assessments:

(1) Identify challenges and opportunities related to the identified water supply sources. The approach for this assessment includes:
   - Identify main assessment categories of challenges and opportunities.
   - Identify category-specific challenges and opportunities.
   - Identify potential strategies to mitigate~~ion measures where possible to manage risks~~ the challenges and capture the opportunities identified, where applicable ~~as feasible~~.
   - Qualitatively characterize each challenge and opportunity based on relative impact and probability of occurrence. For this assessment, impact broadly encompasses cost, implementation, and other barriers to utilizing the identified water supply sources for hydrogen production. Both relative impact and probability will be ranked as high, medium, or low.
   - Identify common challenges related to conveyance of water from source locations to the site for hydrogen production.

- ~~Identify potential benefits to local communities by use of identified water sources.~~
- ~~Evaluate the regulatory landscape to identify potential triggering events that could upset the water supply, such as drought regulations and regional supply issues.~~
- ~~Develop a risk profile for issues that could interrupt water supply, how and when issues may occur, and how issues may affect supply reliability.~~

(2) Identify risks and opportunities related to geographic setting. The approach for this assessment includes:
   - Identify general categories of challenges and opportunities related to the geographic setting of the water sources.
   - Group the source locations into broad geographic categories with different challenges and opportunities.

- Characterize the geographic implementation challenges and opportunities based on project impact and probability of occurrence (high, medium, or low).

~~*Water Option Prioritization Analysis Task*~~

~~The purpose of this task is to prioritize options for water supply development based on goals, risk profile, opportunities, and benefits. The approach for this task is as follows:~~

- ~~Use a proprietary analysis tool for quantitative evaluation.~~
- ~~Develop criteria for prioritizing options for water supply based on findings from the Risk and Opportunities Identification and Management task and the prioritization criteria as primary inputs into a Multi-Objective Decision Analysis (MODA) tool to score and rank the options.~~
- ~~Evaluate potential benefits through steps including: 1) Input parameters, 2) Confirm evaluation criteria, 3) Establish relative criteria weights, 4) Score options against criteria, 5) Calculate results, 6) Confirm results with sensitivity outputs.~~
- ~~Prioritize potential water supply sources based on goals, risk profile, opportunities, and benefits.~~

Nitrogen Oxides (NOx) Emissions Assessment

Overview

The Decision requires (OP 6 (h)) SoCalGas to assess potential NOx emissions associated with the Project, including appropriate controls to mitigate emissions. The NOx assessment will evaluate NOx and other air emissions associated with storage and transportation of hydrogen, as well as NOx emissions associated with end users. Key areas of focus will be on hard-to-electrify industrial sectors, the mobility sector, and power generation.

The objective of this study is to assess the potential for both NOx emissions increases and reductions associated with the Angeles Link Project and to identify potential NOx mitigation measures to reduce potential NOx emissions. Although NOx will be the primary focus of this emissions assessment, the study will also include a high-level assessment of other potential emissions with a focus on volatile organic carbon (VOC) which is the other precursor to ozone and particulate matter (PM) which is the primary pollutant associated with diesel combustion.

Background

Study Approach

The study will estimate NOx associated with the anticipated storage and transportation of hydrogen and estimate NOx emissions from end users (mobility, power generation, and hard to electrify industrial sectors). Additionally, potential NOx mitigation measures will be identified to control NOx emissions. Where applicable, the study will rely on specific technical information (about facilities, equipment, processes, throughputs, etc.) that is available including, from the demand study and other ongoing Phase One feasibility studies, regulatory (including the SCA) and transportation agencies, and other available information and studies. If specific information is not available, estimates based on availability of related data or documented assumptions will be developed. The study will also include a high-level assessment of other potential emissions.

Technical Research

The study will collect, review, and analyze technical research studies and information related to NOx emissions associated with the combustion of hydrogen. This analysis will include:

- Available literature and studies from research-based academic institutions such as the University of California Irvine (UCI) Combustion Laboratory and the Georgia Institute of Technology and private organizations such as the Electric Power Research Institute (EPRI)
- Existing, proposed, and potential future regulatory requirements from federal agencies including the United States Environmental Protection Agency (US EPA), the United States Department of Energy (US DOE), state agencies such as the California Air Resources Board (CARB) and the California Energy Commission (CEC), and local agencies including the nine local air districts located within the geographic scope of this study such as South Coast Air Quality Management District (AQMD) and San Joaquin Valley Air Pollution Control District (APCD)
- Technological developments and timelines from manufacturers working on hydrogen technology
- Presentations and data releases from government agencies and laboratories including the US DOE and the National Renewable Energy Lab (NREL); and potential NOx emissions mitigation measures from technological advancements.

The study will research available literature and studies to evaluate:

- How NOx is formed from the combustion of hydrogen.
- How NOx might be controlled when combusting hydrogen
- How to quantify the formation of NOx from the combustion of hydrogen.

Preliminary information reviewed regarding the formation of NOx indicates:

- NOx may be formed via three pathways during combustion: thermal NOx, fuel NOx, and prompt NOx.
- Valuable information regarding the formation of NOx is available from publications by the US EPA and other regulatory agencies, academia and research institutions.
- Control of NOx emissions from the combustion of hydrogen begins with designing equipment to account for the unique properties of hydrogen, as outlined in many

studies and reports, including government publications by the US EPA and the US DOE.

- Aftertreatment such as three-way catalysts, selective catalytic reduction, and lean NOx traps will also be analyzed.

Research conducted by entities such as academic institutions will be evaluated to determine the best available methods for quantifying emissions of NOx from the combustion of hydrogen fuels. EPA and other regulatory data will be evaluated for potential NOx emission factors related to hydrogen fuels, and relevant regulatory data regarding NOx emission limitations for combustion units.

Review of Other Information and Data

There are parallel Angeles Link Phase One studies that will provide further details and scenario options needed to complete this study. These include the *Production Planning & Assessment*, *Preliminary Routing/Configuration Analysis*, and the *Demand Study*.

Technical Approach

The following assessment process (Figure 1) will be used for this technical approach. The approach will be based on review of technical research studies, research of anticipated technological advancements, and review of expected evolution of regulatory frameworks.

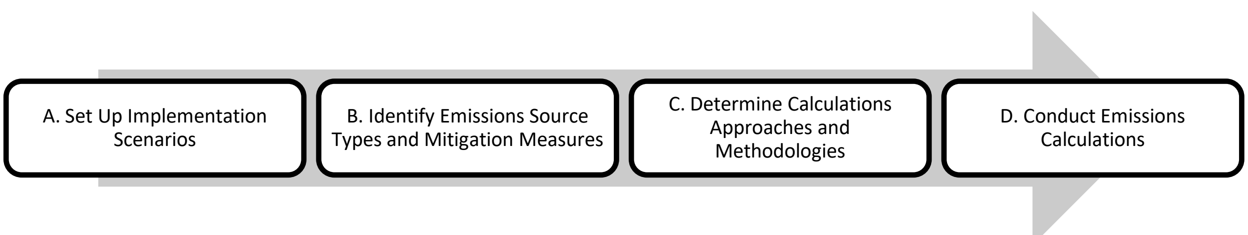


Figure 1. NOx emissions assessment process for the Angeles Link Project.

Set Up Implementation Scenarios

To evaluate NOx emissions and emissions changes associated with Angeles Link, the ~~baseline scenario will be compared to the Project scenario. The Project scenario will include the~~timeframe from 2030 to 2045 was considered. The end use sectors are anticipated to achieve the ability to accommodate 100% hydrogen fuel use at different times due to the availability of technology and the feasibility of transitioning existing equipment and building new infrastructure. The use of hydrogen as fuel for each end-use sector will be evaluated beginning with 2030 based on the details obtained from the parallel studies. NOx emissions will be calculated using the approaches described in the next steps.

Identify Emissions Source Types and Mitigation Options

The study will evaluate NOx and other emissions potentially associated with the following by developing emission calculation approaches and methodologies:

- Production
- Transmission and Storage
- Hard to Electrify Industrial End Users, Mobility (focused on heavy-duty trucks), and Power Generation (initial focus on existing power plants))

NOx emissions are a result of combustion of fuel. NOx is created from the conversion of nitrogen in fuel and ambient air at elevated temperatures resultant from combustion. For each topic identified above, the study will:

- Identify potential NOx mitigation measures for existing, emerging/new, and alternate equipment.
- Use a top-down evaluation to prioritize and rank the measures identified for each.

Evaluation of NOx emission mitigation options will be focused on technologies that minimize combustion temperatures and post-combustion NOx emission control technology such as catalytic reduction.

Hydrogen Production

Two potential clean renewable hydrogen production options will be analyzed. The first is the production of clean renewable hydrogen using the process of electrolysis which uses electricity to split water molecules into oxygen and hydrogen.

- The electrolyzers will be powered by renewable electricity.
- No combustion sources are anticipated and therefore, there is no potential for NOx emissions associated with electrolyzers.

The second potential clean renewable hydrogen production option includes bio gasification and biogas fueled steam methane reformers.

- Steam methane reforming is a process in which the biogas reacts with steam in the presence of a catalyst to produce hydrogen and carbon dioxide.
- This option is anticipated to have the potential for NOx emissions and those potential emissions will be evaluated in this study.

Hydrogen Transmission and Storage

For the purpose of this study, hydrogen will be transmitted using pipeline to end users. Transmission and storage of hydrogen will require the use of compressors.

- Compressors are assumed to be driven by 100% hydrogen fueled turbines or internal combustion engines, or grid electricity powered motors.
- If the compressor drivers are electric motors, there will be no potential for NOx emissions to occur on site.

- If the compressor drivers are turbines or engines, they will be fueled by 100% hydrogen and there is the potential for NOx emissions.
- For grid electricity interruptions, hydrogen-fueled back-up generators may also be used, which would also have the potential for NOx emissions.

Hydrogen Industrial End Users

Potential NOx emissions source types from end users in three key sectors are being evaluated: Power Generation, Mobility, and Hard to Electrify Industrial sectors. Estimated NOx emissions reductions will be determined and reported separately for each sector. Information obtained from the parallel *Demand Study* will help inform the analysis of end uses in each of these three sectors, as well as their respective subsectors.

- Power generation units such as turbines are the primary source for potential NOx emissions in the first sector.
- Source types with the potential for NOx emissions in the Mobility Sector include heavy-duty trucks, port vehicles/cargo handling equipment, marine vessels, and airplanes.
- Hard to electrify industrial subsectors include energy intensive industries such as refining; food and beverage manufacturing; primary and fabricated metals; stone, clay, and glass (including cement); chemical manufacturing; wood and paper; petroleum products; mining; ammonia production; industrial launderers; co-generation; and textile manufacturing.
- Source types with the potential for NOx emissions in the three sectors include, but are not limited to, hot water boilers, steam generating units, process heaters, furnaces/kilns, internal combustion engines, turbines, and miscellaneous combustion equipment.
- The parallel *Demand Study* will define the anticipated use of hydrogen.

Determine Calculations Approaches and Methodologies

For each emission source type identified, calculations to estimate emissions and mitigation of emissions will be prepared.

- Studies may identify calculation approaches for a particular source type based on emission factors, stoichiometric calculations, testing data, continuous emissions monitoring systems, or other approaches based on types of datasets that may be available.
- For the selected calculation approach, the calculation method including the equations, constant and variable data, and configuration information to conduct the calculations will be determined.
- Potential NOx emissions and mitigations will be assessed for each of the emissions source types identified in the section above.
- NOx emissions will be calculated at the unit level and scaled based on activity data quantified using information from the parallel studies identified above.
- Calculations will be prepared for the conservative, moderate, and ambitious scenarios evaluated in the parallel *Demand Study*.

Key Considerations

- Availability of consistent, useable data across the geographies and impacted sectors;
- Methods for projecting the change in demands for equipment and source types; and
- A repeatable process that can be applied for different scenarios.

Preliminary Calculation Methodology

The study will evaluate potential for NOx emissions based on the type of equipment and specific source categories. Identification of potential opportunities to minimize and mitigate NOx will also be evaluated. Unit level estimates will be scaled to determine NOx emissions related to the Project. To the extent feasible, this will include location-based evaluations and provide potential emissions impacts data for geographic areas with a focus on those identified by CalEnviroScreen as disadvantaged communities.

Conduct Emissions Calculations

The study will prepare emission calculations using the emission factors and activity data compiled for each of the topic areas.

- The tool will be designed to conduct calculations at the unit level (per unit equipment count, unit distance, unit throughput, or other unit parameters, as applicable).
- The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans
- Emission calculations will utilize information from evaluated research, the *Demand Study*, and other Phase One AG studies.

Hydrogen Leakage Assessment

Overview

The Decision directs (OP 6 (g)) SoCalGas to assess the risks and mitigations for hydrogen leakage. During Phase One, an evaluation of potential hydrogen leakage associated with production, storage, and transportation of clean renewable hydrogen will be prepared. Identification and evaluation of potential mitigation measures will also be included.

The objective of this study is to assess potential leakage of hydrogen associated with Angeles Link and to identify mitigation measures to reduce the potential leakage. This scope includes a desktop study of potential clean renewable hydrogen leakage associated with hydrogen production/transportation/storage. Anticipated sources include, but are not limited to, electrolyzers, pipeline venting, compressor venting, compressor rod packing, components (i.e., valves, flanges, connections, etc.), above ground tanks, and underground reservoirs.

Background

Study Approach

The study will evaluate potential sources of hydrogen leakage associated with the production and storage/transportation of hydrogen associated with Angeles Link. Where applicable, the study will rely on specific technical information that is available including, from other ongoing Phase One feasibility studies and other available information and studies. If specific information is not available, estimates based on availability of related data or documented assumptions will be developed. Hydrogen leakage can include intentional or unintentional releases. For example, rod packing, degassing, blowdowns on compression equipment, pipelines, vessels, etc. are designed to release to support maintenance activities, manage safety risks, and address emergency events. This evaluation will include both intentional and unintentional releases.

Technical Research

The study will collect, review, and analyze technical research studies and information related to the potential for hydrogen leakage and opportunities to minimize and mitigate leaks of hydrogen. This analysis includes:

- Studies from research-based academic institutions such as Columbia University and the University of Wyoming and private organizations such as the Frazer-Nash Consultancy.
- Existing, proposed, and potential future regulatory requirements from federal agencies including the United States Environmental Protection Agency (US EPA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the United States Department of Energy (US DOE), state agencies such as the California Air Resources Board (CARB) and the California Energy Commission (CEC), and local agencies including each of the nine local air districts located within the geographic scope of this study such as South Coast Air Quality Management District (South Coast AQMD) and San Joaquin Valley Air Pollution Control District (San Joaquin Valley APCD)
- Technological developments and timelines from manufacturers working on hydrogen technology
- Presentations and data releases from government agencies and laboratories including the US DOE and the National Renewable Energy Lab (NREL)
- Potential mitigation measures from technological advancements.

The resources specified by stakeholders in the feedback will be included such as the literature identified by Environmental Defense Fund (EDF) in their July 31, 2023, letter.

Review of Other Information and Data

There are parallel Angeles Link Phase One studies that will provide details to further inform this study. These include the *Production Planning & Assessment, Preliminary Routing/Configuration Analysis*, and Storage Studies (Underground Storage and Aboveground Storage).

Technical Approach
The following technical approach (Figure 2~~1~~) will be used for this assessment based on review of existing technical research studies, research of anticipated technological advancements, and review of expected evolution of regulatory frameworks.

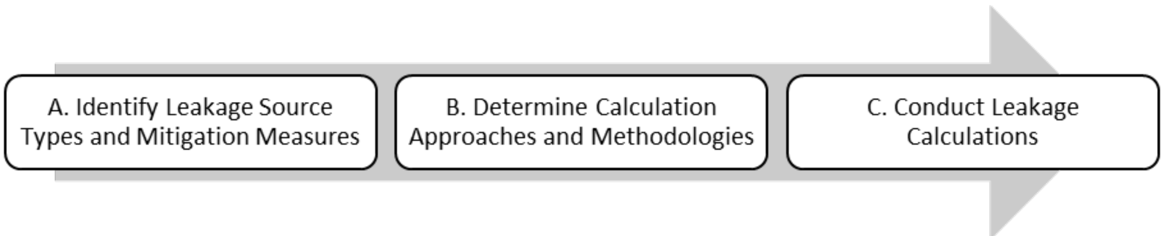


Figure 2~~1~~. Hydrogen Leakage assessment process for the Angeles Link Project.

Identify Leakage Source Types and Mitigation Options

The study will complete an evaluation of potential leakage and opportunities to minimize and mitigate leakage associated with the following:

- Production
- Transmission and Storage

For each potential source of leakage identified above, potential mitigation measures for existing, emerging/new, and alternate equipment including available sensors and leak detection methodologies will be identified. A top-down evaluation to prioritize and rank the measures identified for each source type will be used.

Hydrogen Production

Two potential hydrogen production options will be analyzed. The first is the production of clean renewable hydrogen produced using the process of electrolysis, which uses electricity to split water molecules into oxygen and hydrogen.

- The electrolyzers will be powered by renewable electricity.

The second potential clean renewable hydrogen production option includes bio gasification and biogas fueled steam methane reformers.

- Steam methane reforming is a process in which the biogas reacts with steam in the presence of a catalyst to produce hydrogen and carbon dioxide.

Leakage may occur from electrolyzers and steam methane reformers:

- During purging, bleeding, or the process of removal of impurities.
- Through piping components such as valves or connections.

- Leakage of hydrogen through the casing of the electrolyzer and steam methane reformer is assumed to be negligible and could be mitigated through laminated gaskets and welded joints.

Hydrogen Transmission and Storage

Hydrogen is anticipated to be transmitted via pipelines to end users.

- The transmission and storage of hydrogen will require the use of compressors, where the seals/packing vents have the potential to release hydrogen.
- Also, blowdowns, purging, and other venting processes may result in hydrogen releases.
- Potential leaks may occur from pipelines components, including valves and connectors, and equipment handling hydrogen.

Information from the parallel Angeles Link Phase One studies including the preliminary routing and configuration analysis would be used to quantify the potential for leakage, if available.

Determine Calculations Approaches and Methodologies

For each source type identified in the above task, the study will identify potential calculation approaches for leakage. Based on a review of available studies and preliminary data, the study will outline the options for calculation approaches and evaluate the options to determine the best calculation approach for each source. Criteria for evaluation may include accuracy, availability of data, scalability of leakage calculations, probabilistic analysis, etc.

For the selected calculation approach, the calculation method including the equations, constant and variable data, and configuration information that would be needed to conduct the calculations will be determined.

- Calculation methods will be scalable such that changes to anticipated equipment counts, pipeline lengths, and mitigations could be easily incorporated into calculations.
- Potential leakage will be assessed for each of the topics identified in the section above.
- Potential leakage will be estimated at the unit level and scaled based on data from the parallel studies identified above.

Key Considerations

Codes, regulations, and standards applicable to hydrogen value chain systems and equipment provide guidance for the design, construction, and operation of systems to minimize leakage.

Preliminary Calculation Methodology

The study will evaluate potential for hydrogen leakage for the anticipated types of equipment such as electrolyzer, compressor, pressure vessels, and pipelines, and will also include:

- Valves, flanges, connections, etc.
- Design, procurement, installation, operational, and maintenance considerations.
- Identification of areas susceptible to leakage and potential opportunities to minimize and mitigate leakage.
- The identification of emerging monitoring technologies.

Conduct Leakage Calculations

The study will develop a calculation tool and include each potential source of leakage.

- The tool will be built for scalability to accommodate changes in equipment/component counts, lengths of pipelines, compression needs, storage requirements, throughputs, and configurations.
- The calculation tool will be tested for accuracy and ease of use.
- The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans.
- Estimates will include information from evaluated research, the *Demand Study*, and other Phase One feasibility studies, as applicable.

Greenhouse Gas Emissions Evaluation

Overview

The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental laws and public policies. To support environmental laws and public policies, SoCalGas will conduct an initial evaluation of greenhouse gas (GHG) emissions increases and decreases from end users associated with the Project. This assessment will evaluate GHG emissions associated with compressors for storage and transportation of hydrogen, as well as GHG emissions associated with end users. Key areas of focus will be on the Mobility, Power Generation, and Hard to Electrify Industrial sectors.

This scope includes a study of GHG emissions associated with fuel use by compressors and by end users in the Mobility, Power Generation, and Hard to Electrify Industrial sectors. The objective of this study is to assess the potential for both GHG increases and reductions resulting from Angeles Link and to identify mitigation measures to reduce potential GHG emissions.

Background

Study Approach

The study will estimate GHG emissions associated with the anticipated storage and transportation of hydrogen and estimate potential GHG emissions and GHG emissions reductions from end users of clean renewable hydrogen (Mobility, Power Generation, and Hard to Electrify Industrial sectors). Additionally, potential GHG minimization and mitigation measures will be identified to control GHG emissions. Where applicable, specific technical information (about facilities, equipment, processes, throughputs, rates, costs etc.) that is available from the *Demand Study* and other parallel Phase One studies, regulatory agencies, or other studies will be used. If specific information is not available, general information available from the same sources will be used. If general information is not available, estimates based on availability of related data or documented assumptions will be developed.

Although the Intergovernmental Panel on Climate Change (IPCC) and other authorities such as the US EPA have not yet established or published Global Warming Potential (GWP) standards for hydrogen, the study will summarize information evaluated from several current and available scientific research efforts for both GWP 100, which describes the warming effect that hydrogen may have over a 100-year period, and GWP 20, which describes such effects over a 20-year period.

- US EPA's Greenhouse Gas Reporting Program (GHGRP) and California Air Resources Board's (CARB's) GHG Mandatory Reporting Regulation (MRR) define "greenhouse gas" as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases. For reporting and inventory comparisons, hydrogen itself is not considered a GHG by CARB, US EPA, or the International Panel for Climate Change (IPCC) at this time. For this study, two types of GHG emissions will be assessed: Direct and Indirect.
- CO2, CH4, and N2O emissions are direct GHGs that are released during the combustion of fossil fuels such as natural gas, diesel, gasoline, jet fuel, etc. The potential for some end users to combust blended hydrogen with natural gas may occur prior to some end users being able to combust 100% hydrogen. Therefore, direct GHG emissions that may potentially occur from these types of activities are being evaluated. Combustion of 100% hydrogen is not expected to release significant GHGs. The study will also evaluate GHG emissions reductions obtained from switching from 100% fossil fuels such as natural gas, diesel, gasoline, jet fuel, etc. to hydrogen.

Technical Research

The study will collect, review, and analyze technical research studies and information related to GHG emissions associated with the combustion of hydrogen. This analysis includes:

- Studies from research-based academic institutions such as the UCI Combustion Laboratory and the Georgia Institute of Technology and private organization such as the Electric Power Research Institute
- Existing, proposed, and potential future regulatory requirements from federal agencies including the United States Environmental Protection Agency (US EPA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the United States Department of Energy (US DOE), state agencies such as the California Air Resources Board (CARB) and the California Energy Commission, and local agencies including each of the nine local air districts located within the geographic scope of this study
- Technological developments and timelines from manufacturers working on hydrogen technology;
- Presentations and data releases from government agencies and laboratories including the US DOE and the National Renewable Energy Lab (NREL)
- Potential mitigation and minimization measures from technological advancements.

Review of Other Information and Data

There are parallel Angeles Link Phase One studies that will provide details needed to complete this study. These include the *Production Planning & Assessment, Preliminary Routing/Configuration Analysis,* and the *Demand Study*.

Technical Approach

The following technical approach (Figure 3~~1~~) will be used for this assessment based on review of technical research studies, research of anticipated technological advancements, and review of expected evolution of regulatory frameworks.

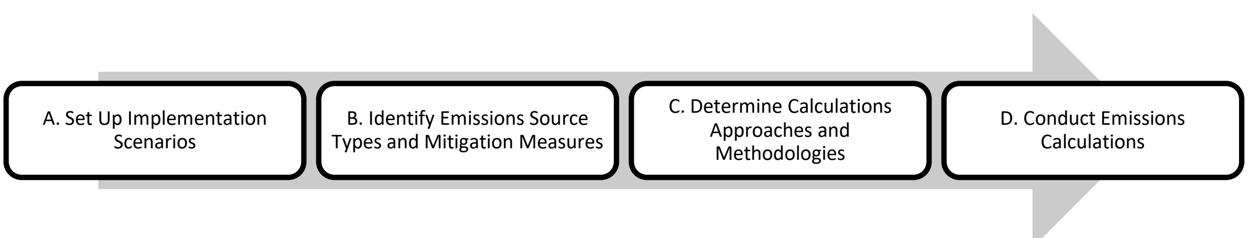


Figure 3~~1~~. GHG emissions assessment process for the Angeles Link Project.

Set Up Implementation Scenarios

To evaluate GHG emissions and emissions changes associated with Angeles Link, the ~~baseline scenario will be compared to the Project scenario.The Project scenario will include~~ the timeframe from 2030 to 2045 was considered. The end use sectors are anticipated to achieve the ability to accommodate 100% hydrogen fuel use at different times due to availability of technology and feasibility of transitioning existing equipment. The use of clean renewable hydrogen as fuel for each end-use sector will be evaluated beginning with 2030 based on the details obtained from the parallel studies. GHG emissions will be calculated using the approaches described in the next steps.

Identify Emissions Source Type and Mitigation Options

The study will evaluate direct and/or indirect GHG potentially associated with the following by developing emission calculation approaches and methodologies:

- Production
- Transmission and Storage
- Hard to Electrify Industrial End Users, Mobility (focused on heavy-duty trucks), and Power Generation (initial focus on existing power plants)

For each topic identified above, potential GHG mitigation measures for existing, emerging/new, and alternate equipment will be identified. A top-down evaluation to prioritize and rank the measures identified for each will be used.

Hydrogen Production

Two potential hydrogen production options will be analyzed. The first is the production of clean renewable hydrogen using the process of electrolysis which uses electricity to split water molecules into oxygen and hydrogen.

- The electrolyzers will be powered by renewable electricity.
- No combustion sources are anticipated and therefore, there is no potential for GHG emissions associated with electrolyzers.

The second potential clean renewable hydrogen production option includes bio gasification and bio gas fueled steam methane reformers.

- Steam methane reforming is a process in which the biogas reacts with steam in the presence of a catalyst to produce hydrogen and carbon dioxide.
- This option is anticipated to have the potential for GHG emissions and those will be evaluated in this study.

Hydrogen Transmission and Storage

Transmission and storage of hydrogen will require the use of compressors.

- Compressors are assumed to be driven by 100% hydrogen fueled turbines or internal combustion engines or grid electricity powered motors.
- If the compressor drivers are electric motors, there is the potential for indirect GHG emissions if the source of electricity is not renewable.
- If the compressor drivers are turbines or engines, they are assumed to be fueled by blended hydrogen or 100% hydrogen and there is the potential for direct GHG emissions.
- For grid electricity interruptions, hydrogen-fueled back-up generators may also be used, leading to the potential for direct GHG emissions.

Hydrogen End Users

Current GHG emissions source types that may convert from fossil fuels to hydrogen are being evaluated in three key areas: Power Generation, Mobility, and Hard to Electrify Sectors. Information obtained from the parallel *Demand Study* will help inform the analysis of end uses in these three sectors, as well as their respective subsectors.

- Power generation units such as turbines are the primary source for current GHG emissions in the first sector.
- Source types with the current GHG emissions in the Mobility Sector include heavy-duty trucks, port vehicles/cargo handling equipment, marine vessels, and airplanes.
- Hard to electrify industrial subsectors include energy intensive industries such as refining; food and beverage manufacturing; primary and fabricated metals; stone, clay, and glass (including cement); chemical manufacturing; wood and paper; petroleum products; mining; ammonia production; industrial launderers; co-generation; and textile manufacturing.
- Source types with the current for GHG emissions in the three sectors include, but are not limited to, hot water boilers, steam generating units, process heaters, furnaces/kilns, internal combustion engines, turbines, and miscellaneous combustion equipment.
- The parallel *Demand Study* will define the anticipated use of hydrogen.

Determine Calculations Approaches and Methodologies

For each emission source type identified, the study will prepare calculations to estimate emissions and mitigation of emissions.

- Studies may identify calculation approaches for a particular source type based on emission factors, stoichiometric calculations, testing data, or other approaches based on types of datasets that may be available.
- For the selected calculation approach, the calculation method including the equations, constant and variable data, and configuration information to conduct the calculations will be determined.
- Potential emissions and mitigations will be assessed for each of the emissions source types identified section above.
- GHG emissions will be calculated at the unit level and scaled based on activity data quantified using information from the parallel studies identified above.
- Calculations will be prepared for the conservative, moderate, and ambitious scenarios evaluated in the parallel *Demand Study*.

Key Considerations

- Availability of consistent, useable data across the geographies and impacted sectors;
- Methods for projecting the change in demands for equipment and source types; and
- A repeatable process that can be applied for different scenarios.

Preliminary Calculation Methodology

The study will evaluate direct GHG emissions from combustion of fossil fuels and fuel blends based on the type of equipment.

- Indirect GHG emissions from grid electricity usage will be estimated using the grid emission factors such as those from US EPA's "The Emissions & Generation Resource Integrated Database" (eGRID).
- Identification of potential opportunities to minimize and mitigate GHG will also be evaluated.
- Unit level estimates will be scaled to determine GHG emissions related to Angeles

Assumptions

Clean renewable hydrogen will be used as fuel for reciprocating internal combustion engines and/or turbines powering storage and transmission compressors; or grid electricity will be used for electric motor compressors.

Conduct Emissions Calculations

The study will prepare emission calculations using the emission factors and activity data compiled for each of the topic areas.

- The tool will be designed to conduct calculations at the unit level (per unit equipment count, unit distance, unit throughput, or other unit parameters, as applicable).
- The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans.
- Estimates will include information from evaluated research~~.~~, ~~T~~the *Demand Study*, and other Phase One feasibility studies, as applicable.

Environmental & Social Justice Analysis

Overview

The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental law and public policies. Further, the Decision directs SoCalGas to address and mitigate impacts to disadvantaged communities and other environmental justice concerns (OP 6 (l)). SoCalGas will conduct an initial evaluation of a clean renewable hydrogen transportation system's compliance with environmental law and public policies, which will include an assessment of environmental impacts of project alternatives, environmental justice concerns and impacts to disadvantaged communities.

Technical Approach[3]

Overview

SoCalGas will conduct a high-level desktop environmental analysis of the Project, including analysis of transportation pipelines and appurtenance facilities, to make an initial assessment of compliance with environmental law and public policies. The high-level desktop analysis will also include an initial assessment of potential environmental impacts of project alternatives, environmental justice concerns, and impacts to disadvantaged communities. The high-level desktop analysis will also review potential environmental impacts in key resource areas related to potential third-party production facilities and potential storage facilities that may support the Project. Given that the Project consists of clean renewable hydrogen transportation system and that third parties will likely construct and operate the potential production and storage facilities, analysis of potential environmental impacts related to the production and storage facilities will be conducted at a very high level during this Phase One analysis.

The environmental analysis of the Project could focus on these resource areas—air quality/greenhouse gas emissions, biological resources, cultural and tribal resources, energy, hazards and hazardous materials, hydrology and water quality, and land use and planning, —that are described in the following sections. In general, the desktop environmental analysis will be performed using geographic information system (GIS) data and review of aerial imagery. Research of online databases will also be conducted to obtain relevant information and aid in the analysis. The following steps will be taken for each resource area to conduct the analysis.

First, SoCalGas will collect all available public data including, but not limited to, landownership, conservation areas, vegetation communities, species data, wetland and waters information, known hazards sites, and soils and geological hazards data. In addition, SoCalGas will evaluate whether data from other SoCalGas projects in Southern and Central California is available for use and determine if any past projects overlap; if so, they will be added to the GIS library that is developed for the analysis and used by planners and Subject Matter Experts (SMEs) to evaluate potential impacts from the Project.

Once the GIS library has been compiled, planners and SMEs will review the data and assess the types of resources that intersect with potential facilities, including the pipelines and appurtenances (e.g., compressor stations), third-party production facilities, and third-party storage facilities. Each resource area analysis (e.g., biological resources, cultural resources, noise) requires a different approach and will involve some level of GIS review, aerial photography review, and consideration of local and municipal regulations.

In order to evaluate the pipeline routes, potential routes have been broken into study areas ranging from 31 miles to 358 miles and made up of different segments corresponding to the *Preliminary Routing/Configuration Analysis*. Potential environmental impacts of the selected alternatives carried forward for further review will also be evaluated at a high desktop level.

[3] This technical approach document does not include the High-Level Feasibility Assessment and Permitting Analysis because it is a screening analysis that has already been described in the work descriptions document.

Methodology specific to each resource area, including anticipated data sources, is described in the sections that follow.

Air Quality/Greenhouse Gas (GHG) Emissions

Based on the *Preliminary Routing/Configuration Analysis* work study, an initial, high-level analysis will be made to determine:

- If the proposed Project will potentially conflict with or obstruct implementation of the applicable air quality plan, result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard or expose sensitive receptors to substantial pollutant concentrations.
- Additionally, for GHG emissions, the analysis will determine if the Project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Biological Resources

SoCalGas will use existing, publicly available GIS data to identify or estimate the biological resources crossed by the Project, including flora, fauna, and critical habitat. Sources of data include:

- The National Wetland Inventory (NWI) from the U.S. Department of Fish and Wildlife (USFWS)
- California Natural Diversity Database from the California Department of Fish and Wildlife (CDFW)
- Critical Habitat data from CDFW, USFWS, and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)
- Vegetation Classification and Mapping Program and other data sets as necessary (e.g., U.S. Forest Service Calveg system, Bureau of Land Management Desert Renewable Energy Conservation Plan, or the California Department of Forestry and Fire Protection Fire and Resource Assessment Program) information on land cover and natural vegetation communities
- USFWS Information for Planning and Consultation; NMFS Essential Fish Habitat
- USFWS Habitat Conservation Plan Areas
- And other data as appropriate.

This analysis may also include additional detailed analysis within areas identified in the High-Level Feasibility Assessment & Permitting Analysis.

A 100-foot-wide corridor will be evaluated for the pipeline routes; however, impacts to biological resources will not be evaluated as part of this desktop study where the pipeline is within paved roadways.

- Otherwise, documented locations of federally and state-listed threatened or endangered species within 0.25 mile of Project components will be tabulated and plotted on maps for analysis. Similarly, critical habitat, riparian habitat, and wetland areas will be identified where data exists.
- An initial assessment will be made regarding the number of square feet or acres of sensitive habitat (i.e., critical habitat, riparian habitat, wetland, wildlife corridors, nursery sites, or habitats identified in conservation plans) that overlap the Project, as well as a list of threatened, endangered, or fully protected species that have been previously documented within 0.25 mile of Project components.
- Candidate species, species of special concern, and rare plants will not be included in the Phase One analysis but may be considered in a later phase when more design details for the Project are available.

This data will be tabulated and shown on maps as appropriate. An initial assessment will be made on whether measures are available to reduce or avoid impacts if any are identified.

Cultural and Tribal Resources

SoCalGas' cultural resources consultant will use the California Historical Resources Information System to identify any known cultural resources that are recommended or determined eligible for the California Register of Historical Resources or the National Register of Historic Places. Resources listed as being locally significant will be researched as well. Records will be collected with 0.5 mile of the Project components; however, potential impacts will be analyzed within the area around facility boundaries for the desktop analysis. A summary of the resources and an analysis of whether mitigation measures are available to reduce or avoid impacts will be discussed.

Energy

Based on the *Preliminary Routing/Configuration Analysis* work study, an initial assessment will be made to determine if the Project could result in wasteful, inefficient, or unnecessary consumption of energy resources during the construction or operation phases, as well as identify conflicts with state or local plans for renewable energy or energy efficiency. This high-level analysis will be limited to the clean renewable energy system and will not evaluate individual equipment or materials used to construct or operate the transportation system.

Hazards and Hazardous Materials

For Phase One, the hazards and hazardous materials section will focus on obtaining known hazardous materials sites from the California State Water Resources Control Board through use of its GeoTracker database.

- Cleanup fund sites and other contaminated sites will be tabulated and analyzed as they relate to the pipeline and appurtenant facilities.

- In addition, an initial assessment will be made to determine hazardous substances that could be used during construction and operation.

Hydrology and Water Quality

Existing, publicly available GIS data on hydrology and water quality will be overlain with the pipeline corridor and facility footprint to determine where the pipeline crosses named and unnamed surface waterways and groundwater basins.

- Sources of data for this analysis include the National Hydrography Dataset from USGS, the NWI data from USFWS, Department of Water Resources groundwater data, and Federal Emergency Management Agency Flood Insurance Rate Maps.
- An initial assessment will be made on whether measures are available to reduce or avoid impacts, if any are identified.

Land Use and Planning

The resource area will build off the results of the High-Level Feasibility Assessment & Permitting Analysis, which may identify key areas that need further land use and planning analysis as part of this study.

- This analysis will not be done at the individual parcel level; it will assess major land use categories within the counties or cities that occur along the pipeline routes and appurtenant facilities.
- An initial assessment of the conflicts between the Project facilities and current land uses will be provided and recommendations on whether measures are available to reduce or avoid any identified impacts.

Environmental Social Justice

The Environmental Social Justice Analysis will involve two parts: (1) conducting an Environmental Justice (EJ) screening and (2) preparation of an ~~Stakeholder~~ Environmental Justice Community Engagement Plan. Part two has been added in response to stakeholder comments received on the scope of the Environmental Social Justice Analysis.

The EJ screening will include a high-level overview of the disadvantaged communities potentially affected, which will be identified from available environmental justice screening tools, such as CalEnviroScreen and the Biden-Harris Administration's Climate and Economic Justice Screening Tool. High-level maps using preliminary Angeles Link routing and agency approved GIS screening tools will be prepared. Demographic information pertinent to the high-level analysis will be described, and any recommendations to avoid/reduce potential impacts and/or changes already incorporated to benefit potentially affected disadvantaged communities will be included.

The analysis will also evaluate the Project's alignment with applicable goals and objectives in the California Public Utilities Commission's Environmental and Social Justice Action Plan 2.0, as well as potential impacts and benefits to disadvantaged communities and other low-income communities of color located in SoCalGas's service territory. Assembly Bill 617 communities that have been selected by the California Air Resources Board to participate in the Community Air Protection Program will be highlighted in the impact and benefits analysis. In addition, SoCalGas will consider the *Equity Principles for Hydrogen- Environmental Justice Position on Green Hydrogen in California* issued on October 10, 2023, by a coalition of environmental justice organizations.

The information gathered through EJ screening and PAG/CBOSG feedback will facilitate preparation of a community focused Environmental Justice Community Engagement Plan. The Environmental Justice Community Engagement Plan will establish an approach or framework for engaging disadvantaged communities with activities anticipated to occur during Phase Two, which will focus on gathering community input to address concerns and mitigate impacts and educating communities on hydrogen related topics of most interest to community members.

Right-of-Way Analysis

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing private rights-of-way to accommodate the Project and future right-of-way locations needed.

Technical Approach

The *Right-of-Way (ROW) Analysis* consists of reviewing potential routes in multiple segments to assess the potential availability of existing private ROWs as well as future ROW locations to accommodate the Project. The review entails 1) identification of private parcel ownership for each segment, and 2) evaluation of terms and conditions of existing ROW agreements where the potential routes parallel existing pipelines in private properties. The analysis will be conducted at a high level and is intended to assist with identifying potential pipeline routes.

Data collection:

Private ownership research will be conducted by retrieving publicly available real estate/property ownership data and public property record information through county tax roll databases and other real estate data service providers such as Data Tree by First American and Land Vision by Lightbox.

Existing ROW research will be conducted by first reviewing GIS and other Company facility maps to determine relevant existing ROW agreements, followed by retrieving the associated documents from the repository where Company ROWs are stored.

Data evaluation:

Parameters used when evaluating ownership data include:

- Identification of parcels owned by federal, state and local governmental agencies, railroads, other utilities, and private owners with known history which may present acquisition challenges due to long lead time or onerous permitting requirements.
- Detailed title due diligence review for individual private parcels is not part of the ownership data evaluation.

Parameters used when evaluating terms and conditions of existing ROW agreements include:

- Identification of ROW widths
- Type(s) of product allowed to be transported in the ROW
- Whether installation of multiple pipelines is allowed within the ROWs
- Any other limitations or restrictions that may prevent the utilization of existing ROWs.

Approach consideration and review:

For selected segments, a ROW Analysis Summary will be provided, as well as line list providing private parcel ownership information, assessor parcel numbers, and where applicable, existing ROW information and significant terms of the ROW agreement. Assumptions in compiling the line lists and summary reports are as follows:

- Where potential routes parallel public ROWs, assume installation of new pipeline within franchise streets.
- Where potential routes parallel Caltrans controlled-access ROWs, assume installation outside of state ROW in either franchise streets or private parcels adjacent to Caltrans ROW.
- Where potential routes parallel existing pipelines in private ROWs, assume 25’ as minimum width required to accommodate the new pipeline, in addition to existing pipeline(s) already installed within the ROWs.

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing franchises[4] to accommodate the proposed routes and future franchises needed for the proposed routes.

Technical Approach

Source considerations:

The *Franchise Analysis* consists of reviewing potential routes in multiple segments to assess the potential availability of existing public ROWs as well as future ROW locations to accommodate the Project. The review entails 1) identification of franchise agreements for each segment, and 2) evaluation of terms and conditions of existing franchise agreements where the potential routes would be sited in franchised, public ROWs.

Data collection:

Franchise Agreement research will be conducted by reviewing existing digital and hard copy franchise agreements. The Franchise Analysis will assess existing franchise agreements and, to the extent applicable, relevant provisions in municipal ordinances and/or charters vis-a-vis preliminary routing concepts. This work will include initial review and analysis of:

- The number and types of SoCalGas projects in applicable municipalities
- An assessment of SoCalGas's rights in its existing franchised ROWs (including existing franchise agreement payment mechanisms and other terms or conditions that may implicate clean renewable hydrogen as well as related municipal ordinances and charters)
- Potential terms and conditions, as developed, for clean renewable hydrogen franchises.

Data evaluation:

Certain criteria will be evaluated when assessing franchise agreements, including the term, the subject matter (including purposes and uses) of the grant, the specific public rights-of-way that the franchise agreements provide access to as well as other terms and conditions of each franchise agreement. In addition, SoCalGas will also evaluate municipal charters, as applicable, and relevant ordinances related to or that otherwise implicate hydrogen and/or pipelines in the public right-of-way.

SoCalGas will note and document where new or modified franchise agreements may be necessary to support potential routes and alternatives. The analysis will be synthesized in a database/spreadsheet, allowing for land use/franchise comparisons across different potential routes and alternatives.

[4] A contract, generally in the form of an ordinance passed by a municipality, that grants SoCalGas 'the right, privilege and franchise to lay, construct, operate, maintain, use, repair, replace or remove pipelines, and appurtenances thereto, for transmitting and distributing gas for any and all purposes under, along, across over or upon a municipality's city's existing rights-of-way.'

Approach consideration and review:

For each potential segment, a Franchise Analysis Summary will be provided, as well as a detailed line listing the municipality that owns/operates the public right of way, terms and expirations dates, and pertinent terms and conditions information.

ENGINEERING & DESIGN WORKSTREAM TECHNICAL APPROACHES

Preliminary Routing/Configuration Analysis

Overview

The Decision requires (OP 6 (i)) SoCalGas to identify and compare possible routes and configurations for the Project. This study will (i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, other known existing rights-of-way, franchise rights, designated federal energy corridors or rights-of- way, and the need for new rights-of-way; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges. This study includes high-level construction staging for implementation of routes and evaluation of a localized hydrogen hub. As part of the configuration analysis, SoCalGas will conduct an initial evaluation of hydrogen storage technology. SoCalGas will assess storage proximity to the Southern California region and both aboveground and underground technologies.

Technical Approach

Approach consideration and review:

SoCalGas' 2021 Report studied conceptual high-level pipeline routings to transport various levels of clean renewable hydrogen to supply demand in the LA Basin along existing Federal Energy Transit Corridors. These potential routes and several alternatives were collected into one System. These routes will be evaluated from an overall System standpoint to determine routes and staging that support both forecasted supply and demand modeling and long-term resiliency. The evaluation process is summarized below:

System Evaluation

Step One: Identify general system routing/pathways and functional zones considering potential Production and Demand locations

Step Two: Identify preferred routes in each of the functional zones: Connection, Collection, Central

Route Evaluation

Step Three: Refine preferred routes and compare to determine preliminary ideal alignment

Step Four: Identify preferred route combinations with components from each of the functional zones and validate to ensure constructability and assess social justice implementation.

The System evaluation (Steps 1 and 2) will aim to assess the overall layout and pathways to safely transport clean renewable hydrogen. The analysis will evaluate only pipeline routes that are intrastate and will identify the regulatory uncertainties and assumptions behind any references to interstate facilities. The individual routes will be cataloged into three functional zones – Connection, Collection, and Central and combined to form a continuous pipeline network.

- The **Connection Zone** will identify assets necessary to access San Joaquin Valley (Interstate-5/State Route-99 corridor), High Desert (Interstate-15 corridor), Low Desert (Interstate-10 corridor), and Southern Desert (Interstate-40 corridor) supplies.
- The **Collection Zone** will aim to create flexibility between the anticipated areas of higher production and anticipated areas of higher demand.
- The **Central Zone** will assess pipeline and other assets that connect between potential assets in LA Basin.

Assessment will be done from a functional standpoint, assessing the operational characteristics that the segment supports within a conceptual fully built-out clean renewable hydrogen system. Independent factors such as production, demand, storage, and design parameters will then be used in Step Two to identify preferred routes within each functional area based on criteria discussed further herein. Application of design parameters will be further applied to identify potential compression needs in conjunction with anticipated operational model. Preferred routes will be identified in each of the three functional areas.

Those routes identified for further consideration will be used as the basis for which routes are further refined. Preferred routes will be identified in each of the three functional zones identified within the system evaluation. In Step Three, route evaluation will be conducted on a point-to-point basis to determine benefits and elements that may require further refinement. Pipeline characteristic evaluation will be completed by assessing a variety of different evaluation criteria that fall within social, environmental, and engineering categories to assess which features may be more prevalent along a route. This allows for a systematic and quantifiable comparison to aid preferred Project selection. A high-level cost estimate will also be calculated for each of the preferred routes.

Lastly, in Step Four, preferred routes from the three functional zones will be grouped to create continuous pathways of transmission. These pathways will be again evaluated from a safety and engineering standpoint to validate constructability, as well as from an environmental social justice standpoint for implementation.

Data collection including regulatory review:

The contractor will work with SoCalGas to collect data from other integrated Angeles Link Phase One ~~1~~ Studies and GIS. Data compilation will include:

- Literature review and compiling of various information such as jurisdictions and parcel boundaries, infrastructure, soil and geological surveys, floodplain and wetland maps, and other environmental reports.
- Land use and zoning information, as well as the most recent publicly available aerial photography, will be obtained for the project area.
- Information will be obtained from various sources, including federal, state, and local agencies, and information databases accessible through the internet.

Calculation approach:

System evaluation will integrate information from the Demand and Production studies under a variety of different scenarios to identify areas with the greatest opportunity to maximize access and transmission.

- Route evaluation will utilize mileage that is applicable to one criterion compared to another.
- A range of criteria will be used for the process to identify relative significance and create the ability to quantify impacts and identify potentially affected resources, design constraints, and/or potential for lower costs.

Data evaluation:

SoCalGas will evaluate the following categories of information, including, but not limited to:

Pipeline Sizing & Design Criteria

Overview

The Decision requires SoCalGas to compare possible routes and configurations (OP 6 (i)) and evaluate safety concerns for the Project (OP 6 (f)). This study will: (i) estimate potential pipeline sizes for the pipeline route from production to end-use; (ii) identify specific materials for pipeline, fittings, and differences in operational equipment; (iii) discuss safety considerations, pressures, and maintenance operations associated with design; and (iv) evaluate compression characteristics and options.

Technical Approach

Approach consideration and review:

Pipeline Sizing, Pressure Profile, and Compression

Evaluation of pipeline sizing will consider the results of the production model generated as part of *Production Planning & Assessment* Study. Pipeline sizing options will be developed to meet the needs of the anticipated operating conditions for the new clean renewable hydrogen pipeline system, incorporating each step in the sequential supply/demand increase of the Angeles Link systems developed in the Production and Demand studies.[5] A summary report will be developed illustrating multiple sizing options focused on maintaining reasonable pressure loss and provides suggestions for future capacity sizing considerations and potential staging to accomplish various demand/supply scenarios.

In addition to performing hydraulics along the refined pipeline routes, multiple scenarios will consider various ways to optimize the pipeline system including the following items:

- Quantities of piping and other materials required for the Project.
- Pipeline operating pressure to optimize system capacity and required system compression (horsepower).
- Loops and branches to reduce required wall thickness, improve resiliency and reliability, and optimize pipeline nominal diameter
- Phased/staged installation of required pipeline section

Hydrogen compression requirements will be assessed along the selected pipeline routes, to determine:

- Total compression requirements (horsepower)
- The total number of compressor stations and their locations
- Heat exchange requirements for the system.

Repurposing

SoCalGas will assess repurposing of existing natural gas pipelines through high-level evaluation of existing SoCalGas assets, comprehensive research and literature review, and discussion on existing application and future and ongoing research of hydrogen in repurposed natural gas infrastructure.~~;~~

- ~~Evaluation of location~~
- ~~Pipeline attributes such as grade and wall thickness~~

The scope of the Pipeline Sizing & Design Criteria Study has been further adjusted over time as the needs of the analysis have been refined. Those adjustments are highlighted through the redlines in this section.

- ~~Operational parameters such as in-line inspection records, design level, minimum operating pressure, and maximum allowable operating pressure.~~

Storage

Storage of hydrogen will be evaluated and incorporated into the sizing optimization.

- Underground storage technologies will be evaluated from a technology readiness level (TRL), location, and by characteristic to rank and establish potential to support operational models and system evaluation.
- Aboveground storage technologies will be evaluated as well from a characteristic standpoint, including cost, capacity, and siting.
- All methods of storage share the goal of safely meeting storage capacity needs with suitable injection and production rates.

In addition to being discussed with regard to system hydraulics and operation, a supplemental high-level reliability and resiliency literature review of the Power Sector in California will also be conducted. The evaluation will consider the need for clean firm dispatchable generation and storage to meet widespread system needs and the role that clean renewable hydrogen can fill in securing a reliable and resilient electric system.

Design Basis:

A preliminary design basis will be developed to identify key factors including the operating and design characteristics of clean renewable hydrogen for the various routes and segments, which will be used in the determination of preliminary pipeline sizing, compression requirements, and pipeline material selection. These factors will become further available as the study progresses.

Many of the components of the preliminary design basis and routing will require iteration to finalize, including:

- Routing
- Operating and design characteristics
- Pipeline diameter
- Quantity and sizing of compressor stations and their locations
- Material specifications (considers embrittlement and leakage)

SoCalGas' 2021 Report and appendices were consulted as the first step of the pipeline sizing and design criteria. Once preferred routings are identified, a hydraulic study will be completed to determine the required pipe diameter and compressor station(s) based on the pipeline routing and the desired delivery pressure to the LA Basin and end-use customers.

The preliminary design basis will include the following criteria:

- Federal, state, and local laws and regulations
- Gas standards and specifications

- Industry best practices
- Pipeline engineering and design factors including the following:
    - Design Pressure & Maximum Allowable Operating Pressure
    - Piggability
    - Corrosion Allowance
    - Supervisory Control and Data Acquisition (SCADA), Control Philosophy, Communication, & Monitoring
    - Pipe Coating
    - Constructability Factors

The preliminary design basis will be prepared once appropriate data from the Production, Demand, and Water Resources Analysis has been developed.

Plan for Applicable Safety Requirements

Overview

The Decision requires (OP 6 (f)) SoCalGas to evaluate safety concerns involved in pipeline transmission, storage, and transportation of hydrogen applicable to the Project. This study will evaluate safety concerns and develop an assessment of applicable safety requirements for employee, contractor, system, and public safety.

Technical Approach

Approach consideration and review:

A focus on all aspects of safety and consideration of the physio-chemical properties of hydrogen is required.[6] A safety assessment will be conducted to include the following features:

1. *High-level characterization of the physical and chemical properties of hydrogen that impact safety in the gas transmission system (including pipeline, compression, storage, and transportation)* – Size of hydrogen molecules, Btu content of hydrogen, combustion temperature of hydrogen, flammability and explosive range, challenges of compressibility, storage, and transportation (by hydrogen trailer) will be addressed. INGAA Foundation safety-related studies will be referenced.

2. *A description of key safety risks, including seismic events, and potential mitigations (utilizing available industry standards)* – API Pipe specifications for 100% hydrogen pipe are in development and will help guide specifications on pipe, valves, and fittings that are approved for 100% hydrogen.

3. *A summary of key safety codes in the US and globally* – US codes and standards to be

[6] The scope of the Plan for Applicable Safety Requirements Study has been further adjusted over time as the needs of the analysis have been refined. Those adjustments are highlighted through the redlines in this section.

reviewed will include 49 CFR Park 192, ASME B31.12, and CPUC General Order No. 112-F. International codes will be researched and reviewed; INGAA Foundation safety-related studies also reference other global standards and codes which will be included in the review.

4. *Specifications, standards and protocols which will include ~~for~~ leak detection and employee safety measures.* ~~SoCalGas will focus on leak detection equipment and safety training for working on hydrogen systems~~ An evaluation will be conducted to review existing company standards and specification sheets to identify potential impacts, required updates, and/or new processes to be created due to the introduction of the Angeles Link Project

5. *Typical operations and maintenance considerations for 100% hydrogen systems to guide pipeline and facilities handling* – 49 CFR Part 192 is the primary federal code for operations and maintenance of pipeline systems transporting natural "and other gases" like hydrogen. GO 112-F~~E~~ contains additional requirements by the CPUC which may ultimately be applicable to hydrogen. Both 49 CFR Part 192 and GO 112-F~~E~~ will be reviewed and considered as a basis. The study will also consider the potential for future requirements and how to plan for regulatory changes.

6. *A description of organizations accredited to undertake hydrogen safety training, operator training, operator qualifications, and opportunities for collaboration with other stakeholders (community colleges, ports, etc.)* – Training and operator qualification organizations will be researched to determine accreditations.

7. *A summary of public safety concerns and stakeholder engagement processes, including approximate timing of engagement, to help guide development of Hydrogen Public Awareness Plans* – Discussion and education topics will be generated by the consultant and through engagement with external stakeholders. This plan would identify topics to pursue in support of educational opportunities to create awareness in regards to hydrogen safety.
8. *High-level evaluation of existing safety programs, plans, and systems for applicability to 100% hydrogen systems.*
9. *A summary of lessons learned and other relevant information gained from actual experience that could be applicable to the proposed Angeles Link system (including pipeline, compression, storage, and transportation).*

Data evaluation:

SoCalGas will review existing company standards and specification sheets to identify potential impacts, required updates, and/or new processes to be created due to the introduction of the Angeles Link Project. As part of this process, SoCalGas will:

- Create a listing of all standards and specification sheets to track review process
- Conduct a gap analysis for each standard to identify those standards that would be impacted by the introduction of a 100% clean renewable hydrogen system

- Establish criteria to identify impacts
- Apply criteria to evaluate standards
- Determine if existing standards will require an update and/or a new standard

- Review the availability and existence of potential future specifications and standards
- Create timeline/schedule for implementation of changes and additions

Workforce Planning & Training Evaluation

Overview

The Decision requires (OP 6 (e)) SoCalGas to evaluate workforce planning and training. This study will evaluate construction practices and operations and maintenance protocols for utility workers regarding hydrogen infrastructure and workforce needs in terms of staging and growth for the Project.

Technical Approach

Source considerations:

Federal regulations (49 CFR Part 192 Subparts A through P) and CPUC General Order No. 112-F provide a basis for establishing training programs and workforce planning. These rules and regulations contain requirements for procedures that cover a wide range of areas from materials, design, construction, welding, corrosion, testing, operations and maintenance, qualification of pipeline personnel, and integrity management.

Approach consideration and review:

In addition to the federal and CPUC requirements noted above, SoCalGas may have existing Company requirements and protocols that may be part of the evaluation and utilized as the overall basis for proposed updates to existing protocols where applicable. The following areas will be assessed as part of this task:

1. Operations & Maintenance Protocols – Existing SoCalGas natural gas operations and maintenance procedures provide a basis for starting evaluations for hydrogen-specific requirements. Operations and maintenance protocols will be reviewed to provide guidance on including significant language about hydrogen safety, abnormal operating conditions, PPE required and other topics. Additionally, 49 CFR Part 191, 49 CFR Part 199 (Drug & Alcohol), and GO 112-F will be reviewed for further requirements as well as any California-specific standards such as CalOSHA Title 8 and Cal Gov. Code § 4216. A log of procedures and associated regulatory requirements will be generated to document the guidance on existing standards and potential new standards.

2. Department of Transportation (DOT) and Other Construction Qualification/Protocols – Design and construction requirements including welding, weld flaw criteria, pipe specifications are likely to be developed by API. Protocols will be reviewed and any changes necessary will be identified and incorporated. Pipe manufacturers are actively

engaged in evaluating additional pipe specifications for 100% hydrogen systems in conjunction with API and other agencies. A log of specifications and associated regulatory requirements will be generated to document the guidance on existing specifications and potential new specifications.

3. Timeline for Workforce Staging – As the pipeline routing and design is completed and the location of hydrogen production sites, storage sites, and compressor station sites are developed, Operations Management SMEs will review staffing models used on the natural gas system and create the workforce staging and staffing plan, including an estimate of jobs created, for Angeles Link. The staffing model may require updating as the final design for the hydrogen design is developed. The analysis will consider how acquiring the required operations personnel and initiating the training and Operation Qualification (OQ) process may necessarily require the hiring process to start well in advance of planned operations. In addition, opportunities for partnering with local training centers, colleges and industry will be considered.

4. Comparison to Existing SoCalGas Facilities – SoCalGas will review existing SoCalGas natural gas facilities as a basis for applicability to hydrogen facilities and assess potentially required modifications. An existing SoCalGas compressor station and an existing SoCalGas pipeline segment will be used as a starting point for the comparison. Operations Management SMEs and Labor Relations SMEs will be consulted during this comparison.

5. Risk/Mitigation Assessment – SoCalGas will review potential risks associated with workforce planning and training applicable to hydrogen pipelines. As the project proceeds from design to construction to commissioning, effective training will be under constant updates and review. The consultant will review and provide a list of accredited training and operator qualification third party companies who can assist with increasing the effectiveness of workforce training, including lessons learned from prior incidents as applicable to hydrogen.

6. Changes to Existing Processes – SoCalGas will review existing processes related to:

    - Leak Survey
    - Leak Detection
    - Leak Mitigation and Repair
    - Control room and emergency response protocols
    - Integrity Management

Federal regulations (49 CFR Part 192) contain significant language for these processes for the transportation of natural gas – and other gases (such as hydrogen) – by pipeline. Operations Management, Regulatory Compliance, and Control Room Management SMEs will provide input.

A summary report of integrity management issues for the hydrogen pipeline system will be provided.

7. Changes to Human Resource Considerations – SoCalGas will review and develop recommendations regarding human resources issues, including consideration of:

   - Hydrogen system control room management; and
   - Potential for separate job classifications in: Facility operations
     - Facility maintenance
     - Leak Survey
     - Valve maintenance
     - Emergency response
     - Public liaison with emergency response agencies

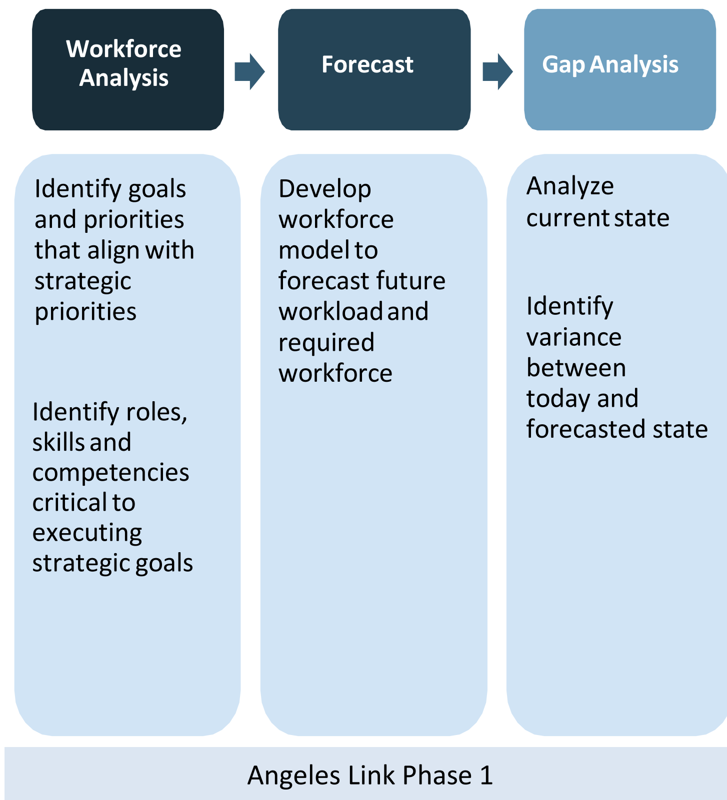
As part of this process, SoCalGas will consult with Labor Relations SMEs as the study progresses on determining if field personnel and gas control personnel and emergency response personnel can hold dual classifications and operator qualifications in both natural gas and hydrogen. A summary report will consider all the classifications specified within the Company.

8. Changes to Technology & Implementation – SoCalGas will review the potential changes to or additional technology needed to transport 100% hydrogen, including:
   - Close Interval Survey (CIS) – Review and summarize any requirements pertaining to hydrogen.
   - System Analysis Programming (SAP) and Asset Management (GIS) – To be reviewed and summarized from the perspective of Hydrogen System Operations and Integrity Management. Traceable, Verifiable and Complete records of the new hydrogen system are a must have consideration according to the Mega Rule changes to 49 CFR Part 192.
   - SCADA – Capacity and scaling of existing SCADA to include the hydrogen system. SCADA becomes the primary network to monitor system performance, gather critical operating data including leak detections indications, compressor performance, hydrogen productions, and hydrogen storage. These systems will add significant numbers of field data points to the SCADA system necessitating a review of the capacity of existing SCADA system.

Data evaluation:

SoCalGas will perform modeling that takes into account business data that measure and describe work volumes, how employees work, current staffing needs, and labor costs in both time and money. The staffing model will provide insights into the utilization of internal ~~&~~ and external resources, identify internal ~~&~~ and external factors that drive work volume and forecast workforce level required on specific tasks to meet the objective of the Project. The skills and knowledge required to meet organizational needs of the Project are assessed as well. This evaluation will highlight skill gaps, plan future employee training, promote employee engagement, and drive more accurate external recruitment efforts.

Workforce Capacity Planning Model



APPENDIX 2 – PAG/ CBOSG WRITTEN COMMENTS

PAG/CBOSG MEMBER COMMENTS

EQUITY PRINCIPLES FOR HYDROGEN

Equity Principles for Hydrogen

Environmental Justice Position on Green Hydrogen in California

October 10, 2023

PREAMBLE

We represent heavily polluted communities throughout the State of California. Our communities border oil refineries, gas-fired power plants, industrial farming operations, fossil fuel extraction facilities, waste processing centers, ports, transportation corridors and other polluting operations. These cumulative sources of pollution cause a wide range of adverse health outcomes in working class communities of color. Our communities share a common fence with facilities and operations that emit toxins, foul smells, and noise and cause nuisance impacting people's quality of life at all hours of the day and night.

The State of California intends to expand the use of hydrogen as a fuel, and to this end, we offer these guiding principles, which are essential to respect and protect our communities. The following principles represent our collective values and positions to support communities as hydrogen energy is utilized across the state.

Equity Principles for Hydrogen

Environmental Justice Position on Green Hydrogen in California

October 10, 2023

These principles were developed in ten workshops and learning sessions for environmental justice partners across California between March and September of 2023. The learning sessions examined the current science, including risks, benefits, and unknowns, and shed light on each stage of the hydrogen cycle, including production, delivery, storage, and use. The workshops allowed our organizations to discuss different perspectives, build consensus, and reflect on how hydrogen may impact our communities.

We adamantly oppose all non-green hydrogen proposals and projects. We insist that new projects protect communities first and do not perpetuate the injustices that polluting infrastructures impose on fence-line communities today. Each stage of the hydrogen life cycle—production, delivery, storage, and end use—can present unique risks and harms to environmental justice communities and to all Californians. Discussions about building new green hydrogen infrastructure must involve the community, and its members should be meaningfully engaged. Siting green hydrogen infrastructure should also take into account the cumulative impacts of environmental justice communities and the risks associated with hydrogen.

PRODUCTION

1. **We oppose all hydrogen production that is not green hydrogen production, and we agree that green hydrogen is produced by means of electrolysis using surplus water and additional renewable electricity.**

    a. The hydrogen is made using electrolysis of water
        i. Where water used as feedstock is surplus and not diverted from sources which serve jurisdictions that are struggling or failing to meet clean drinking water needs.
    b. Electrolysis is powered only by electricity produced from new dedicated wind or solar power, and
        i. The facility generating the electricity used for the production of green hydrogen does not use tradable renewable energy credits.
    c. If any electrolysis facility is connected to the California electricity grid, it must honor the hourly use concept:
        i. The new renewable generation resource provided for in subsection b(i) above has a first point of interconnection to the California balancing authority in which the electrolytic hydrogen production facility is sited, and

ii. The electrolytic hydrogen production facility must use the new renewable electricity in the same hour that the electricity is delivered to the grid.

d. Green hydrogen is not defined according to pounds of CO2 equivalent.
e. We oppose carbon capture in hydrogen production operations.
f. The above conditions must be the starting point for informed community consent to hydrogen production projects. Though the specifics of a green hydrogen production project may be undefined at the outset of community engagement, the public should have faith that all above conditions are met under any project permutation.

2. We agree that green hydrogen production projects should consider the impacts of electrolysis and be tightly regulated.

a. Projects must include EJ protections related to water use for production/desalination.
b. Projects must not negatively impact California's already stretched water supply.
c. Projects must not use potable water when drinking water needs are not met.

3. We agree that hydrogen production projects must center Tribal consultation and consent for projects considered on or near ceded and unceded Tribal territories.

a. State agencies must mandate any recipient of Federal or State level funding to undergo training on Tribal history, cultural sensitivity, and the significance of the Tribal consultation process for all recipient staff expecting to participate in any hydrogen or related project. This requires ongoing education to keep staff updated on evolving Tribal engagement practices. Educational material should be designed by California Native-led nonprofits or the California Native American Heritage Commission.
b. All public agencies that have the principal responsibility for carrying out, approving, or expecting to participate in any hydrogen or related project must conduct extensive outreach to California Native American Tribe(s) to increase their sign-on to the Tribal notification list; each agency should have to complete the CEQA process as required by PRC 21080.3.1(b)(1). This should also include updating any outdated communication information to assure proper notification for California Native American Tribe(s) when an agency undertakes a hydrogen or hydrogen related project.

c. When a public agency decides to undertake a hydrogen or related project, or decides an application for such a project is complete, this agency must begin the AB 52 Tribal Consultation process. A Tribal liaison must be appointed from the agency with extensive knowledge of the project and Tribal engagement practices to facilitate communication, answer questions, and address concerns from Tribal representatives.
d. If California Native American Tribe(s) request consultation, a good faith and reasonable effort should be conducted with best practices that include establishing a formal process for meetings, site visits, and opportunities for collaborative discussions and allocating sufficient time for meaningful engagement and dialogue, allowing Tribes to provide input and voice concerns.
e. Mandate cultural resource assessments for all projects that may impact Tribal resources to include Tribal experts in the assessment process to ensure accurate cultural insights.
f. Provide consistent updates to Tribes throughout the project's lifecycle, informing them of any changes or developments.
g. Seek feedback from Tribes on the agency's Tribal consultation process and continuously work to improve its effectiveness.
h. Assure that any changes to a General Plan or adoption/changes to a Specific Plan in order to create a hydrogen or related project initiates the SB 18 Tribal consultation process in consultation with the Native American Heritage Commission (NAHC). Same practices for the AB 52 process should be followed in this procedure as well.

4. **We agree that hydrogen production projects should center community consent and engagement.**

a. Informed community consent is necessary, and should be sought in addition to production conditions listed under #1 being met.
b. Center community input, continue to elevate EJ voices, and ensure meaningful community participation is present for any hydrogen project. This includes providing language access such as interpretation and translation services for non-English speakers, depending on the common languages spoken in the particular community.
c. Any new potential hydrogen production project must include the formation of a local oversight committee that will be composed of local stakeholders including local environmental justice, public health, labor, and utility representatives to

conduct multiple waves of education and engagement to vet the project with the community. This oversight committee will be responsible for coordinating a series of workshops/presentations that will educate the community on sources of energy, emissions projections, job opportunities, and community benefits and risks. Following this process will include the opportunity for the oversight committee to consider local resident feedback to either approve, deny, or make modifications to the plan.

5. **We oppose hydrogen production that includes dirty hydrogen production methods.**

   a. Hydrogen produced using reformation or gasification is not green hydrogen.
      i. This includes hydrogen produced by reformation of municipal solid waste gas, livestock biogas (factory farm gas), biomass, lignite or coal, and
      ii. Hydrogen produced using any fossil fuel as a feedstock.
   b. Hydrogen produced from electrolysis, but powered by dirty electricity sources is not green hydrogen.
      i. Dirty electricity sources include but are not limited to:
         1. Energy produced from combustion of fossil gas, landfill gas, municipal solid waste gas, livestock biogas (factory farm gas), biomass, lignite or coal, and
         2. Electricity produced from nuclear fission or fossil, biogas, or landfill gas fuel cells.
   c. Hydrogen produced using carbon capture and sequestration in any point in its production is not green hydrogen.
   d. For existing hydrogen production, we support phasing out electrolysis powered by GHG emitting fuels or non-excess wind/solar.

6. **We agree that hydrogen production projects should result in net-reduction of energy pollution.**

   a. Hydrogen production should be able to reduce current forms of energy production pollution.

7. **We agree that hydrogen production projects should only be considered if they are limited in scale and scope.**

    a. All hydrogen production projects should be limited in size and scope to the maximum extent feasible.
    b. Public and community dollars that financially support hydrogen production should also be heavily regulated and available in public records.

STORAGE & DELIVERY

1. **We agree that any hydrogen pipelines and storage infrastructure project should be equipped with safety and leak detection technologies and strictly monitored.**

    a. Every hydrogen pipeline and storage infrastructure project must be equipped with effective leak detection technology.
    b. Any proposed project to transport hydrogen must include a leak detection response protocol including an alert system to notify residents and workers of potential exposure, health risks, and a relocation plan until any leak is resolved.
        i. This program must include language access to all local populations and contact staff that can support coordination of leak response protocol.

2. **We agree that any hydrogen delivery project should minimize risk by limiting size and scope and by focusing on environmental impact from development through operations and decommissioning.**

    a. All hydrogen transmission and storage infrastructure projects should be limited in size and scope and equipped with design features to:
        i. Avoid perpetuating the impacts of gas infrastructure on environmental justice communities,
        ii. Prevent leaks, spills, breaches, and explosions in or near environmental justice communities, environmentally sensitive areas, pollution burdened communities, Tribal land, or any residential areas.
    b. In considering new hydrogen transmission and storage infrastructure, the project should:

i. Obtain prior and informed consent from every community and/or Tribe where hydrogen transmission infrastructure originate, pass by, or terminate,
ii. Define who is responsible for managing infrastructure leaks throughout the lifecycle of design, implementation, and maintenance.
iii. And should consider:
    1. Historic harms gas infrastructure has caused in project communities,
    2. Safe, reliable, and efficient alternative methods of energy delivery.

c. Local and regional hydrogen distribution pipelines and storage/compressor facilities should be limited in size and scope to forward these objectives.

3. **We agree that existing methane infrastructure is not equipped to deliver hydrogen safely.**

   a. Hydrogen should not be transported in existing methane gas systems.
   b. Hydrogen should never be blended into existing methane pipelines or storage containers.

4. **We agree that data gaps should be addressed before hydrogen delivery projects are permitted.**

   a. Research into hydrogen pipeline and delivery infrastructure should focus on data gaps including, but not limited to
      i. Leakage;
      ii. Appropriate safety testing standards for dedicated hydrogen pipelines;
      iii. Hydrogen gas impacts on humans, ecosystems, and the climate;
      iv. Risks and challenges of different hydrogen storage options such as
          1. Storage in liquid state,
          2. Low temperature storage,
          3. Ammonia,
          4. Methanol, and
      v. Further exploration of data gaps in hydrogen transmission and storage.

5. **We agree that community impacts should determine where hydrogen pipelines are placed.**

    a. All hydrogen delivery projects should obtain prior and informed consent required for communities where pipelines or delivery infrastructure are built or hydrogen is introduced.
    b. Hydrogen delivery projects should fully consider and respect
        i. Historic harms gas infrastructure has caused in project communities,
        ii. Community expertise of their experience, and
        iii. Safe, reliable, and efficient alternative methods of energy delivery.

6. **We agree that the cost of infrastructure to deliver hydrogen should be clear and transparent to ratepayers and consumers.**

    a. Pipeline infrastructure presents a cost issue for ratepayers, given how expensive it is to site and build.

END-USES

1. **We agree to principles of supporting electrification, minimizing harm, and centering community voice and environmental impacts in our consideration of any end-uses that could use green hydrogen as a resource or feedstock.**

    a. Electrification
        i. If the end-use can be electrified, green hydrogen should not be used.
        ii. Electrification should always be prioritized over the use of green hydrogen, including the consideration of rapid advancement in electrification technologies.
        iii. Emerging electrification technologies should be pursued before considering hydrogen for the end-use.
        iv. Electrification research and development should be prioritized above hydrogen research and development.
        v. Hydrogen should only be considered when there is a technical or practical constraint to electrification.
    b. Harmful end-uses

i. Harmful end-uses should be reduced or phased out altogether, such as excessive fertilizer use, where possible.
ii. Using hydrogen to improve a feedstock for an industry that is a harmful industry shouldn't justify the continued operation of that industry.
iii. Potential end-uses should use the Precautionary Principle to first prove that using hydrogen in that context isn't harmful.

c. Community voice and environmental impacts
   i. The cost of using green hydrogen in any end-use should not disproportionately impact EJ communities and ratepayers from lower income families.
   ii. Public funds should be prioritized for advancing electrification over hydrogen.
   iii. All life-cycle impacts, including financial impacts and health and environmental impacts, should be transparently considered.
   iv. Any end-use should reduce local and regional pollutants.
   v. Informed local communities should have veto power over any hydrogen end-use in their communities.
   vi. EJ communities should have a governing voice in end-use decision-making.
   vii. Environmental and EJ impact review processes must be thorough and should never be fast-tracked.

2. We prioritize equitable direct electrification with renewable energy, and we agree that green hydrogen should only be used when that is not an option.

a. Direct electrification with renewable energy is cheaper, safer and more efficient than producing green hydrogen, and therefore should be prioritized.
b. Green hydrogen should be considered only for necessary end-uses that cannot be supported by electrification or phased out by alternatives.
c. Hydrogen gas should not be used in residential and commercial buildings because direct electrification with renewable energy is safer and more efficient.
d. Hydrogen should not be used in transportation methods that can easily be electrified, including passenger cars, light-duty trucking, main line rail, and drayage trucking.
e. Hydrogen should not be combusted in gas-fired generating units to produce electricity.
f. Hydrogen should not be blended into the fossil gas system in pursuit of

decarbonization.

g. We oppose the use of green hydrogen in carbon capture operations.
h. We may support the use of hydrogen in fuel cells to power niche applications such as back-up power for Public Safety Power Shutoff (PSPS) events as long as the high-level principles mentioned above are also followed.

3. **We agree that additional research is needed regarding the use of green hydrogen in maritime transport, port infrastructure, long-haul trucking, aviation, fertilizer production, and hard-to-electrify industrial manufacturing.**

   a. We agree that the principles outlined at the start of this section and elsewhere throughout the document should determine whether hydrogen should be used in any of these applications.
   b. We agree that more research is needed on green hydrogen in fertilizer but oppose any end-use that is used to greenwash or justify the continued over-application of fertilizer in rural communities who are forced to live with contaminated drinking water as a result.

WHO WE ARE

- Asian Pacific Environmental Network (APEN)
- California Environmental Justice Alliance (CEJA)
- Center for Community Action and Environmental Justice (CCAEJ)
- Center on Race, Poverty & The Environment (CPRE)
- Communities for a Better Environment
- Environmental Health Coalition
- Leadership Counsel for Justice and Accountability
- Pacoima Beautiful
- Physicians for Social Responsibility Los Angeles (PSR-LA)

PAG MEMBER COMMENTS

From:	Heller,Miles T.
To:	ALP1 Study PAG Feedback
Subject:	Air Products Comments - Technical Approaches Document
Date:	Friday, October 13, 2023 2:28:10 PM
Attachments:	Air Products PAG workstream technical approaches comments to SoCalGas 10-13.pdf

Please find our comments attached on the Technical Approaches Document

Miles Heller
Air Products and Chemicals, Inc.
Director, Greenhouse Gas Government Policy
(916) 860-9378

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1940 Air Products Blvd.
Allentown, PA 18106-5500
www.airproducts.com

October 13, 2023

VIA EMAIL TO
ALP1_PAG_FEEDBACK@INSIGNIAENV.COM

Emily Grant
Angeles Link Senior Public Affairs Manager
Southern California Gas Company
555 West Fifth Street
Los Angeles, CA 90013

Re: Angeles Link Planning Advisory Group (PAG) Feedback of Air Products and Chemicals Inc. for SoCalGas Second Quarterly Report

Air Products and Chemicals, Inc. ("Air Products") submits the following feedback concerning the *Technical Approach for Phase One Studies*. Air Products notes that it also provided feedback on the *Scope of Work Descriptions for Phase One Studies*, and the workshops on those scopes of work held on July 18 and July 20, 2023, on July 31, 2023. The majority of the comments below were raised in the June 31 comments, but have not been addressed in either the revisions to the *Scope of Work* Descriptions nor in the *Technical* Approaches.

Air Products expects that the below feedback will be included in Southern California Gas Company's ("SoCalGas") quarterly report to the California Public Utilities Commission, as required by Decision ("D.") 22-12-055, Ordering Paragraph 3. Air Products also welcomes any response that SoCalGas may wish to provide to the comments below.

General Comments

Air Products has the following general comments concerning the summary *Technical Approach* that SoCalGas has provided to PAG members.

SoCalGas's Limited Technical Approach Details Are Insufficient to Allow for Meaningful Feedback

In its July 31 letter providing feedback on the *Scope of Work* descriptions, Air Products raised concerns that the document consisted only of very cursory summaries of the proposed scopes of work for the Phase One studies, and lacked much of the specific detail that would typically be required to be included in any scope of work being provided to a third-party consultant. SoCalGas proposes to conduct sixteen separate studies in Phase One, to comply with the obligations set forth in D.22-12-005, including making findings required before SoCalGas can proceed with Phase Two. Yet the *Scope of Work Descriptions* for all sixteen studies consisted only of twenty-nine pages of text, averaging less than two pages per study.

The Final *Scope of Work Descriptions*, revised September 5, 2023, and the *Angeles Link Phase One Technical Approaches* continue to suffer from the same flaw; both offer only cursory summaries, lacking the detail that would typically be required in such documents. This continues to hamper the ability of PAG members to provide meaningful feedback. As it urged in its July 31 letter, Air Products continues to request that SoCalGas provide the same level of detail to PAG members that it is presumably providing to (or receiving from) the consultants who will actually perform the work.

SoCalGas Must Consider Private Sector Investment

As D.22-12-055 recognized, there is an existing and rapidly growing hydrogen industry in California. PAG members have repeatedly raised the concern that SoCalGas's efforts could impede private sector investment, stifle innovation, and require captive ratepayers to fund investments that could be more quickly and cost-effectively developed by a robust private sector. Neither the Commission nor the California legislature has as yet concluded that the Commission has or should have jurisdiction over any aspect of this growing hydrogen industry.

Furthermore, ongoing private sector investment will likely impact the need for, and the purpose of an Angeles Link trunkline, and will impact the extent to which ratepayer funding is needed or appropriate to advance access to clean hydrogen. It is therefore critically important that SoCalGas's Phase One studies explicitly evaluate and consider the private sector's ongoing and planned investment in hydrogen projects and infrastructure, and private sector alternatives to a trunkline. The Angeles Link should not be considered in a vacuum, ignoring the myriad private sector efforts currently ongoing.

Comments on Technical Approaches to Specific Scopes of Work

Air Products provides the following comments on several of the technical approaches for specific scopes of work. As noted above, the lack of detail makes it difficult to provide meaningful feedback.

<u>Project Options and Alternatives</u>

As explained in the General Comments above, SoCalGas should weigh private sector current and future infrastructure investments as compared to the cost of ratepayer-funded infrastructure developed by investor-owned utilities. In particular, the Project Alternatives should include private sector projects, products and services, to be compared to the costs and timing of ratepayer-funded efforts.

The Technical Approach outlines only two options for "Other Alternatives": (1) non-hydrogen alternatives (e.g., electrification, energy efficiency, renewable natural gas, natural gas with carbon management), and (2) hydrogen delivery alternatives (e.g., trucking, in-basin hydrogen production).[1] The Technical Approach fails to include any evaluation of private sector investment as viable alternatives, completely ignoring ongoing private sector efforts. The "Other Alternatives" section should add a third section addressing private sector alternatives. This third category will be particularly important in evaluating the cost-effectiveness and economic feasibility of clean renewable hydrogen delivery via the Angeles Link,[2] as compared to non-ratepayer funded alternatives.

Furthermore, for all three categories, SoCalGas should also identify the criteria by which it chooses the specific Project Alternatives to study, as well as identifying any Project Alternatives that it chooses not to study, and reasons why those Alternatives were omitted.

Demand Study

D.22-12-055 restricts the Angeles Link Project to transportation of "clean hydrogen." As Air Products noted in its July 31 comments, any evaluation of the potential for "clean renewable hydrogen demand" must distinguish between demand for "clean hydrogen" as defined by D.22-12-055, and hydrogen demand generally. Potential demand for hydrogen generally is not necessarily reflective of demand for clean hydrogen.

Unfortunately, the Technical Approach for the Demand Scenarios fails to adequately distinguish between demand for hydrogen generally as compared to the demand for clean renewable hydrogen. The Technical Approach also contemplates that demand assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisories. However, the Technical Approach fails to identify how these interviewees will be selected, or the criteria that will be used to select the interviewees. The validity and value of any feedback obtained through interviews will depend in significant part on who was interviewed, how they were selected, and what criteria was used to select them. The Technical Approach should be revised to provide interviewee selection criteria, and the final Phase One study on demand should include also identify how interviewees were selected, the criteria used to select the interviewees, as well as a detailed list of those interviewed.

Production Planning and Assessment

This study is intended to include an evaluation of "potential sources of clean renewable hydrogen production from renewable energy resources such as solar and wind, the input requirements, the estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards."

However, as explained in some detail in recent decisions in the Commission's Integrated Resource Plan proceeding (R.20-05-003) and Resource Adequacy proceeding (R.21-10-002), electric load-serving entities are currently struggling to meet mid-term reliability procurement

[1] *Technical Approach* at 5.
[2] *Technical Approach* at 5-6.

requirements, and development challenges, including interconnection delays, supply chain disruptions, and permitting delays have further exacerbated the challenges faced by load-serving entities in procuring required capacity. These challenges will only increase as load increases as a result of increasing electrification.

In determining what renewable energy resources might be available for hydrogen production, this Study should distinguish between generation sources needed by load-serving entities to meet current and future demand, and those renewable generation sources that are available for hydrogen production. Hydrogen production should not be competing for resources with load-serving entities seeking to procure electric capacity necessary to ensure reliability. The Technical Approach for Production Capacity Modeling outlined for this Study states that the approach will include the step of "[d]evelop[ing] maximum MW and MWh of renewable energy production potential available for future development to serve H2 production." In performing this step, the Study should expressly evaluate whether the renewable energy production is additive to the amount needed to meet current and future demand and California's reliability needs, and other environmental goals.

<u>Water Resource Evaluation</u>

According to the *Technical Approach*, this study has two components: (1) an evaluation of various types of water availability for clean renewable hydrogen production in Central and Southern California, and (2) an evaluation of the potential risks and opportunities associated with water availability that may impact the production of clean renewable hydrogen.[3]

In its July 31 comments, Air Products noted two issues, which have not been addressed in the *Technical* Approach. First, to the extent the identified potential sources are not collocated with the production sites, SoCalGas should evaluate energy needs associated with water pre-treatment, and how those energy needs would be met, as well as evaluating how the water will be transported to the production site, and the energy sources and emissions associated with that transportation.

Second, as with the renewable energy resources needed for production, any water sources for production may be subject to competing demands for the resource. SoCalGas should also evaluate competing demands for the resource, and the potential impacts, including cost impacts, associated with using the water resource for hydrogen impacts rather than the competing alternate use or uses.

<u>Plan for Applicable Safety Requirements</u>

Air Products notes that the *Technical Approach* for this study cites to Commission General Order ("GO") 112 F, Subpart E, which supplements Federal Pipeline Safety Regulations. As set forth in D.22-12-055, the Commission has yet to determine that the Angeles Link, or hydrogen

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[3] *Technical Approach* at 15.

transportation generally, would be subject to Commission jurisdiction. It therefore is at best unclear whether GO 112 will be applicable to the Project; furthermore, it is unclear whether the Commission, if it did assert jurisdiction, would apply GO 112 as currently drafted to hydrogen pipelines.

Conclusion

Air Products appreciates the opportunity to provide this input on the *Angeles Link Technical Approach for Phase One Studies*. Air Products remains concerned about the limited information being provided to the PAG in both the *Scope of Work* and the *Technical Approach*, and urges SoCalGas to provide more detailed information to the PAG to allow adequate feedback on those prior to the commencement of any work by consultants. Failing to fully vet the Scope and Technical Approach with PAG members may result in faulty studies that fail to provide analyses suitable to meet the requirements of D.22-12-055.

Respectfully,

Miles Heller
Director, Greenhouse Gas Government Policy

July 31, 2023 Letter from Air Products and Chemicals, Inc.

Please Refer to the Angeles Link Q3 Quarterly Report Appendices (Phase One) for a Copy of the Air Products and Chemicals, Inc. Angeles Link Planning Advisory Group (PAG) Feedback of Air Products and Chemicals Inc. for SoCalGas Second Quarterly Report.

From:	Lorrie J. LeLe
To:	ALP1 Study PAG Feedback
Cc:	Kevin Carmichael; Thomas A. Enslow
Subject:	Feedback on the SoCalGas Angeles Link Project Public Advisory Group October Workshop (4878)
Date:	Friday, November 3, 2023 3:45:11 PM
Attachments:	4878-004j - Angeles Link October Workshop Comment Letter - CPTC.pdf

On behalf of the California State Pipe Trades Council, we submit the attached comments regarding the above referenced matter.

If you have any questions, please contact Kevin Carmichael.

Thank you,

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November 3, 2023

Via Email:

SoCalGas
Planning Advisory Group
Email: ALP1_Study_PAG_Feedback@insigniaenv.com

Re: Feedback on the SoCalGas Angeles Link Project Public Advisory Group October Workshop

I am writing on behalf of the California State Pipe Trades Council ("Council") to provide comments on the October 18, 2023, Angeles Link Planning Advisory Group ("PAG") Workshop regarding SoCalGas' progress developing the Phase One feasibility studies for the Angeles Link Project ("Project"). The Council represents more than 30,000 plumbers and pipe fitters in local unions throughout California. The Council has advocated at the California Public Utilities Commission, the California Energy Commission, and other agencies for a coordinated statewide decarbonization plan that considers impacts on workers, safety, equity, energy reliability and rates.

The Project proposed by SoCalGas to develop transmission pipelines dedicated for clean renewable hydrogen transport to serve hard to electrify uses in the Los Angeles Basin is a major step forward in creating low-GHG emitting infrastructure for hard-to-electrify industries. Implementation of the Project will further the State of California's decarbonization goals, including the California Air Resources Board's ("CARB") 2022 Scoping Plan for Achieving Net Neutrality[1], which identifies the scaling up of renewable hydrogen for the hard-to-electrify sectors as playing a key role in the State achieving carbon neutrality by 2045 or earlier.

Electrification alone is not an economically sustainable solution to reaching our greenhouse gas reduction goals. Hydrogen and alternative renewable gas must

[1] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality (November 16, 2022) available at https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp.pdf

be part of the solution. Without investing in these technologies and infrastructure, California will see a continued exodus of industrial jobs out of the state. Further, such an exodus will undercut greenhouse gas reduction goals because greenhouse gas emissions are a global problem – not a regional issue. When industrial plants move to other states or countries, they are almost certainly going to areas that rely on more greenhouse-gas-intensive energy sources than would be the case if they stayed in California. Keeping traditional greenhouse-gas-intensive industries here in California and transitioning them to hydrogen is the best way to reduce global emissions from these industries while protecting jobs for blue collar workers.

In addition to helping the State meet its clean energy goals, the Project presents an opportunity to provide a just transition for skilled workers in the oil and gas industries, including pipefitters and plumbers represented by the Council's members that currently install, repair, and maintain oil and gas infrastructure and industrial facilities. The proposed Project provides a clear path for those very workers negatively impacted by the state's electrification efforts to find equivalent replacement jobs in the hydrogen industry. We look forward to the forthcoming Workforce Planning and Training Report and stress the importance of prioritizing solutions that employ the same workers whose jobs will be displaced by the transition from fossil fuels.

The Council would like to thank the SoCalGas Angeles Link Project team for their hard work as they continue the Phase One Feasibility Studies in preparation of the Phase One Report. The October Workshop presentations by Amy Kitson and Katrina Regan of SoCalGas regarding the status of the Pipeline Routing Study and the Pipeline Sizing and Design Study create a strong foundation for further development of the Project and demonstrate a commitment to creating a pipeline route that's efficient, sustainable, and harmonious with its environments and communities. The Council supports the continued development of the Angeles Link Project.

Sincerely,

Kevin Carmichael

Kevin T. Carmichael
Thomas A. Enslow

KTC:ljl

4878-004j

From:	Theo Caretto
To:	ALP1 Study PAG Feedback
Cc:	Emily Grant; Chester Britt; Alma Marquez; Roselyn Tovar; Shara Burwell
Subject:	Feedback on Angeles Link Technical Approach
Date:	Friday, October 13, 2023 4:13:31 PM
Attachments:	CBE Angeles Link Technical Approach Feedback Letter.pdf

SoCalGas Angeles Link Team,

Please see attached Communities for a Better Environment's feedback to the Technical Approach document.

Best,

Theo Caretto
Associate Attorney
Communities for a Better Environment
113 E. Anaheim Street
Wilmington, CA 90744
Cell: (805) 570-0970

October 13, 2023

Southern California Gas Company
555 West Fifth Street,
Los Angeles, CA 90013

Submitted via email to ALP1_Study_PAG_Feedback@insigniaenv.com.

Feedback for Southern California Gas Company on the Angeles Link Project Phase One Technical Approaches

Communities for a Better Environment (CBE) submits this feedback letter to Southern California Gas Company (SoCalGas) on the Technical Approach for Phase One Studies. CBE offers this feedback to ensure SoCalGas is apprised of critical gaps in their current approach which must be remedied. In some instances, the information provided in the technical approach is too vague to meaningfully respond, an unfortunate barrier to meaningful community engagement and feedback required by the Public Utilities Commission's Angeles Link Decision. SoCalGas must endeavor to provide better information in future, including specific study inputs and descriptions rather than sanitized summaries. In addition to the several issues CBE raises in this letter, we share the newly released equity principles for hydrogen by 9 major California environmental justice organizations which elaborate an environmental justice position on hydrogen production, transportation, storage, and end-uses.

I. Emissions Assessments

a. Climate Impacts

Hydrogen has a known climate warming impact. Though hydrogen is not a direct greenhouse gas, it has significant indirect warming effects. The chemical reactions of hydrogen in the atmosphere increase concentrations of other greenhouse gases, like methane, ozone, and stratospheric water vapor. These hydrogen reactions can lead to an increase in global warming greater than that caused by carbon. Hydrogen can also damage and leak easily from gas lines during production, transportation, and storage. It is extremely important that SoCalGas measures the potential hydrogen impacts of its proposed Angeles Link Project accurately and ensures with absolute certainty that gas leakage impacts are appropriately measured.

The potential impacts of any hydrogen project must be measured completely and accurately. The traditional way of measuring climate forcers such as hydrogen or carbon dioxide has been to calculate the global warming potential (GWP) over 100 years. The GWP 100 calculation was established decades ago and climate science has continued to evolve. While 100 years is still the metric used most often; comparing the climate effects between hydrogen, a climate forcer whose impacts are short-lived, and carbon dioxide, a climate forcer whose impacts are long-lived, will not uncover important emissions data from the project. This traditional metric ignores the near-term impacts of hydrogen and other short-lived climate-forcing agents, masking a much bigger, more immediate influence. Thus, SoCalGas must outline a calculation for its studies that will capture the long- *and* near-term warming impacts of hydrogen. A GWP 20 metric would be a more accurate representation of hydrogen's impacts while it is most forcefully affecting the climate. SoCalGas should use a 20-year measurement as a supplement to, not a replacement of, a longer-term measurement because hydrogen's impacts may remain in the atmosphere beyond the 20-year time period. SoCalGas may also need to look at the relative warming impacts from a continuous—as opposed to a 20- or 100-year pulse—emissions measurement.

b. Local Impacts

In addition to the climate impacts of hydrogen, the local impacts of the Angeles Link project must be addressed. Some of those critical impacts include leakage, combustion, flaring, and NOx emissions.

SoCalGas and other industry operators and regulators have less experience with hydrogen than with other fuels, such as fossil gas. Hydrogen is highly combustible and explodes when mixed with air at a wide range of concentrations. It is even more explosive than methane. Hydrogen is odorless, tasteless, and colorless, making leaks hard to identify with the naked eye or inadequate leak detection technology. As these risks are studied, SoCalGas must establish in their plan for Applicable Safety Requirements extensive protections. Protections must include up front information to local communities of the safety risks as well as a comprehensive alert protocol to notify residents of any threats to their safety that arise along the Angeles Link Project. The risks associated with producing, transporting, and storing hydrogen must be studied extensively *before* placing any hydrogen infrastructure in proximity to residences so that a comprehensive mitigation plan can be implemented to prevent harms to local communities.

While leakage and combustion from gas infrastructure often results from mechanical failure, improper operation, or inadequate precautionary measures, operators who process, transport, store or utilize gases have a practice of purposeful releases gas from pipelines and other infrastructure to relieve pressure and avoid acute risks. Operators often do this without informing local residents, much to the detriment of those residents' air quality, immediate and long-term health, and sense of safety and calm. Any new hydrogen gas releases would perpetuate this toxic practice and interfere with ongoing efforts by fenceline communities to monitor and control harmful "flaring" at oil refineries. SoCalGas must not only include the air impacts of releases or flaring in its emissions studies and leakage assessments but must also center environmental justice concerns by studying pathways to limiting releases and develop an alert and cataloging protocol to notify local residents when releases and flares occur.

Finally, Nitrogen Oxide (NOx) and other ambient air emissions are a major environmental justice concern. NOx, specifically, is a primary ingredient in the smog that causes a disproportionate increase in asthma diagnoses, respiratory infections, and other lung-related health complications in pollution burdened communities. It is critical that SoCalGas provide more details on how it will measure these emissions, and how the Angeles Link Project will work to decrease air pollution in the Los Angeles Basin. SoCalGas' Demand Study explains that hydrogen may be used in gas-fired power plants to generate electricity. Any emissions study should include emissions projections that incorporate the disparate efficacy of pollution control technology that is likely to under each demand scenario. Studies show that pollution control technology can be less effective during ramping of powerplants or in certain cogeneration configurations. Since reliance on hydrogen to meet times of peak energy demand would mean more ramping up and down, emissions estimates should reflect this.

Hydrogen blended with methane can dramatically increase NOx emissions, increase risk of leakage and explosions, and with current blending capabilities does not greatly reduce greenhouse gas emissions from combustion of fossil gas. For these reasons, CBE opposes blending hydrogen into methane gas for any reason. SoCalGas' NOx emissions assessment states that power generation units such as turbines are the primary source for NOx emissions. The impacts of hydrogen combustion should be a focal point in the study. Scenarios should look at how NOx emissions impact local communities while accounting for existing air pollution.

II. Alternatives Assessments

SoCalGas listed four hydrogen alternatives that it would study in the alternatives assessment required by the Decision: (1) electrification, (2) energy efficiency, (3) renewable natural gas (RNG), and (4) natural gas with carbon management. An energy transition will transform our communities, industry, energy generation, goods movement, and more. These changes will be especially profound for environmental justice communities on the fenceline of oil refining, gas power plants, shipping and drayage, oil drilling, and industrial manufacturing. Separate and apart from SoCalGas' environmental assessments, SoCalGas must explore the impacts of each alternative in these communities. It will be critical in the Angeles Link process to understand how, if at all, hydrogen can help reduce pollution burdens, clean up communities, and remove polluting infrastructure from residential neighborhoods and how it compares with each alternative.

Electrification is a clean, safe, and affordable way to meet California and Los Angeles's climate goals. While hydrogen is a popular emerging climate solution, electrolytic hydrogen is an immensely inefficient fuel source, and it will be important to assess it alongside data on electrification. Thus, in its alternatives assessment, SoCalGas must identify and explain in detail end-uses that would be better suited to hydrogen fuel than direct electrification.

SoCalGas should *not* include in its analysis alternatives that might create new sources—or exacerbate existing sources—of air pollution in disadvantaged communities. Methane and fossil gas "alternatives," such as renewable natural gas or natural gas with carbon management, are not true solutions to the climate crisis. Continued reliance on methane or fossil gas will exacerbate existing pollution in environmental justice communities and perpetuate existing harm. To study these alternatives would be contrary to public policy, the Public Utilities Commission's directives in other proceedings, and a waste of public resources.

III. Economic Assessments

a. Local Economic Impacts

SoCalGas' economic studies should include analysis of the social costs of continued air and climate pollution. Every year, residents of Wilmington, and similar neighborhoods across the State spend their own dollars on medical bills and sick days, air filters, inhalers, air conditioning units, fans, and more to combat bad air quality and a changing climate. If SoCalGas is intent on measuring the benefits of "creating jobs and economic benefits with the construction of a green energy infrastructure project" it too must examine any costs from the project.

SoCalGas' Angeles Link application forecast "high-paying jobs for gas workers whose livelihoods are being phased out as the state transitions away from natural gas uses." Economic studies must examine where jobs will go and who will benefit. If this project brings economic benefits, they must be concentrated in communities where the project is located and ensure economic opportunities will be available for those who have been most harmed by fossil gas's toxic legacy. Local economic considerations and long-term stability through job opportunities and growth are important to the communities that SoCalGas proposes to run their pipeline through. To have a comprehensive economic analysis that adheres to the Decision, SoCalGas must include these analyses in their overall economic analyses of the Angeles Link Project.

b. Concrete Costs of Hydrogen

Economic studies should include true costs of hydrogen deployment in the industries identified in SoCalGas' Demand Study. If SoCalGas intends to study demand across its entire service territory, it is imperative that the costs of developing that demand are known. At present, hydrogen end-use infrastructure in Southern California is minimal. The Los Angeles Department of Water and Power has already committed at least $800 million dollars to retrofit only part of one gas generating station for hydrogen combustion. Deployment of hydrogen fuel cell electric vehicles and hydrogen fueling stations is low. Mileage of hydrogen-ready piping for end-use delivery is minimal. Infrastructure and technology for commercial harbor craft, ocean going vessels, aerospace, and many industrial end-uses are in their infancy. Projecting each of these demands is one thing, realizing them will be quite another. Understanding these economic strains is essential to assessing the economic impacts of the project and vetting hydrogen against alternatives like electrification. SoCalGas must strive for concrete cost estimates for the end-uses that provide the foundation of their estimated hydrogen demand in addition to their study of the economics of the pipeline itself.

IV. Environmental Social Justice Analysis

The projects' impact on disadvantaged communities should be considered throughout all regulatory, policy, & environmental studies, not just in the EJ analysis portion. Environmental Social Justice Analysis will utilize CalEnviroScreen data and Biden-Harris Administration's Climate and Economic Justice Screening tool. CBE recommends using additional metrics for identifying DAC communities such as participants of utility assistance programs such as SoCalGas CARE program, LADWP EZ-Save Program, LADWP Senior/Disability Lifeline ratepayers.

SoCalGas has spoken favorably of Angeles Link and clean renewable hydrogen and downplayed key concerns brought up by environmental justice voices on the negative impacts of this project such as hydrogen leakage and NOx pollution. SoCalGas is not fit to execute a community engagement plan and may spread misinformation as well as make false promises to community members about safety and environmental impacts of Angeles Link. If Angeles Link were to conduct a Stakeholder Engagement Plan, all materials should be approved by environmental justice participants and the Public Utilities Commission.

In addition to the several issues CBE raises in this letter, we share, attached, Equity Principles for Hydrogen, an Environmental Justice Position on Green Hydrogen in California which offers direction on environmental justice concerns for hydrogen from nine California environmental justice organizations.

Sincerely,

Theo Caretto
Communities for a Better Environment

Attachment

CC:
Emily Grant, SoCalGas
Chester Britt, Arellano Associates
Alma Marquez, Lee Andrews Group

Please Refer to *Equity Principles for Hydrogen*, which is attached as the First Document Under "PAG/CBOSG MEMBER COMMENTS"

From:	Theo Caretto
To:	ALP1 Study PAG Feedback
Cc:	Emily Grant; Chester Britt; Alma Marquez; Roselyn Tovar; Shara Burwell; MHovsepian@SoCalGas.com; NPedersen@HanMor.com; Malinda@ProtectOurCommunities.org; jazzell2@yahoo.com; RKoss@AdamsBroadwell.com; Marcel@turn.org; MBorgeson@nrdc.org; Seth.Hilton@Stoel.com; BCragg@DowneyBrand.com; NSheriff@Buchalter.com; NSheriff@Buchalter.com; Beth@emk-law.com; HGolub@BBKlaw.com; IYan@msh.law; JJDavis@msh.law; Katherine.Ramsey@SierraClub.org; nconnell@ghcoalition.org; Shana Lazerow; Brady.VanEngelen@BloomEnergy.com; CReed@CharlesEReed.com; wyk@cpuc.ca.gov; ATrowbridge@DayCarterMurphy.com; christa.lim@shell.com; Theo Caretto; Tyson@CleanStrat.com; ja@verticalresearchpartners.com; ekaboli@earthjustice.org; kirby.bosley@edftrading.com; Paul.Gendron@edftrading.com; Eric.Hill@ladwp.com; marlon.santacruz@LADWP.com; Priscila.Kasha@ladwp.com; APatel@SoCalGas.com; EMoreno5@SoCalGas.com; ghealy@socalgas.com; JEgan@SoCalGas.com; JMock@SoCalGas.com; Megan Lorenz; MSilva@SoCalGas.com; sclorfeine@socalgas.com; SMortazavi@socalgas.com; tcarman@socalgas.com; SGersen@Earthjustice.org; DFrommer@AkinGump.com; jaguilar@hanmor.com; rothenergy@sbcglobal.net; Jill Tracy; Ernie.Shaw@Yahoo.com; Klatt@EnergyAttorney.com; tdaquila@cityofpasadena.net; charles.read@charlesreadlaw.com; Douglass@EnergyAttorney.com; cchwang@burbankca.gov; HPandey@ci.burbank.ca.us; JoeJMoreno@uwua132.org; Case.Admin@sce.com; Claire.Torchia@sce.com; case.admin@sce.com; Ryan.Jerman@sce.com; meghan.obrien@stoel.com; Liddell@EnergyAttorney.com; CentralFiles@SempraUtilities.com; Brian.McCall@lw.com; Casey.Kirk@lw.com; Janice.Schneider@lw.com; Jennifer.Roy@LW.com; joshua.bledsoe@lw.com; karin.sanders@lw.com; Natalie.Rogers@lw.com; Nikki.Buffa@lw.com; Todd.Campbell@CleanEnergyFuels.com; Jennifer@CaliforniaHydrogen.org; MSeville@AdamsBroadwell.com; ayu@cpuc.ca.gov; ats@cpuc.ca.gov; clu@cpuc.ca.gov; cg2@cpuc.ca.gov; ec2@cpuc.ca.gov; cja@cpuc.ca.gov; jo2@cpuc.ca.gov; kjp@cpuc.ca.gov; kar@cpuc.ca.gov; mta@cpuc.ca.gov; sg8@cpuc.ca.gov; sjl@cpuc.ca.gov; svn@cpuc.ca.gov; srg@cpuc.ca.gov; tg3@cpuc.ca.gov; zap@cpuc.ca.gov; JDeLamare@nrdc.org; RFakhry@nrdc.org; cparker@buchalter.com; Michael Colvin; KatieJorrie@dwt.com; monicamolina@dwt.com; PatrickFerguson@dwt.com; DWTcpucDockets@dwt.com; AVCrawford@AkinGump.com; Jin@Decodees.com; cathy@barkovichandyap.com; Tyson Siegele; sgersen@earthjustice.org; Michael Colvin; Faith Myhra; Andrea Leon-Grossmann; Lydia Ponce; Roy van de Hoek; Alex Jasset; Jackson Garland; Marcia Hanscom; Andrea Vega; Leah.Bahramipour@sierraclub.org; cesa_Regulatory@StorageAlliance.org; cbermel@politico.com; julee@ppallc.com; MBoccadoro@WestCoastAdvisors.com; Samantha.Holdstock@Stoel.com; RL@eslawfirm.com; MCade@Buchalter.com; "Budden, Pete"
Subject:	Nov. 3 Feedback on Angeles Link Technical Approach
Date:	Monday, November 6, 2023 10:22:38 AM
Attachments:	CBE Angeles Link Additional Technical Approach Feedback Letter.pdf

You don't often get email from theodore@cbecal.org. Learn why this is important

SoCalGas Angeles Link Team,

Please see attached Communities for a Better Environment's additional feedback to the Technical Approach document.

Best,

Theo Caretto
Associate Attorney
Communities for a Better Environment
113 E. Anaheim Street
Wilmington, CA 90744
Cell: (805) 570-0970

November 3, 2023

Southern California Gas Company
555 West Fifth Street,
Los Angeles, CA 90013

Submitted via email to ALP1_Study_PAG_Feedback@insigniaenv.com.

Additional Feedback for Southern California Gas Company on Angeles Link Project Phase One Technical Approaches

Communities for a Better Environment (CBE) submits this letter of feedback to Southern California Gas Company (SoCalGas) on the following Technical Approaches for Phase One: Production Planning & Assessment, Preliminary Routing/Configuration Analysis, and Pipeline Sizing & Design Criteria. CBE reiterates the standard of transparency set out in the Public Utility Commission's Angeles Link Decision in regard to the studies being conducted in Phase One, which SoCalGas has not yet met. CBE request SoCalGas provide more specific study descriptions, all study inputs and assumptions, and return full and clear data in study results. CBE also reattaches the equity hydrogen principles of nine major California environmental justice organizations.

I. Production Planning Assessment

SoCalGas must ensure that green hydrogen production modeled in its assessment will not draw down renewable energy supporting California's electricity grid. Production of green hydrogen is an energy-intensive endeavor with the potential to increase fossil fuel reliance and divert renewable energy from powering California's homes and businesses directly. As detailed in CBE's Hydrogen Equity Principles, it is more economically and energy efficient to directly electrify end uses with renewable electricity than to rely on hydrogen as an energy source. For these reasons, hydrogen production should not interfere with direct electrification. Therefore, the SoCalGas Production Planning Assessment must assume hydrogen production supported by new renewable electricity buildout or production only from *surplus* renewable energy. Without such careful planning, the production planning assessment could model a scenario that would increase reliance on fossil gas generation and eliminate any climate benefits.

Production planning should also explicitly exclude carbon credits; carbon capture, sequestration, use, and storage; and other "resource shuffling" arraignments that which divert power generated by existing hydropower, solar, or wind facilities, causing increased grid reliance on fossil fuels. Carbon accounting practices further jeopardize any possible climate benefits of green hydrogen.

Finally, inaccurate demand study inputs and results will negatively impact the accuracy and value of the production planning assessment. As the Utility Consumer Action Network detailed in their September 25 and October 21 feedback letters, SoCalGas' "conservative" demand scenario overestimates Angeles Link's (the "Project") hydrogen demand by at least a factor of ten. Whatever demand scenarios SoCalGas proceeds with, its production analysis must include the costs associated with building out these additional renewable energy sources and electrolyzer facilities to support the Projects demand. Without a clear picture of the total costs required to produce, transport, and use the amount of hydrogen SoCalGas forecasts in its Demand Study, it will be exceedingly difficult to realistically assess the Project.

II. Preliminary Routing & Configuration Assessment

According to SoCalGas, this study will "(i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, and the need for new rights-of-way; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges." CBE is particularly concerned with SoCalGas using existing pipelines and infrastructure to transport and store hydrogen and locating pipelines near sensitive receptors. Much of the gas infrastructure in the Los Angeles Basin was built in and around low-income and minority residential communities without their input, taking advantage of discriminatory zoning practices, such as redlining, as well as the historical silencing of these communities. After decades living with harmful local air, water, and land pollution and climate impacts, these communities will not consent to incomplete and even harmful climate policies dictating the rollout of hydrogen in California. A poorly designed hydrogen rollout could concentrate pollution in already burdened communities even while statewide emissions decline. For the Project, SoCalGas must take pains to remedy this past environmental injustice. Therefore, SoCalGas must be entirely transparent about the existing pipelines, franchises, rights-of-way, and other infrastructure it may utilize; outline its exact plans for that infrastructure; and not proceed without informed consent and forward-looking participation of impacted communities.

III. Pipeline Sizing & Design Assessment

In determining pipeline sizing and design, the emphasis should be on safety, leak prevention, and appropriate inputs. Hydrogen leaks pose local and climate risks. Though hydrogen is not a direct greenhouse gas, it has significant indirect warming impacts detailed in CBE's October 13 feedback letter. The chemical reactions of hydrogen in the atmosphere increase concentrations of other greenhouse gases, like methane, ozone, and stratospheric water vapor. These climate impacts will limit or erase any benefits of the Project if leakage is not carefully monitored and strictly limited. Additionally, hydrogen leaks harm local communities. Hydrogen is even more explosive than methane, and it is odorless, tasteless, and colorless. This makes leaks dangerous to residents' physical safety and health and difficult to identify without adequate leak detection technology. It is imperative that hydrogen leaks are prevented throughout the Angeles Link Project. SoCalGas should release explicit information on planned pipeline materials, expected leakage rates, leakage monitoring technology, proposed retrofits, siting, and leakage notification and safety protocols.

In addition to the several issues CBE raises in this letter, we reattach our Equity Principles for Hydrogen, an Environmental Justice Position on Green Hydrogen in California which offers direction on environmental justice concerns of hydrogen from nine California environmental justice organizations.

Sincerely,

Theo Caretto
Communities for a Better Environment

Attachment

CC:
Emily Grant, SoCalGas
Chester Britt, Arellano Associates
Alma Marquez, Lee Andrews Group
Angeles Link PAG service list

Please Refer to *Equity Principles for Hydrogen*, which is attached as the First Document Under "PAG/CBOSG MEMBER COMMENTS"

September 25, 2023 Letter from The Utility Consumers’ Action Network

Please Refer to The Angeles Link Q3 Quarterly Report Appendices (Phase One) for a Copy of The Utility Consumers' Action Network Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings.

October 21, 2023 Letter from The Utility Consumers' Action Network

Please Refer to the October 21, 2023 Letter Included in this Appendix from The Utility Consumers' Action Network on Feedback for SoCalGas Regarding SoCalGas's Technical Approach for Phase One Studies.

October 13, 2023 Letter from Communities for a Better Environment

Please Refer to the October 13, 2023 Letter Included in this Appendix from Communities for a Better Environment on Feedback for Southern California Gas Company on the Angeles Link Project Phase One Technical Approaches.

From: Joon Seong
To: Emily Grant; Chester Britt; ALP1 Study PAG Feedback; alpag; "Budden, Pete"; Michael Colvin
Cc: MHovsepian@SoCalGas.com; NPedersen@HanMor.com; Malinda@ProtectOurCommunities.org; jazzell2@yahoo.com; RKoss@AdamsBroadwell.com; Marcel@turn.org; MBorgeson@nrdc.org; Seth.Hilton@Stoel.com; BCragg@DowneyBrand.com; NSheriff@Buchalter.com; NSheriff@Buchalter.com; Beth@emk-law.com; HGolub@BBKlaw.com; IYan@msh.law; JJDavis@msh.law; Katherine.Ramsey@SierraClub.org; nconnell@ghcoalition.org; SLazerow@CBEcal.org; Brady.VanEngelen@BloomEnergy.com; CReed@CharlesEReed.com; wyk@cpuc.ca.gov; ATrowbridge@DayCarterMurphy.com; christa.lim@shell.com; theodore@cbecal.org; Tyson@CleanStrat.com; ja@verticalresearchpartners.com; ekaboli@earthjustice.org; kirby.bosley@edftrading.com; Paul.Gendron@edftrading.com; Eric.Hill@ladwp.com; marlon.santacruz@LADWP.com; Priscila.Kasha@ladwp.com; APatel@SoCalGas.com; EMoreno5@SoCalGas.com; ghealy@socalgas.com; JEgan@SoCalGas.com; JMock@SoCalGas.com; Megan Lorenz; MSilva@SoCalGas.com; sclorfeine@socalgas.com; SMortazavi@socalgas.com; tcarman@socalgas.com; SGersen@Earthjustice.org; DFrommer@AkinGump.com; iaguilar@hanmor.com; rothenergy@sbcglobal.net; Jill Tracy; Ernie.Shaw@Yahoo.com; Klatt@EnergyAttorney.com; tdaquila@cityofpasadena.net; charles.read@charlesreadlaw.com; Douglass@EnergyAttorney.com; cchwang@burbankca.gov; HPandey@ci.burbank.ca.us; JoeJMoreno@uwua132.org; Case.Admin@sce.com; Claire.Torchia@sce.com; case.admin@sce.com; Ryan.Jerman@sce.com; meghan.obrien@stoel.com; Liddell@EnergyAttorney.com; CentralFiles@SempraUtilities.com; Brian.McCall@lw.com; Casey.Kirk@lw.com; Janice.Schneider@lw.com; Jennifer.Roy@LW.com; joshua.bledsoe@lw.com; karin.sanders@lw.com; Natalie.Rogers@lw.com; Nikki.Buffa@lw.com; Todd.Campbell@CleanEnergyFuels.com; Jennifer@CaliforniaHydrogen.org; MSeville@AdamsBroadwell.com; ayu@cpuc.ca.gov; ats@cpuc.ca.gov; clu@cpuc.ca.gov; cg2@cpuc.ca.gov; ec2@cpuc.ca.gov; cja@cpuc.ca.gov; jo2@cpuc.ca.gov; kjp@cpuc.ca.gov; kar@cpuc.ca.gov; mta@cpuc.ca.gov; sg8@cpuc.ca.gov; sjl@cpuc.ca.gov; svn@cpuc.ca.gov; srg@cpuc.ca.gov; tg3@cpuc.ca.gov; zap@cpuc.ca.gov; JDeLamare@nrdc.org; RFakhry@nrdc.org; cparker@buchalter.com; Joon Seong; Michael Colvin; KatieJorrie@dwt.com; monicamolina@dwt.com; PatrickFerguson@dwt.com; DWTcpucDockets@dwt.com; AVCrawford@AkinGump.com; Jin@Decodees.com; cathy@barkovichandyap.com; Leah.Bahramipour@sierraclub.org; cesa_Regulatory@StorageAlliance.org; cbermel@politico.com; julee@ppallc.com; MBoccadoro@WestCoastAdvisors.com; Samantha.Holdstock@Stoel.com; RL@eslawfirm.com; MCade@Buchalter.com
Subject: Environmental Defense Fund and Natural Resources Defense Council Joint Comments on Angeles Link Phase 1 Study Technical Approaches
Date: Friday, October 20, 2023 12:01:20 PM
Attachments: image001.png
EDF NRDC Q3 PAG Meeting Joint Feedback_Oct20.pdf

To the Angeles Link PAG Facilitator Team and the A.22-02-007 Service List:

Please find attached EDF and NRDC joint comments on Phase 1 study technical approaches as a follow-up to the September 28th PAG meeting.

Thank you,

Joon Seong

Joon Hun Seong
Senior Energy Decarbonization Analyst

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Environmental Defense Fund

October 20, 2023

Chester Britt
Planning Advisory Group Facilitator

Emily Grant
Angeles Link Senior Public Affairs Representative
Southern California Gas Company

Alisa Lykens
Director
Insignia Environmental

Subject: Environmental Defense Fund and Natural Resources Defense Council Joint Comments on Phase One Study Technical Approaches

As a follow-up to the Angeles Link Project Public Advisory Group (PAG) quarterly meeting held September 28, 2023, Environmental Defense Fund (EDF) and the Natural Resources Defense Council (NRDC) share the following comments and feedback.

First, with respect to the proposed initial screening and evaluation criteria, EDF and NRDC highlight following important considerations to be included: affordability, cost-allocation, and compatibility with state climate policies of proposed project options and alternatives. While such considerations may be implicitly covered by the framework proposed in the PAG meeting, we believe that they are critical enough to be explicitly highlighted. These considerations will be central in evaluating whether various uses of hydrogen or non-hydrogen alternatives are appropriate decarbonization pathways for the state to pursue.

If the potential Angeles Link project were to proceed beyond the currently authorized Phase 1 studies, the "used-and-usefulness" of the project will be a key consideration. A full consideration of this issue, in turn, will necessarily involve a determination of which customer segments are actually "using" the project—and therefore who pays for it and how much they would be paying. As such, we believe that affordability and cost-allocation are deeply connected but distinct concerns from cost-effectiveness in that it focuses on the impacts to the right set of ratepayers; and that they should be separately examined in the technical studies as well. Also, climate and emissions impacts, while potentially falling under the broader umbrella of environmental and social justice concerns, should be highlighted as driving issues. EDF and NRDC propose altering the proposed Phase 1 project options and alternatives study technical approach per the following:

> *Step 5: Feed alternatives into cost effectiveness study and environmental & social justice study*
>
> → *Step 5: Feed alternatives into cost effectiveness**, affordability, cost-allocation, emissions impact,** and environmental & social justice study*

Second, consideration of hydrogen pipeline alternatives—and specifically of localized hydrogen hubs—should take a comprehensive account of various concerns associated with hydrogen transport, including leakage concerns. We have consistently highlighted the importance of incorporating leakage concerns into any consideration of hydrogen projects; and appreciate the due attention SoCalGas has promised to pay to this issue as mentioned in previous PAG meetings. Put bluntly, we believe shorter pipelines run smaller risks of leakage. Focusing *solely* on cost-effectiveness may end up prioritizing longer pipeline options with riskier leakage integrity—which would undermine the entire reason for pursuing a clean hydrogen project. Therefore, EDF and NRDC urge a comprehensive evaluation of alternatives that takes these concerns into account.

Third, we recommend a more granular geographic analysis of the cumulative impact of various air pollutants—including, but not limited to, NOx emissions—arising from hydrogen usage connected to the potential Angeles Link project in addition to a SoCalGas territory-wide impact analysis. The cumulative impacts assessment should be performed in accordance with guidance from the Environmental Protection Agency.[1] We highlight existing resources that provide pollution impact data (including NOx emissions) on communities across California such as CalEnviroScreen and the Climate and Economic Justice Screening Tool (CEJST). EDF and NRDC recommend that SoCalGas actively utilize these tools in order to conduct a more granular geographic impact analysis of hydrogen usage—both in terms of the decrease in emissions from

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[1] U.S. Environmental Protection Agency (EPA), *EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum*, January 2023. Available at: https://www.epa.gov/system/files/documents/2022-12/bh508-Cumulative%20Impacts%20Addendum%20Final%202022-11-28.pdf

fuel substitution as well as potential emissions increases from hydrogen infrastructure as identified by SoCalGas.

Fourth, EDF and NRDC recommend a by-sector breakdown of NOx emissions reductions, taking into account the impacts of California's Advanced Clean Fleet and Advanced Clean Truck rules. While hydrogen (and the Angeles Link project) may play a part in reducing NOx emissions in the transportation sector, any emissions impact arising from these new rules will have to happen regardless. In contrast, a by-sector breakdown that separates out transportation sector NOx emission impacts from those of other sectors that do not yet have a set mandate from the state—such as hard-to-electrify heavy industries—will allow for a more accurate assessment of the unique potential impact of the proposed Angeles Link project.

Fifth, greenhouse gas (GHG) emission potential evaluation of the proposed Angeles Link project should include not only the global warming potential over a 100-year period (GWP100) as SoCalGas is planning, but also the potential over a 20-year period (GWP20). Peer-reviewed research authored by EDF scientists have found that the GHG impacts of hydrogen are mostly short-term and indirect.[2] Therefore, an accurate assessment of the GWP associated with hydrogen—and in particular, the impacts arising from a fixed infrastructure such as Angeles Link which could serve as a continuous source of leakage—must focus on the short-term climate impacts, rather than just the longer-term ones.

[2] Ocko, I. B. and Hamburg, S. P.: "Climate consequences of hydrogen emissions", *Atmos. Chem. Phys.*, **22**, 9349–9368, https://doi.org/10.5194/acp-22-9349-2022, 2022

Respectfully,

Michael Colvin
Director, Regulatory and Legislative Affairs

Joon Hun Seong
Senior Energy Decarbonization Analyst

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Dr. Pete Budden
Hydrogen Advocate, Climate and Clean Energy

National Resources Defense Council
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From:	Joon Seong
To:	Emily Grant; Chester Britt; ALP1 Study PAG Feedback; alpag; Michael Colvin
Cc:	MHovsepian@SoCalGas.com; NPedersen@HanMor.com; Malinda@ProtectOurCommunities.org; jazzell2@yahoo.com; RKoss@AdamsBroadwell.com; Marcel@turn.org; MBorgeson@nrdc.org; Seth.Hilton@Stoel.com; BCragg@DowneyBrand.com; NSheriff@Buchalter.com; NSheriff@Buchalter.com; Beth@emk-law.com; HGolub@BBKlaw.com; IYan@msh.law; JJDavis@msh.law; Katherine.Ramsey@SierraClub.org; nconnell@ghcoalition.org; SLazerow@CBEcal.org; Brady.VanEngelen@BloomEnergy.com; CReed@CharlesEReed.com; wyk@cpuc.ca.gov; ATrowbridge@DayCarterMurphy.com; christa.lim@shell.com; theodore@cbecal.org; Tyson@CleanStrat.com; ja@verticalresearchpartners.com; ekaboli@earthjustice.org; kirby.bosley@edftrading.com; Paul.Gendron@edftrading.com; Eric.Hill@ladwp.com; marlon.santacruz@LADWP.com; Priscila.Kasha@ladwp.com; APatel@SoCalGas.com; EMoreno5@SoCalGas.com; ghealy@socalgas.com; JEgan@SoCalGas.com; JMock@SoCalGas.com; Megan Lorenz; MSilva@SoCalGas.com; sclorfeine@socalgas.com; SMortazavi@socalgas.com; tcarman@socalgas.com; SGersen@Earthjustice.org; DFrommer@AkinGump.com; iaguilar@hanmor.com; rothenergy@sbcglobal.net; Jill Tracy; Ernie.Shaw@Yahoo.com; Klatt@EnergyAttorney.com; tdaquila@cityofpasadena.net; charles.read@charlesreadlaw.com; Douglass@EnergyAttorney.com; cchwang@burbankca.gov; HPandey@ci.burbank.ca.us; JoeJMoreno@uwua132.org; Case.Admin@sce.com; Claire.Torchia@sce.com; case.admin@sce.com; Ryan.Jerman@sce.com; meghan.obrien@stoel.com; Liddell@EnergyAttorney.com; CentralFiles@SempraUtilities.com; Brian.McCall@lw.com; Casey.Kirk@lw.com; Janice.Schneider@lw.com; Jennifer.Roy@LW.com; joshua.bledsoe@lw.com; karin.sanders@lw.com; Natalie.Rogers@lw.com; Nikki.Buffa@lw.com; Todd.Campbell@CleanEnergyFuels.com; Jennifer@CaliforniaHydrogen.org; MSeville@AdamsBroadwell.com; ayu@cpuc.ca.gov; ats@cpuc.ca.gov; clu@cpuc.ca.gov; cg2@cpuc.ca.gov; ec2@cpuc.ca.gov; cja@cpuc.ca.gov; jo2@cpuc.ca.gov; kjp@cpuc.ca.gov; kar@cpuc.ca.gov; mta@cpuc.ca.gov; sg8@cpuc.ca.gov; sjl@cpuc.ca.gov; svn@cpuc.ca.gov; srg@cpuc.ca.gov; tg3@cpuc.ca.gov; zap@cpuc.ca.gov; JDeLamare@nrdc.org; RFakhry@nrdc.org; cparker@buchalter.com; Michael Colvin; KatieJorrie@dwt.com; monicamolina@dwt.com; PatrickFerguson@dwt.com; DWTcpucDockets@dwt.com; AVCrawford@AkinGump.com; Jin@Decodees.com; cathy@barkovichandyap.com; Leah.Bahramipour@sierraclub.org; cesa_Regulatory@StorageAlliance.org; cbermel@politico.com; julee@ppallc.com; MBoccadoro@WestCoastAdvisors.com; Samantha.Holdstock@Stoel.com; RL@eslawfirm.com; MCade@Buchalter.com; "Budden, Pete"
Subject:	EDF Comments on October 18th PAG Meeting and Technical Approaches
Date:	Friday, November 3, 2023 1:35:46 PM
Attachments:	image001.png EDF Oct18 PAG Meeting Feedback_Nov3.pdf

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To the Angeles Link PAG Facilitator Team and the A.22-02-007 Service List:

Please find attached EDF comments on Phase 1 study technical approaches as a follow-up to the October 18th PAG meeting.

Thank you,

Joon Seong

Joon Hun Seong
Senior Energy Decarbonization Analyst

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EDF.org | A vital Earth. For everyone.

Environmental Defense Fund

Environmental Defense Fund

November 3, 2023

Chester Britt
Planning Advisory Group Facilitator

Emily Grant
Angeles Link Senior Public Affairs Representative
Southern California Gas Company

Alisa Lykens
Director
Insignia Environmental

<u>Subject:</u> Environmental Defense Fund Comments on October 18th PAG Workshop Discussions

As a follow-up to the Angeles Link Project Public Advisory Group (PAG) quarterly meeting held October 18, 2023, Environmental Defense Fund (EDF) shares the following comments and feedback.

First, **<u>on the topic of production planning and assessment</u>**, EDF would like to echo acknowledgement from Southern California Gas Company (SoCalGas) representatives at the workshop that, it is important to remain realistic about the actual level of hydrogen supply that can be expected from various "green" production sources. Specifically, EDF cautions overly optimistic projections of hydrogen sourced via biomass and biomethane. It is important to keep in mind—as SoCalGas expressed during the PAG discussions—that the most realistic source of hydrogen production in line with California's climate and environmental objectives will be electrolysis using renewable electricity. Moreover, any use of biomass and biomethane as feedstock for hydrogen production must adhere to general procurement standards applicable to those feedstocks as articulated by EDF in existing and on-going regulatory proceedings.[1]

With such general context in mind, EDF further reiterates the need to adhere to the "three pillars" of hydrogen production using renewable electricity (*i.e.,* hourly matching, additionality, and deliverability). Any technical study conducted as Phase 1 of the potential Angeles Link project should take those "three pillars" as basic project assumptions. EDF also cautions any "leaps of faith" when it comes to comparative analysis of hydrogen with various other energy

[1] See, *e.g.,* previous EDF comments for the on-going biomethane standards and requirements proceeding (R. 13-02-008) before the California Public Utilities Commission.

storage technologies. The lack of technical maturity or economic feasibility on the part of a comparable energy storage technology does not automatically guarantee hydrogen will be appropriate for a given use-case or demand scenario. Production planning and assessment for hydrogen supplied through a potential Angeles Link project, then, must be justified on the merits of hydrogen use itself *and then* compared to analogous technologies—not vice versa. In previous comments, the Utility Consumers' Action Network (UCAN) noted that SoCalGas' estimated hydrogen demand figures from even a "conservative" scenario is ten times higher than those projected by UCAN.[2] EDF expresses concern that SoCalGas is relying on a figure much higher than projected by PAG members; and that such higher figures may be a result of unrealistic demand and use-case assumptions such as the "leaps of faith" described above. Instead, EDF urges that all technical studies be based on realistic demand figures and assumptions fully shared with the PAG members.

EDF also recognizes that that the demand forecast has a direct impact on overall affordability; and while no forecast will ever be fully accurate, some range of variance should be "baked in" from the onset. To that end, EDF encourages scenario analysis with the intent of understanding how a growing demand for hydrogen may be scaled up within different "stair steps" to ensure that the project is proposed at the right size with an appropriate level of confidence. To address these questions—as well as any other related questions around hydrogen demand raised by PAG members—EDF suggests a future PAG meeting dedicated to the topic of demand forecasts used in the Phase 1 studies.

Additionally, EDF notes that it may be prudent to produce hydrogen recognizes at times where no instant demand for it exists, in order to maintain hydrogen production cost-efficiency. This would indicate that understanding how the potential Angeles Link project may be configured for some level of hydrogen storage for future use would be important in production planning and assessment, since very few truly "24/7" industrial operations exist.

Second, **on the issue of pipeline routing**, EDF supports comments raised during the PAG meeting around the regulatory uncertainty of "inter-state" hydrogen pipeline transport. As

[2] Utility Consumer's Action Network (UCAN), *Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings* (UCAN Demand Study Feedback) submitted September 25, 2023 at 7; UCAN, *Feedback for SoCalGas Regarding SoCalGas's Technical Approach for Phase One Studies* (UCAN Technical Approach Feedback) submitted October 21, 2023 at 4.

such, EDF believes any Phase 1 study—and pipeline routing studies specifically—should focus on *intra-state* routing options. If SoCalGas chooses to consider inter-state pipeline connection, such options should be evaluated and marked distinctly from intra-state options; and SoCalGas should clearly identify the regulatory uncertainties and assumptions behind the studies. Additionally, EDF does not oppose use of the PIVVOT tool as proposed by SoCalGas but notes that the use of the tool should not and cannot replace on-the-ground community-based feedback. Also, since the tool is proprietary software that is not easily accessible to PAG members and other stakeholders, SoCalGas should be as transparent as possible with both the results from, and the assumptions used in the tool.

Furthermore, EDF highlights that the potential Angeles Link project is a hydrogen *pipeline* project, not a general hydrogen *supply* project. Costs to hydrogen pipeline customers served by a potential Angeles Link project—and if the project is ever included in the rate-base, rate impacts to appropriate ratepayers—will be central questions in the final evaluation of Phase 1 studies. Therefore, the pipeline routing study, as well as all other relevant technical studies, should look explicitly at what the most cost-effective option for potential hydrogen pipeline customers would be. As EDF has indicated consistently throughout this process, SoCalGas should examine multiple scenarios for the pipeline routing, including a hub model and different ways of disaggregating production, so that it can respond to overall affordability and community concerns.

Third, **on technical approaches to pipeline sizing and design**, EDF notes that current approaches as presented by SoCalGas focus on existing safety and environmental standards. EDF's PAG comments submitted July 31, 2023, included various peer-reviewed articles that highlighted the potential impact of hydrogen as an indirect greenhouse gas; and the need for far more stringent leakage detection and prevention methods in the light of such information. Specifically, studies have shown that leak detection and prevention at the parts per billion level is needed to ensure climate benefits from the use of hydrogen, while commercially available sensors—and therefore, standards—fall far short of that requirement at parts per million levels.[3]

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[3] Ocko, I. B. and Hamburg, S. P.: "Climate consequences of hydrogen emissions", *Atmos. Chem. Phys.*, **22**, 9349–9368, https://doi.org/10.5194/acp-22-9349-2022, 2022; Esquivel-Elizondo, Sofia, Alejandra H. Mejia, Tianyi Sun, Eriko Shrestha, Steven Hamburg, and Ilissa Ocko. 2023. "Wide Range in Estimates of Hydrogen Emissions from Infrastructure." *OSF Preprints*. April 13. https://doi.org/10.31219/osf.io/unzrm.

Therefore, pipeline sizing and design technical studies should also go beyond simply adhering to existing standards, instead accounting for the level of leak detection and prevention that would ensure climate benefits of hydrogen use—and actively take into account both the various studies on hydrogen leakage recommended by PAG members and SoCalGas's own leakage study planned as part of Phase 1 of the potential Angeles Link project. EDF suggests that a future PAG meeting specifically dedicated to the question of pipeline material selection to understand what level of leaks could be expected from each pipe material option. It is not in the interest of any potential customer to invest in the wrong pipeline material initially, only to have to replace the pipeline material after field operation. EDF suggests that the PAG could help provide guidance on this question.

Respectfully,

Michael Colvin
Director, California Energy Program

Joon Hun Seong
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September 25, 2023 Letter from The Utility Consumers’ Action Network

Please Refer to The Angeles Link Q3 Quarterly Report Appendices (Phase One) for a Copy of The Utility Consumers' Action Network Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings.

October 21, 2023 Letter from The Utility Consumers' Action Network

Please Refer to the October 21, 2023 Letter Included in this Appendix from The Utility Consumers' Action Network on Feedback for SoCalGas Regarding SoCalGas's Technical Approach for Phase One Studies.

July 31, 2023 Letter from the Environmental Defense Fund

Please Refer to The Angeles Link Q3 Quarterly Report Appendices (Phase One) for a Copy of The Environmental Defense Fund Environmental Defense Fund Phase One Study Topics and Scope of Work Comments.

From:	Tyson Siegele
To:	Emily Grant; Chester Britt; alpag; stakeholderoutreach; ALP1 Study PAG Feedback; almarquez@leeandrewsgroup.com
Cc:	Zanjani, Nick; Arroyo, Christopher; Hovsepian, Melissa A; NPedersen@HanMor.com; Malinda Dickenson; jazzell2@yahoo.com; RKoss@adamsbroadwell.com; Marcel Hawiger; MBorgeson@nrdc.org; Hilton, Seth D.; BCragg@downeybrand.com; Nora Sheriff; Beth Kelly; HGolub@bbklaw.com; IYan@msh.law; JJDavis@msh.law; Katherine.Ramsey@SierraClub.org; nconnell@ghcoalition.org; Shana Lazerow; Brady.VanEngelen@bloomenergy.com; CReed@charlesereed.com; wyk@cpuc.ca.gov; ATrowbridge@daycartermurphy.com; christa.lim@shell.com; Theo Caretto; Tyson Siegele; ja@verticalresearchpartners.com; ekaboli@earthjustice.org; Kirby.Bosley@edfTrading.com; Paul.Gendron@edftrading.com; Eric.Hill@ladwp.com; marlon.santacruz@ladwp.com; Priscila.Kasha@ladwp.com; APatel@socalgas.com; EMoreno5@socalgas.com; ghealy@socalgas.com; JEgan@SoCalGas.com; Mock, Joseph; Megan Lorenz; MSilva@socalgas.com; sclorfeine@socalgas.com; SMortazavi@socalgas.com; Carman, Teresa A; Sara Gersen; DFrommer@akingump.com; iaguilar@hanmor.com; rothenergy@sbcglobal.net; Jill Tracy; Ernie Shaw; Klatt@energyattorney.com; tdaquila@cityofpasadena.net; charles.read@charlesreadlaw.com; Douglass@EnergyAttorney.com; cchwang@burbankca.gov; HPandey@ci.burbank.ca.us; JoeJMoreno@uwua132.org; Case.Admin@sce.com; Claire.Torchia@sce.com; Ryan.Jerman@sce.com; Meghan.OBrien@stoel.com; Liddell@EnergyAttorney.com; CentralFiles@SempraUtilities.com; Brian.McCall@lw.com; Casey.Kirk@lw.com; Janice.Schneider@lw.com; Jennifer.Roy@lw.com; joshua.bledsoe@lw.com; karin.sanders@lw.com; Natalie.Rogers@lw.com; Nikki.Buffa@lw.com; Todd.Campbell@cleanenergyfuels.com; Jennifer@californiahydrogen.org; MSeville@adamsbroadwell.com; ayu@cpuc.ca.gov; ats@cpuc.ca.gov; clu@cpuc.ca.gov; cg2@cpuc.ca.gov; ec2@cpuc.ca.gov; cja@cpuc.ca.gov; jo2@cpuc.ca.gov; kjp@cpuc.ca.gov; kar@cpuc.ca.gov; mta@cpuc.ca.gov; sg8@cpuc.ca.gov; sjl@cpuc.ca.gov; svn@cpuc.ca.gov; srg@cpuc.ca.gov; tg3@cpuc.ca.gov; zap@cpuc.ca.gov; JDeLamare@nrdc.org; RFakhry@nrdc.org; Parker, Christopher; jseong@edf.org; Michael Colvin; KatieJorrie@dwt.com; monicamolina@dwt.com; PatrickFerguson@dwt.com; DWTcpucDockets@dwt.com; AVCrawford@akingump.com; Jin@decodees.com; Catherine Yap; Leah Bahramipour; cesa_Regulatory@storagealliance.org; cbermel@politico.com; julee@ppallc.com; MBoccadoro@westcoastadvisors.com; Samantha.Holdstock@stoel.com; RL@eslawfirm.com; MCade@buchalter.com
Subject:	Angeles Link Phase 1 - UCAN feedback on the SoCalGas Technical Approach Proposal
Date:	Saturday, October 21, 2023 5:49:00 PM
Attachments:	2023-10-21 UCAN feedback - tech approach - final.pdf

SoCalGas Angeles Link Phase 1 team and the A.22-02-007 Service List:

Please find attached comments from the Utility Consumers' Action Network (UCAN) on SoCalGas's Angeles Link Technical Approach for Phase One Studies.

Tyson Siegele
Principal Consultant, Clean Energy Strategies
917-771-2222

The Utility Consumers' Action Network
(Angeles Link PAG Member)

Feedback for SoCalGas Regarding
SoCalGas's Technical Approach for Phase One Studies

Date: October 21, 2023

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1. Summary of Recommendations

- SoCalGas should end its practice of withholding data and information requested by the Planning Advisory Group ("PAG"). SoCalGas has refused to supply its:
  - Contracts w/ Phase 1 contractors
  - Demand study computer model
- SoCalGas should pause work on all Angeles Link studies – including the technical approach work – until the demand study has been corrected to eliminate the errors identified by UCAN in its feedback to SoCalGas on September 25, 2023.[1]
- SoCalGas should revise its work plans and technical approaches to conform to the *Equity Principles for Hydrogen* provided by the environmental justice community.[2]
- Several proposals in SoCalGas's technical approach document violate D.22-12-055. SoCalGas should make the necessary changes to avoid those violations.
- UCAN requests that SoCalGas distribute to the PAG the spreadsheets and computer models that are or will be used in each of the Phase 1 studies.

2. Background

On September 28, 2023, SoCalGas hosted a Planning Advisory Group ("PAG") meeting that provided an overview of some sections of the technical approach document ("Tech Approach").[3] The following UCAN feedback primarily addresses recommendations for SoCalGas related to the Tech Approach document. Prior to providing recommendations, several threshold issues must be highlighted.

First, until SoCalGas corrects its demand study, all other studies and work in Phase 1 should be paused. As the Utility Consumers' Action Network ("UCAN") called out in its September 29, 2023, feedback, "UCAN believes SoCalGas's 'conservative' scenario over-estimates demand by at least a factor of ten."[4] UCAN detailed several major errors in the demand study that SoCalGas has yet to correct. Further, the numbers in the demand study appear similar to the figures that SoCalGas promotes as fact.[5] Both the power sector and mobility sector emissions reductions claimed in SoCalGas's "fact sheet" significantly over-state the emissions reductions that can be anticipated from green hydrogen. SoCalGas inflated the fact sheet's emissions reductions claims by significantly overestimating the future green

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[1] UCAN anticipates providing additional feedback on the demand study based on updated citations and methodology information provided by SoCalGas on September 29, 2023.

[2] Equity Principles for Hydrogen. https://www.cbecal.org/wp-content/uploads/2023/10/Equity-Hydrogen-Initiative-Shared-Hydrogen-Position-1.pdf

[3] Angeles Link Technical Approach for Phase One Studies (September 7, 2023).

[4] The Utility Consumers' Action Network Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings ("UCAN 9-25-23 Feedback"), p. 7.

[5] SoCalGas, Angeles Link Fact Sheet, 2023-06, available at https://www.socalgas.com/sites/default/files/2023-06/AL%20Factsheet.pdf.

hydrogen demand, just as the Phase 1 demand study does. UCAN recommends that SoCalGas correct its inaccurate demand study before it continues with any additional Phase 1 work.

Second, UCAN has repeatedly asked for SoCalGas to provide transparency in its processes. SoCalGas assured the Commission that it would be transparent with the PAG,[6] and the Commission provided its approval of the Phase 1 memorandum account with the understanding that SoCalGas would implement transparent Phase 1 processes. SoCalGas's secretive calculations and modeling are a violation of D.22-12-055. UCAN renews its request for SoCalGas to release its contracts with Phase 1 contractors and release the demand study computer model. UCAN also requests all computer models and spreadsheets be released that will be used in any of the other Phase 1 studies.

UCAN provides the following feedback for SoCalGas on the Tech Approach document. The feedback is divided into the three categories Market Assessment and Alternatives ("MAA"), Regulatory, Policy & Environmental Workstream ("RPE"), and Engineering and Design ("E&D").

3. Market Assessment and Alternatives

3.1. Project Options and Alternatives

- Project alternatives must include:
    - A localized hydrogen hub (e.g. production and use of hydrogen to supply some of the hydrogen demand at one of the ports);
    - Electrification of end uses including all industrial heat applications, all wheeled transportation, all power sector applications, short and mid-distance shipping, and short and mid-distance air travel.
    - Hydrogen delivery alternatives including trucking and marine shipping
    - Behind-the-meter green hydrogen production and utilizations using electrolyzers supplied with electricity from on-site renewables or renewable, grid-delivered, electricity.
- The Tech Approach document claims that the pipeline design "will consider production capacity and demand availability at various points in time (e.g., 2030, 2035, 2040, 2045) and will identify the infrastructure required to meet those needs at that specific point in time."[7]
    - SoCalGas should assume that the hydrogen demand cannot be reliably forecast for any years beyond 2030, and even the latter years in that timeframe (i.e., the present through 2030) could see just a fraction of the demand that SoCalGas forecasts due to advancements and innovations in other sectors and other technologies. Any demand beyond 2030, should be viewed as theoretical and demand that will not be served by the initial hydrogen hub or Angeles Link.

[6] D.22-12-055, p. 3 ("SoCalGas states that the Memo Account would enable it to record Project costs while providing customers and stakeholders with a transparent mechanism to monitor the planning development of the Project."

[7] Tech Approach, p. 5.

- The study also discusses demand generally. One can assume that the demand being considered is the demand from the demand study's preliminary outputs. The preliminary demand study estimated demand for the entire SoCalGas territory. D.22-12-055 called for a demand analysis of just the Los Angeles basin.[8] Before the work commences on the pipeline design, the demand study should be corrected.

- Coordination with the demand study
  - All project options and alternatives are highly dependent on the demand study. Because the demand study over-estimates demand by at least a factor of 10, any work completed on the options and alternatives prior to correction of the demand study will be unusable. All work on the project options and alternatives should be shelved until SoCalGas corrects the demand study.
- The Tech Approach document states that "[l]astly, options and alternatives to the pipeline system including hydrogen pipeline alternatives, such as a localized hub, and other alternatives, such as non-hydrogen alternatives and hydrogen delivery alternatives, will be developed and evaluated."[9] Neither the hydrogen hub nor the non-pipeline alternatives should be developed as an after through. Those Angeles Link alternatives should commence as soon as the demand study has been corrected and Phase 1 should spend an equal amount of time and resources on each option including the Angeles Link option. Additionally, because the hydrogen hub itself does not need to serve the same hydrogen demand as the Angeles Link, the hydrogen hub could be as simple as a rooftop solar array connected to an electrolyzer to serve one of the port's hydrogen needs. That iteration of a hydrogen hub would enable one of the ports to continue to explore its green hydrogen options and to expand the system incrementally if or when its hydrogen needs increase.
- The Tech Approach document lists examples of non-hydrogen alternatives as: "electrification, energy efficiency, renewable natural gas (RNG), natural gas with carbon management."[10] Energy efficiency and RNG are not alternatives that can eliminate greenhouse gas ("GHG") emissions or particulate emissions. Thus, they are not alternatives to green hydrogen and should be removed from the Phase 1 analysis.
- The Tech Approach document lists four criteria to determine the "viability of alternatives" to green hydrogen.[11] UCAN disagrees with SoCalGas's criteria except for "The ability for the alternative to meet specific end user requirements."[12] The only considerations of the green hydrogen alternatives should be technical capability and cost

[8] D.22-12-055, p. 2 and Ordering Paragraph 6(a), ("The objective of the Angeles Link Project is to develop a clean renewable hydrogen energy transport system to serve the Los Angeles Basin." *and see* OP 6(a) "SoCalGas shall provide the following required findings from its Phase One feasibility studies: (a) Identification of the demand and end uses for the Angeles Link Project (Project).").
[9] Tech Approach, p. 5.
[10] *Ibid.*
[11] *Ibid.*
[12] *Ibid.*

of implementation. If an alternative can meet a customer's need. SoCalGas should calculate the cost of the alternative compared to the Angeles Link.

3.2. Demand Study

- As detailed in UCAN's September 25, 2023, preliminary feedback on the demand study, SoCalGas's green hydrogen demand study remains deeply flawed. SoCalGas must correct the demand study before it proceeds with Phase 1 work. UCAN looks forward to a revised demand study that conforms to the requirements of D.22-12-055 and eliminates the errors that UCAN found in the preliminary analysis.

3.3. Production Planning & Assessment

- The Tech Approach document lists hydroelectric and biomass as potential electricity sources to be used in the production of hydrogen. Neither of these sources should be considered. First, hydroelectric generation is already connected to the electricity grid. Only new sources of carbon free electricity should be evaluated. Existing sources of electricity are already tied into the electricity grid and thus supply existing electricity demand, a more efficient use of electricity than hydrogen production. SoCalGas should not divert output from existing electricity generation resources for use in a low efficiency energy cycle (i.e., hydrogen production). Second, biomass causes significant GHG and particulate pollution. Biomass based hydrogen would immediately make that source of hydrogen production a target for decommissioning. SoCalGas should not use a flawed electricity source as its starting point. Moreover, the environmental justice community in California has already rejected biomass-based hydrogen.[13] Continuing to evaluate this production option would further erode community trust in SoCalGas.
- The Tech Approach document states that "technologies will be compared on a qualitative basis" and that "in-house data and data obtained from vendors will be used."[14] SoCalGas has numerous conflicts of interest regarding the Angeles Link infrastructure and energy technologies. SoCalGas is not able to provide an unbiased evaluation and thus cannot not use "qualitative" comparisons or "in-house" data. SoCalGas should always depend on public third-party data from reports and entities that have not been funded by either SoCalGas or other fossil fuel companies.

3.4. High-Level Economic Analysis & Cost Effectiveness

- The Tech Approach document states that the cost of production and delivery of hydrogen will be included. The economic analysis should also include: hydrogen storage costs; electricity storage costs for renewable electricity in coordination with hydrogen production; health impacts from particulate and GHG pollution if the hydrogen will be

[13] Equity Principles for Hydrogen: Environmental Justice Position on Green Hydrogen in California ("Equity Principles for Hydrogen") (October 10, 2023), available at https://www.cbecal.org/wp-content/uploads/2023/10/Equity-Hydrogen-Initiative-Shared-Hydrogen-Position-1.pdf

[14] Tech Approach, p. 11.

supplied for combustion end uses; the climate change costs due to hydrogen leakage; the additional equipment upgrade costs of end users over and above the costs required for end users to electrify.

- When evaluating the hydrogen hub. SoCalGas should evaluate a hub that is entirely behind the meter (e.g. a hub located entirely on one of the ports). This economic analysis will be valuable because it will establish a baseline cost for a system where the production and end use are not separated by Commission-regulated infrastructure.

4. Regulatory, Policy & Environmental Workstream

4.1. Water Resources Evaluation

- SoCalGas must prioritize the safety of the California communities from which water will be procured. The study must show that the communities' water prices do not increase due to the use of water to supply electrolyzers. The impurities extracted from the water must be disposed of in a manner that will not endanger human health or the environment.
- The product of this study should be a proposed set of water standards for hydrogen suppliers such that the suppliers must meet the water standard requirements, or their hydrogen will not be allowed to be transported through the Angeles Link or the hydrogen hub.

4.2. Nitrogen Oxides (NOx) Emissions Assessment

- SoCalGas should not supply hydrogen to customers that intend to use hydrogen for combustion. UCAN recommended this in the September 28, 2023, PAG meeting. If SoCalGas intends to sell hydrogen for combustion purposes, it will be replacing one energy supply that harms California communities (i.e., natural gas) with another energy supply that harms California communities (i.e., hydrogen). The *Equity Principles for Hydrogen* released by a coalition of some of the largest environmental justice organizations in California state that "[h]ydrogen should not be combusted in gas-fired generating units to produce electricity."[15] UCAN agrees with banning the combustion of hydrogen in gas-fired generation. If SoCalGas were to restrict the use of the hydrogen that it supplies to only end users that use the hydrogen for non-combustion purposes, SoCalGas would not need to evaluate NOx emissions because no hydrogen-based NOx emissions would exist.
- The Tech Approach document states that a "clean renewable hydrogen production option includes bio gasification and biogas fueled steam methane reformers."[16] These production methods should never be used due to safety and emissions issues.

[15] Equity Principles for Hydrogen, p. 9.
[16] Tech Approach, p. 21.

- The Tech Approach document states that SoCalGas will review "[p]otential NOx emissions source types from end users in three key sectors Power Generation, Mobility, and Hard to Electrify Industrial sectors."[17] These are SoCalGas's demand study sectors. The emissions evaluation cannot start until SoCalGas corrects its demand study. The current study overestimates hydrogen demand by a factor of 10.
- The Tech Approach states that "NOx emissions will be calculated at the unit level and scaled based on activity data…" UCAN requests that SoCalGas release to the PAG all computer models and spreadsheets used for NOx calculations.
- UCAN recommends that SoCalGas select non-combustion pathways for hydrogen production, transportation, and end use.

4.3. Hydrogen Leakage Assessment

- In this section the Tech Approach document includes numerous forward-looking statements and qualifiers (e.g. "potential," "proposed," "technology developments," "If specific information is not available"). These words and phrases demonstrate that current hydrogen leakage research and data provide an incomplete picture about the risks posed by hydrogen leakage and even less information on the mitigation measures that should be incorporated into a project like the Angeles Link. Until reliable third-party data becomes available, SoCalGas should not move forward with hydrogen project planning or evaluation. At this point, it is clear that SoCalGas cannot assure Californians that it will be able to avoid hydrogen leakage and the resulting negative effects.
- If SoCalGas continues to move forward with Phase 1, it needs to evaluate hydrogen leakage for a behind the meter type of hydrogen hub in addition to pipeline-delivered hydrogen. If hydrogen is produced on-site by all hydrogen end users, (i.e., behind the meter configurations) California will be able to avoid many miles of hydrogen pipelines. By reducing hydrogen pipeline lengths, California will be able to minimize hydrogen leaks from infrastructure.

4.4. Greenhouse Gas Emissions Evaluation

- The Tech Approach document states that "specific technical information (about facilities, equipment, processes, throughputs, rates, costs etc.) that is available from the *Demand Study*… will be used."[18] The GHG study and any other study that depends on data from the demand study will be unusable because of the significant errors and inaccuracies embedded in the demand study. UCAN will continue to recommend that SoCalGas correct the demand study.

4.5. Environmental & Environmental Social Justice Analysis

- This Environmental & Environmental Social Justice Analysis should use as a guide the *Equity Principles for Hydrogen* that were adopted by some of the largest environmental

[17] Tech Approach, p. 21.
[18] Tech Approach, p. 27, (emphasis added).

justice organizations in California.[19] The analysis should highlight every violation of the equity principles that the Angeles Link would cause. Then the same analysis should be conducted regarding each of the alternatives (e.g. electrification, hydrogen hub, etc.).

- The Tech Approach document states that "The Environmental Social Justice Analysis will involve… preparation of a Stakeholder Engagement Plan."[20] The Tech Approach document also states that "[t]he Environmental Justice Community Engagement Plan will establish an approach or framework for engaging disadvantaged communities with activities anticipated to occur during Phase Two, which will focus on gathering community input to address concerns and mitigate impacts and educating communities on hydrogen related topics of most interest to community members."[21] D.22-12-055 states that "SoCalGas may not record any costs for outreach and public relations activities in the Angeles Link Memo Account in Phase One."[22] Planning public outreach and community "education" is public relations. Thus, SoCalGas's intention to prepare a community engagement plan in Phase 1 is a clear violation of D.22-12-055.

4.6. High-Level Feasibility Assessment & Permitting Analysis

- The Tech Approach doc states that "this technical approach document does not include the High-Level Feasibility Assessment and Permitting Analysis because it is a screening analysis that has already been described in the work descriptions document."[23] However, the feasibility of the project remains in question and the numerous errors in the demand study that led to SoCalGas overestimating hydrogen demand by at least an order of magnitude demonstrate that SoCalGas may not believe the Angeles Link is a feasible project if it were to incorporate an accurate demand forecast into the Phase 1 process.

4.7. Right-of-way Analysis

- A high-level right-of-way analysis is needed, not a detailed analysis. At this early stage, where the future role of hydrogen in the energy system remains undefined, and the likelihood of construction of the Angeles Link remains uncertain, the right-of-way analysis should be completed at a high level.
- This study, like many others that depend on the demand study, should commence only after the numerous flaws in the demand study are corrected.

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[19] Equity Principles for Hydrogen: Environmental Justice Position on Green Hydrogen in California ("Equity Principles for Hydrogen") (October 10, 2023), available at https://www.cbecal.org/wp-content/uploads/2023/10/Equity-Hydrogen-Initiative-Shared-Hydrogen-Position-1.pdf

[20] Tech Approach, p. 35, ("The Environmental Social Justice Analysis will involve two parts: (1) conducting an Environmental Justice (EJ) screening and (2) preparation of a Stakeholder Engagement Plan.").

[21] Tech Approach, p. 36.

[22] D.22-12-055, p. 38.

[23] Tech Approach, footnote 2, p. 32.

4.8. Franchise Agreement Analysis

- This is a clear violation of D.22-12-055. The Commission's decision allows for tracking of costs for possible future recovery. Franchise agreements are a shareholder cost and all work related to franchise agreements should be excluded from the memorandum account.

5. Engineering & Design

- Four studies are listed under the umbrella of "Engineering and Design."[24] None of these studies should commence prior to SoCalGas correcting its Demand Study.

This concludes UCANs preliminary comments on the technical approaches proposed by SoCalGas.

[24] The studies are the: Preliminary Routing/Configuration Analysis; Pipeline Sizing & design Criteria, Plan for Applicable Safety Requirements, and Workforce Planning & training Evaluation.

Please Refer to *Equity Principles for Hydrogen*, which is attached as the First Document Under "PAG/CBOSG MEMBER COMMENTS"

September 25, 2023 Letter from The Utility Consumers’ Action Network

Please Refer to The Angeles Link Q3 Quarterly Report Appendices (Phase One) for a Copy of The Utility Consumers' Action Network Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings.

CBOSG MEMBER COMMENTS

From:	Andrea Vega
To:	ALP1 Study CBO Feedback
Subject:	CBO Stakeholder Group Feedback on Demand Study Technical Approaches - Food & Water Watch
Date:	Friday, October 13, 2023 7:44:04 PM
Attachments:	FWW CBOSG Feedback on Demand Study Technical Approaches - 10.13.23.pdf

Hello,

Attached below is the feedback from Food & Water Watch regarding the Angeles Link Phase One Demand Study Technical Approaches.

Thank you.

Andrea Vega
Southern California Senior Organizer
Food & Water Watch and Food & Water Action

Fight like you live here.

October 13, 2023

Re: CBO Stakeholder Group Feedback on Demand Study Technical Approaches

Phase One of the SoCalGas Angeles Link Project continues to provide vague and insufficient information to the Community Based Organizations Stakeholder Group (CBOSG) during meetings and workshops. As a member of the CBOSG, Food & Water Watch would like to stress that the lack of transparency from SoCalGas on this Project indicates a concerning lack of interest in substantial feedback.

Concerns relating to the Angeles Link Project Phase One Technical Approaches as presented in the meetings, workshops, and materials provided are as follows:

Emissions Assessment

For the proposed Angeles Link Project, SoCalGas must create a detailed plan on how potential impacts of the Project would be measured during production, transportation, and storage. It is crucial that there also be a plan for how leakage would be measured, and how SoCalGas will ensure that leakage is measured accurately. Despite what SoCalGas representatives have been presenting at quarterly meetings and workshops, the reality is that hydrogen is an indirect greenhouse gas which has known climate impacts.

In addition to leakage, SoCalGas must also address other critical impacts such as combustion, flaring, and Nitrogen Oxide (NOx) emissions. This Project needs to have a plan in place on alerting residents in the event of leakage and fires that may result from improper operations, mechanical failures, damaged equipment, or other incidents. SoCalGas must provide a comprehensive emergency response plan that includes notification protocol to frontline communities, ongoing monitoring of emissions and leakage, and the role of government entities.

Given that the Project is looking to transport hydrogen through new pipelines, the emissions assessment must also examine the impacts of installing new pipelines and an emergency response in the event of complications while those pipelines are installed.

Alternatives Assessment

We would like to once again stress that electrification should be at the forefront when considering non-hydrogen alternatives, as it is an affordable and clean energy alternative which meets the climate goals of California and Los Angeles. When creating an alternatives assessment, SoCalGas must provide detailed information to the CBOSG of each alternative and how it compares to hydrogen based on affordability, energy needs, climate impacts, and meeting state and local climate goals.

Economic Assessment

For a truly comprehensive economic assessment of the Angeles Link Project, SoCalGas must also calculate the cost that community members, the state of California, and local governments would incur from ongoing or increased pollution. The use of fossil fuels results in health impacts such as cancer, respiratory diseases, and reproductive harms, which in turn result in medical expenses for impacted community members.

While SoCalGas makes a vague promise of more job opportunities, the Project does not yet outline which communities these job opportunities would be going to or the long-term stability of those jobs. An economic assessment must also include an analysis of the economic opportunities of the Project's alternatives.

Environmental Social Justice Analysis

Given the lack of transparency from SoCalGas towards the CBOSG and the constant downplaying of the climate and public health impacts this Project poses, Food & Water Watch is concerned that SoCalGas is not fit to responsibly engage in community outreach regarding this Project. We cannot risk the spread of misinformation on how hydrogen would impact the health and safety of frontline communities. When creating any community engagement plan, all materials must first be approved by the environmental justice participants of the CBOSG. Materials must then be approved by the Public Utilities Commission. Doing this will help prevent the irresponsible spread of misleading and inaccurate information.

Though the third quarterly meeting included time where members of the CBOSG met in groups to propose ideas for the community engagement, these group sessions were unfortunately interrupted by SoCalGas representatives who would steer the conversations in attempts to push their bias onto the CBOSG. We want to stress that Food & Water Watch is here to represent the voices and concerns of communities impacted by fossil fuel pollution, not to sell a product to those communities.

We hope that all of these concerns will be taken into consideration and the necessary changes will be made.

Andrea Vega
Southern California Senior Organizer, Food & Water Watch

From:	Andrea Vega
To:	ALP1 Study CBO Feedback
Subject:	Feedback on Angeles Link Project Phase One Technical Approaches - Food & Water Watch
Date:	Monday, November 6, 2023 10:23:02 AM
Attachments:	FWW_CBOSG Feedback on Technical Approaches - 11.03.23.pdf

Hello,

Attached below is the feedback from Food & Water Watch regarding the Angeles Link Project Phase One Technical Approaches.

Thank you.

Andrea Vega
Southern California Senior Organizer
Food & Water Watch and Food & Water Action

Fight like you live here.

November 3, 2023

Submitted via email to ALP1_Study_PAG_Feedback@insigniaenv.com.

Re: Feedback on Angeles Link Project Phase One Technical Approaches

Food & Water Watch, as part of the Community Based Organization Stakeholder Group (CBOSG), submits this letter of feedback regarding the Angeles Link Project Phase One Technical Approaches. We once again urge transparency from SoCalGas. We also continue to demand clarity in the data and study descriptions presented to the CBOSG. The lack of clarity and transparency from SoCalGas prevents meaningful, substantial feedback from being presented throughout this process. Concerns relating to the Angeles Link Project Phase One Technical Approaches as presented in the meetings, workshops, and materials provided are as follows:

Production Planning Assessment

> There needs to be clarity on the cost of the Angeles Link Project in the production analysis. This includes any costs associated with building electrolyzers, electrolyzer facilities, and producing hydrogen. Unless the cost of the production, transportation, storage, and use of hydrogen are disclosed to the CBOSG, it will be difficult for the CBOSG to accurately assess this Project. Furthermore, these costs must also be accurately compared with the costs of non-hydrogen alternatives, namely electrification.

Preliminary Routing & Configuration Assessment

> Any existing pipeline corridors or rights-of-way, along with potential new rights-of-way, should be disclosed to the CBOSG. Given that much of the existing gas infrastructure in Los Angeles, as with the rest of California, was built in and around low-income communities and communities of color, which has resulted in a disproportionate rate of health complications due to the pollution from such infrastructure, these pipelines are a major concern. SoCalGas must be transparent about any rights-of-way it is considering to use for this Project. SoCalGas has yet to provide a serious, comprehensive plan on how communities living near pipeline corridors considered for the Project will be able to provide feedback or be able to give consent to infrastructure that could impact their health and safety.

Pipeline Sizing & Design Assessment

> When it comes to assessing the sizing and designs of these pipelines, the priority must be on leak prevention, leakage monitoring, leakage notification, and safety protocols. SoCalGas needs to outline what safety measures they intend to implement in order to monitor leakage, and which leak detection technology they plan to utilize.

We hope that all of these concerns will be taken into consideration and the necessary changes will be made.

Sincerely,

Andrea Vega
Southern California Senior Organizer, Food & Water Watch

From:	Alex Jasset
To:	ALP1 Study CBO Feedback
Subject:	Technical Approach Comments from PSR-LA
Date:	Friday, November 3, 2023 5:18:20 PM
Attachments:	Equity-Hydrogen-Initiative-Shared-Hydrogen-Position-1.pdf

[You don't often get email from ajasset@psr-la.org. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

To whom it may concern,

Please find attached the Equity Principles for Hydrogen document, which was co-developed with many of the leading environmental justice organizations in the state (including PSR-LA), and which lays out clear guidelines for many of the topics that were brought up in the technical approach study. Additionally, PSR-LA would like to emphasize several general points with regard to the studies:

-It is very difficult to provide meaningful feedback about the project without more specific details about the scale and scope of the project and information about where it will be sited and from which bodies of water and renewable energy sources it will be drawing from. This does not mean that we need additional meeting or documents about issues you're considering, but rather that we need clear and accessible information about the project details.

-As far as end uses, direct electrification should always be prioritized wherever feasible, and any plan for hydrogen should prioritize the hardest-to-electrify sectors first (for example high-heat applications and displacing current grey/blue hydrogen usage), rather than end uses for which there are better alternatives or where direct electrification is feasible (for example power plants, passenger vehicles, etc…). In order for this project to make a meaningful impact on climate goals, it must commit to utilizing green hydrogen to complement the Just Transition away from fossil fuels, and not impede or prevent it.

-In order to ensure that green hydrogen production doesn't increase CO2 emissions, it is essential to ensure that the electricity used for green hydrogen production is surplus and does not use carbon credits or resource shuffling tactics to divert those resources when they would be better used on the grid. Additionally, SoCalGas should clearly state that they will only transport green hydrogen produced with surplus renewable energy, and explicitly exclude other so-called "clean" forms of hydrogen that come from nuclear power, carbon capture schemes, biomass/biogas, and others.

-Leakage is a major concern, both in terms of the potential to negate any meaningful climate impacts, as well as for safety reasons. Given SoCalGas' track record around preventing leaks (recent examples including Aliso Canyon and and Valley Generating Station), how do the current plans drastically differ from existing practices? How can you guarantee that there won't be leaks of a much smaller molecule, given the severity of the risks? What kind of standards is SoCalGas willing to commit to in order to ensure safety, and what are the financial and other penalties for failing to live up to these standards?

-In order to not perpetuate the injustices of the past, it is crucial to ensure that pipeline infrastructure is not routed through the same communities that have historically borne the brunt of the region's energy burden. In order for Angeles Link to be a success, it must improve local air quality and not negatively impact water quality or quantity, reduce CO2 emissions, not increase consumer bills, and improve the quality of life for communities living near existing and proposed fossil fuel/hydrogen infrastructure. If during the assessment, the project fails to achieve any of these goals, the project design should be reevaluated until it can.

Thank you, and please reach out if you have questions.

All the best,
Alex Jasset

Please Refer to *Equity Principles for Hydrogen*, which is attached as the First Document Under "PAG/CBOSG MEMBER COMMENTS"

APPENDIX 3 – SOCALGAS RESPONSES TO COMMENTS

Q4 2023 Quarterly Report – Appendix 3

Responses to Written Stakeholder Comments

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
1.	10/13/2023	Air Products (Miles Heller)	SoCalGas's Limited Technical Approach Details Are Insufficient to Allow for Meaningful Feedback In its July 31 letter providing feedback on the Scope of Work descriptions, Air Products raised concerns that the document consisted only of very cursory summaries of the proposed scopes of work for the Phase One studies, and lacked much of the specific detail that would typically be required to be included in any scope of work being provided to a third-party consultant. SoCalGas proposes to conduct sixteen separate studies in Phase One, to comply with the obligations set forth in D.22-12-005, including making findings required before SoCalGas can proceed with Phase Two. Yet the Scope of Work Descriptions for all sixteen studies consisted only of twenty-nine pages of text, averaging less than two pages per study. The Final Scope of Work Descriptions, revised September 5, 2023, and the Angeles Link Phase One Technical Approaches continue to suffer from the same flaw; both offer only cursory summaries, lacking the detail that would typically be required in such documents. This continues to hamper the ability of PAG members to provide meaningful feedback. As it urged in its July 31 letter, Air Products continues to request that SoCalGas provide the same level of detail to PAG members that it is presumably providing to (or receiving from) the consultants who will perform the work.	SoCalGas appreciated the considerable effort of PAG members to provide input on the scopes of work. SoCalGas recognizes that a broad range of stakeholders is likely to have an interest in the study and development of this Project. SoCalGas continues to use its best efforts to engage with those parties to provide input to SoCalGas, on an advisory basis, regarding hydrogen market information and technical aspects of Project design and development. However, execution of the scope of work and final contracting details are proprietary to SoCalGas and the selected consultant. As detailed in the quarterly reports, SoCalGas presented on several of the Phase 1 feasibility studies at quarterly PAG and CBO meetings and at various workshops held throughout 2023, presenting on the proposed scopes of work and technical approaches for various studies. In addition, SoCalGas provided study descriptions summarizing the scopes of work for all of the studies proposed under the Phase 1 analyses in July 2023 and summaries of the technical approaches for each of those studies in September 2023 to PAG and CBO members. PAG and CBO members had an opportunity to provide feedback on the studies at each of those milestones. Additional opportunities to comment on preliminary findings and completed draft studies will be provided to the PAG and CBO at regular quarterly meetings, technical workshops (as appropriate to the subject matter) and on the studies directly during an established comment period.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
2.	10/13/2023	Air Products (Miles Heller)	SoCalGas Must Consider Private Sector Investment As D.22-12-055 recognized, there is an existing and rapidly growing hydrogen industry in California. PAG members have repeatedly raised the concern that SoCalGas's efforts could impede private sector investment, stifle innovation, and require captive ratepayers to fund investments that could be more quickly and cost-effectively developed by a robust private sector. Neither the Commission nor the California legislature has yet to conclude that the Commission has or should have jurisdiction over any aspect of this growing hydrogen industry. Furthermore, ongoing private sector investment will likely impact the need for, and the purpose of an Angeles Link trunkline, and will impact the extent to which ratepayer funding is needed or appropriate to advance access to clean hydrogen. It is therefore critically important that SoCalGas's Phase One studies explicitly evaluate and consider the private sector's ongoing and planned investment in hydrogen projects and infrastructure, and private sector alternatives to a trunkline. The Angeles Link should not be considered in a vacuum, ignoring the myriad private sector efforts currently ongoing.	The purpose of the Angeles Link project is to support California's decarbonization goals, optimize service to all potential end-users, enhance energy system reliability, resiliency, and flexibility, and provide a cost effective and affordable open access clean renewable hydrogen transportation system, among other goals. These goals would provide reliable, lower cost hydrogen to various end-users, both in the public and private sectors. Open-access, common carrier hydrogen pipelines dedicated to public use in California can facilitate market growth and scalability and is consistent with the Department of Energy's Pathways to Commercial Liftoff: Clean Hydrogen materials. Please see Pathways to Commercial Liftoff: Fireside Chat and Clean Hydrogen Deep-Dive (https://www.youtube.com/watch?v=3i7qZfJ5G9Q, 34'). Such infrastructure is pivotal for supporting the burgeoning hydrogen economy and making clean renewable hydrogen accessible to multiple hard –to-electrify sectors within the LA Basin and throughout the Central and Southern California region. To date, SoCalGas is not aware of any proposed unregulated infrastructure investment that would serve the same function as Angeles Link, which is specifically proposed to transport clean renewable hydrogen into the Los Angeles Basin and in the broader Central and Southern California region and serve multiple end users through an open-access pipeline system. However, we are committed to staying informed about the hydrogen market's evolution. Our engagement with initiatives like ARCHES should allow us to remain updated on other hydrogen projects and explore how Angeles Link can complement and accelerate these developments. In our Phase 1 studies, we will incorporate relevant information from ARCHES and other sources, as feasible, available, and appropriate. It is also worth noting that the alternative delivery options we are studying in the Alternatives Analysis do consider unregulated transport methods, such as hydrogen trucking.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
3.	10/13/2023	Air Products (Miles Heller)	Project Options and Alternatives: As explained in the General Comments above, SoCalGas should weigh private sector current and future infrastructure investments as compared to the cost of ratepayer-funded infrastructure developed by investor-owned utilities. In particular, the Project Alternatives should include private sector projects, products and services, to be compared to the costs and timing of ratepayer-funded efforts. The Technical Approach outlines only two options for "Other Alternatives": (1) non-hydrogen alternatives (e.g., electrification, energy efficiency, renewable natural gas, natural gas with carbon management), and (2) hydrogen delivery alternatives (e.g., trucking, in-basin hydrogen production).1 The Technical Approach fails to include any evaluation of private sector investment as viable alternatives, completely ignoring ongoing private sector efforts. The "Other Alternatives" section should add a third section addressing private sector alternatives. This third category will be particularly important in evaluating the cost-effectiveness and economic feasibility of clean renewable hydrogen delivery via the Angeles Link,2 as compared to non-ratepayer funded alternatives. Furthermore, for all three categories, SoCalGas should also identify the criteria by which it chooses the specific Project Alternatives to study, as well as identifying any Project Alternatives that it chooses not to study, and reasons why those Alternatives were omitted. [1] Technical Approach at 5. [2] Technical Approach at 5-6.	The CPUC Decision authorizing the establishment of the Memorandum Account to track costs to advance the first phase of Angeles Link (D.22-12-055) requires SoCalGas to consider and evaluate the costs and environmental impacts of Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification. (Ordering Paragraph (OP), 5(e).) The Decision also requires evaluation of the cost-effectiveness of the Project against alternatives. (OP 6(d).) Pursuant to those requirements, the Project Options & Alternatives Study and Preliminary Routing/Configuration Analysis will evaluate a range of alternatives to the Project that may meet the Project's underlying purposes. Those alternatives generally fall within two categories: (1) hydrogen delivery alternatives, including a localized hydrogen hub; and, (2) non-hydrogen alternatives, including electrification. The alternatives analysis focuses on alternatives generally that could achieve the Project's underlying purposes in addition to the specific alternatives for review set forth in the CPUC Decision (e.g. electrification and localized hydrogen hub). The Project Options & Alternatives Study will apply screening criteria to the initial list of potential alternatives identified and will select certain alternatives to be carried forward for further analysis based on that screening. The screening criteria were presented to the PAG and CBOSG group meetings in October 2023. The screening criteria applied as well as the alternatives not selected for further analysis will be further described in the draft report of the Project Options & Alternatives Study. The High-Level Economic Analysis & Cost Effectiveness Study will measure the cost effectiveness of the Project against the alternatives selected for further analysis. Evaluation of specific projects proposed by the private sector and their associated costs is outside the scopes of the Project Options & Alternatives Study and the High-Level Economic Analysis & Cost Effectiveness Study for the Phase 1 analyses and will not be incorporated into the technical approaches for those studies. In addition, Angeles Link is proposed as a high-pressure, non-discriminatory pipeline system that is dedicated to public use. For more information on the role Angeles Link's infrastructure proposes to play in the Southern and Central California hydrogen economy, see Response to Comment 2.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
4.	10/13/2023	Air Products (Miles Heller)	Demand Study: D.22-12-055 restricts the Angeles Link Project to transportation of "clean hydrogen." As Air Products noted in its July 31 comments, any evaluation of the potential for "clean renewable hydrogen demand" must distinguish between demand for "clean hydrogen" as defined by D.22-12-055, and hydrogen demand generally. Potential demand for hydrogen generally is not necessarily reflective of demand for clean hydrogen. Unfortunately, the Technical Approach for the Demand Scenarios fails to adequately distinguish between demand for hydrogen generally as compared to the demand for clean renewable hydrogen. The Technical Approach also contemplates that demand assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisories. However, the Technical Approach fails to identify how these interviewees will be selected, or the criteria that will be used to select the interviewees. The validity and value of any feedback obtained through interviews will depend in significant part on who was interviewed, how they were selected, and what criteria was used to select them. The Technical Approach should be revised to provide interviewee selection criteria, and the final Phase One study on demand should include also identify how interviewees were selected, the criteria used to select the interviewees, as well as a detailed list of those interviewed.	CPUC Decision 22-12-055, page 42, directs SoCalGas to "restrict[] any future hydrogen transported in the Angeles Link Project to not exceed a standard of four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram of hydrogen produced . . .[and] further restrict the eligibility of any future hydrogen which uses any fossil fuel in its production process. Accordingly, the Demand Study is focused specifically on demand for clean renewable hydrogen, including demand for clean renewable hydrogen driven by zero-carbon and zero-emission policies and legislation. These policies and legislation, including SB100 and CARB's Advanced Clean Fleets (ACF) regulation, are primary factors used to determine future hydrogen adoption across the mobility, power generation, and industrials sectors. SoCalGas reached out to numerous interviewees based on various factors such as number of facilities and/or presence in SoCalGas's territory, size of current emissions footprint and/or fuel consumption, and announcements regarding hydrogen R&D and projects. Questions asked and input received included current fuel usage, future hydrogen plans, and hydrogen adoption rate factors. Any degree of acknowledgement of interviewees and their contributions may depend on further discussions and permissions from those interviewees. The draft Demand Study includes references to third party studies that were used to inform the demand analysis.
5.	10/13/2023	Air Products (Miles Heller)	Production Planning and Assessment: In determining what renewable energy resources might be available for hydrogen production, this Study should distinguish between generation sources needed by load-serving entities to meet current and future demand, and those renewable generation sources that are available for hydrogen production. Hydrogen production should not be competing for resources with load-serving entities seeking to procure electric capacity necessary to ensure reliability. The Technical Approach for Production Capacity Modeling outlined for this Study states that the approach will include the step of "[d]evelop[ing] maximum MW and MWh of renewable energy production potential available for future development to serve H2 production." In performing this step, the Study should expressly evaluate whether the renewable energy production is additive to the amount needed to meet current and future demand and California's reliability needs, and other environmental goals.	The Production Planning & Assessment aims to understand the availability of renewable resources that could be added for hydrogen production. This study assumes renewables for hydrogen production are behind-the-meter systems that could be independent from the electric grid. As a result, currently it is assumed when renewables (e.g., solar) are not available for hydrogen production, grid energy will not be utilized to supplement power for production. The study also seeks to understand how existing renewables on the CAISO grid that are curtailed could be reused for hydrogen production.
6.	10/13/2023	Air Products (Miles Heller)	Water Resource Evaluation According to the Technical Approach, this study has two components: (1) an evaluation of various types of water availability for clean renewable hydrogen production in Central and Southern California, and (2) an evaluation of the potential risks and opportunities associated with water availability that may impact the production of clean renewable hydrogen. In its July 31 comments, Air Products noted two issues, which have not been addressed in the Technical Approach. First, to the extent the identified potential sources are not collocated with the production sites, SoCalGas should evaluate energy needs associated with water pre-treatment, and how those energy needs would be met, as well as evaluating how the water will be transported to the production site, and the energy sources and emissions associated with that transportation.	In response to the comment concerning the energy needs associated with the water needed for clean renewable hydrogen production, it is important to note that third-parties will be responsible for producing the clean renewable hydrogen and therefore will be responsible for the energy needs associated with water used in clean renewable hydrogen production. In-depth analysis of those energy needs is outside the scope of the Water Resources Evaluation. The Water Resources Evaluation includes four principal tasks that provide a high-level analysis of (i) the potential water supply sources third-party producers may pursue for production, (ii) the water quality requirements that may be needed for third-party producers to feed into electrolyzers; (iii) the associated costs for development and treatment of those water sources, and (iv) the related challenges and opportunities related to water supply development.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
			Second, as with the renewable energy resources needed for production, any water sources for production may be subject to competing demands for the resource. SoCalGas should also evaluate competing demands for the resource, and the potential impacts, including cost impacts, associated with using the water resource for hydrogen impacts rather than the competing alternate use or uses.	More specifically, for the first task listed above, the Water Availability Study being prepared as part of the Water Resources Evaluation will identify and characterize potential water supply sources that could support future third-party production of the clean renewable hydrogen, understanding that third-party producers may draw from a menu of sources to meet the water needs to produce the clean renewable hydrogen that Angeles Link would convey. The task that evaluates costs related to water supply under the Water Resources Evaluation will provide high-level estimates for water acquisition, conveyance, and purification for third-party producers to develop water supply sources for clean renewable hydrogen production. The high-level cost estimates for water conveyance and purification include estimates for power costs to convey and purify the water on a per unit basis (i.e., conveyance costs/mile, purification costs/million gallons of water used). This task will ultimately provide a conceptual range of potential costs for the development of water supply sources. In addition, the Production Planning & Assessment being prepared as part of the Angeles Link Phase 1 analyses will evaluate the feasibility of Angeles Link conveying clean renewable hydrogen that "is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in the production process." (D.22-12-055, OP 3(a).) Without more details on specific proposed third-party production projects, an in-depth analysis of the energy needs associated with the water supply development for third-party production projects is outside the scope of the Angeles Link Phase 1 studies. In response to the comment concerning competing demand for water resources, competing water demands will continue to develop due to the dynamic relationship between water supply and demand and the variable water supplies in California from year-to-year. While the Water Resources Evaluation identifies and characterizes potential water sources third-party clean renewable hydrogen producers may pursue, the specific menu of water supply sources that feed those projects would need to be developed on a case-by-case basis as more details on specific production projects are developed. Analysis of competing demand and supply constraints on those potential sources would also need to be evaluated at the time those projects are proposed. At this present stage of Phase 1 analyses, additional analysis of competing demands on water supply is outside the scope of this Water Resources Evaluation.
7.	10/13/2023	Air Products (Miles Heller)	Plan for Applicable Safety Requirements Air Products notes that the Technical Approach for this study cites to Commission General Order ("GO") 112 F, Subpart E, which supplements Federal Pipeline Safety Regulations. As set forth in D.22-12-055, the Commission has yet to determine that the Angeles Link, or hydrogen transportation generally, would be subject to Commission jurisdiction. It therefore is at best unclear whether GO 112 will be applicable to the Project; furthermore, it is unclear whether the Commission, if it did assert jurisdiction, would apply GO 112 as currently drafted to hydrogen pipelines.	The CPUC's Decision 22-12-055 (OP 6 (f)) requires SoCalGas to evaluate safety concerns involved in pipeline transmission, storage, and transportation of hydrogen applicable to the Angeles Link Project. Regulatory requirements and industry-standard codes exist for hydrogen, primarily anchored by 49 Code of Federal Regulations (CFR) Part 192 Subparts A through P and the California Public Utilities Commission (CPUC) General Order (GO) 112-F governing natural gas transmission and distribution and addressing flammable gases such as hydrogen. Other hydrogen-specific standards and specifications exist (e.g., American Society of Mechanical Engineers [ASME] B31.12 and National Fire Protection Association [NFPA] 2) but are not incorporated into 49 CFR Part 192 or CPUC GO 112-F by reference. There are approximately 1,600 miles of hydrogen pipelines operating in the United States that are safely operated under existing regulations and industry practice. As such, potential safety considerations may be derived from GO 112-F and should be appropriately evaluated as it may apply to a clean renewable hydrogen transport system.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
8.	11/3/2023	California State Pipe Trades Council (Lorrie LeLe)	I am writing on behalf of the California State Pipe Trades Council ("Council") to provide comments on the October 18, 2023, Angeles Link Planning Advisory Group ("PAG") Workshop regarding SoCalGas' progress developing the Phase One feasibility studies for the Angeles Link Project ("Project"). The Council represents more than 30,000 plumbers and pipe fitters in local unions throughout California. The Council has advocated at the California Public Utilities Commission, the California Energy Commission, and other agencies for a coordinated statewide decarbonization plan that considers impacts on workers, safety, equity, energy reliability and rates. The Project proposed by SoCalGas to develop transmission pipelines dedicated for clean renewable hydrogen transport to serve hard to electrify uses in the Los Angeles Basin is a major step forward in creating low-GHG emitting infrastructure for hard-to-electrify industries. Implementation of the Project will further the State of California's decarbonization goals, including the California Air Resources Board's ("CARB") 2022 Scoping Plan for Achieving Net Neutrality[1], which identifies the scaling up of renewable hydrogen for the hard-to-electrify sectors as playing a key role in the State achieving carbon neutrality by 2045 or earlier. Electrification alone is not an economically sustainable solution to reaching our greenhouse gas reduction goals. Hydrogen and alternative renewable gas must be part of the solution. Without investing in these technologies and infrastructure, California will see a continued exodus of industrial jobs out of the state. Further, such an exodus will undercut greenhouse gas reduction goals because greenhouse gas emissions are a global problem – not a regional issue. When industrial plants move to other states or countries, they are almost certainly going to areas that rely on more greenhouse-gas-intensive energy sources than would be the case if they stayed in California. Keeping traditional greenhouse-gas-intensive industries here in California and transitioning them to hydrogen is the best way to reduce global emissions from these industries while protecting jobs for blue collar workers. In addition to helping the State meet its clean energy goals, the Project presents an opportunity to provide a just transition for skilled workers in the oil and gas industries, including pipefitters and plumbers represented by the Council's members that currently install, repair, and maintain oil and gas infrastructure and industrial facilities. The proposed Project provides a clear path for those very workers negatively impacted by the state's electrification efforts to find equivalent replacement jobs in the hydrogen industry. We look forward to the forthcoming Workforce Planning and Training Report and stress the importance of prioritizing solutions that employ the same workers whose jobs will be displaced by the transition from fossil fuels. [1] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality (November 16, 2022) available at https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp.pdf	SoCalGas appreciates the comments of the California State Pipe Trades Council and in alignment with the CPUC's Decision 22-12-055, will look to advance the first phase of Angeles Link, a high-pressure, non-discriminatory pipeline system that is dedicated to public use and will transport clean renewable hydrogen from regional third-party production and storage sites to end users in Central and Southern California, including the LA Basin (inclusive of the Ports of Los Angeles and Long Beach). SoCalGas will also be evaluating workforce impacts as a part of the Workforce Study to be released in Q3 2024.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
9.	10/13/2023	Communities for a Better Environment (Theo Caretto)	Feedback on Technical Approach In addition to the several issues CBE raises in this letter, we share the newly released equity principles for hydrogen by 9 major California environmental justice organizations which elaborate an environmental justice position on hydrogen production, transportation, storage, and end-uses.	SoCalGas has received the Equity Principles for Hydrogen (Equity Principles) document and believes it is a foundational document that can help guide the company as we proceed with Angeles Link to foster meaningful conversation between environmental justice advocates and SoCalGas. SoCalGas acknowledges alignment with the Equity Principles document and our vision for Angeles Link. The Equity Principles document underscores the critical importance of incorporating equity, sustainability, and environmental justice considerations when shaping the future of hydrogen infrastructure in California. Overall, our vision for Angeles Link aligns in the following areas: Prioritizing Community Engagement, Tribal Consultation, Minimizing and Mitigating Environmental Impacts and Reducing Energy Pollution, Safety is Foundational Throughout the Lifecycle, and Cost Transparency. While SoCalGas does not plan to produce hydrogen as part of the Angeles Link project, SoCalGas supports sustainable upstream production pathways as well as hydrogen usage that minimizes adverse environmental impacts. Keeping this in mind, SoCalGas is supportive of the following issues raised in the Hydrogen Equity Principles document: Non-fossil hydrogen production, Hydrogen Production Regulation, and Continued Research on Hydrogen End Uses. SoCalGas remains dedicated to upholding these principles and fostering ongoing dialogue with environmental justice advocates. Collaboration and shared understanding are essential as we shape the future of clean renewable hydrogen infrastructure in California. SoCalGas's response to the Equity Principles document is included as an appendix in this quarterly report.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
10.	10/13/2023	Communities for a Better Environment (Theo Caretto)	I. Emissions Assessment a. Climate Impacts Hydrogen has a known climate warming impact. Though hydrogen is not a direct greenhouse gas, it has significant indirect warming effects. The chemical reactions of hydrogen in the atmosphere increase concentrations of other greenhouse gases, like methane, ozone, and stratospheric water vapor. These hydrogen reactions can lead to an increase in global warming greater than that caused by carbon. Hydrogen can also damage and leak easily from gas lines during production, transportation, and storage. It is extremely important that SoCalGas measures the potential hydrogen impacts of its proposed Angeles Link Project accurately and ensures with absolute certainty that gas leakage impacts are appropriately measured. The potential impacts of any hydrogen project must be measured completely and accurately. The traditional way of measuring climate forcers such as hydrogen or carbon dioxide has been to calculate the global warming potential (GWP) over 100 years. The GWP 100 calculation was established decades ago and climate science has continued to evolve. While 100 years is still the metric used most often; comparing the climate effects between hydrogen, a climate forcer whose impacts are short-lived, and carbon dioxide, a climate forcer whose impacts are long-lived, will not uncover important emissions data from the project. This traditional metric ignores the near-term impacts of hydrogen and other short-lived climate-forcing agents, masking a much bigger, more immediate influence. Thus, SoCalGas must outline a calculation for its studies that will capture the long- and near-term warming impacts of hydrogen. A GWP 20 metric would be a more accurate representation of hydrogen's impacts while it is most forcefully affecting the climate. SoCalGas should use a 20-year measurement as a supplement to, not a replacement of a longer-term measurement because hydrogen's impacts may remain in the atmosphere beyond the 20-year period. SoCalGas may also need to look at the relative warming impacts from a continuous—as opposed to a 20- or 100-year pulse—emissions measurement.	In direct response to stakeholder feedback recommending analysis of the 20-year GWP, a table summarizing values found in the existing literature regarding both 20- and 100-year estimated GWP values for hydrogen will now be included in the Greenhouse Gas Emissions Evaluation as part of Phase 1 analyses. SoCalGas recognizes that the scientific understanding and research on the topic of the appropriate GWP for hydrogen is continually evolving, and we are committed to staying informed about the latest research and incorporating it into our discussions and analyses.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
11.	10/13/2023	Communities for a Better Environment (Theo Caretto)	b. Local Impacts In addition to the climate impacts of hydrogen, the local impacts of the Angeles Link project must be addressed. Some of those critical impacts include leakage, combustion, flaring, and NOx emissions. SoCalGas and other industry operators and regulators have less experience with hydrogen than with other fuels, such as fossil gas. Hydrogen is highly combustible and explodes when mixed with air at a wide range of concentrations. It is even more explosive than methane. Hydrogen is odorless, tasteless, and colorless, making leaks hard to identify with the naked eye or inadequate leak detection technology. As these risks are studied, SoCalGas must establish in their plan for Applicable Safety Requirements extensive protections. Protections must include up front information to local communities of the safety risks as well as a comprehensive alert protocol to notify residents of any threats to their safety that arise along the Angeles Link Project. The risks associated with producing, transporting, and storing hydrogen must be studied extensively before placing any hydrogen infrastructure in proximity to residences so that a comprehensive mitigation plan can be implemented to prevent harms to local communities.	At SoCalGas, safety is a core value and is at the foundation of everything we do and will be incorporated into every phase of the Angeles Link Project. The Plan for Applicable Safety Requirements Study will include an assessment of applicable safety requirements for employee, contractor, infrastructure, and public safety. Safety considerations such as the physical and chemical properties of hydrogen and safety regulations and codes, including requirements for emergency response and public awareness plans, will be addressed in the study.
12.	10/13/2023	Communities for a Better Environment (Theo Caretto)	While leakage and combustion from gas infrastructure often results from mechanical failure, improper operation, or inadequate precautionary measures, operators who process, transport, store or utilize gases have a practice of purposeful releases gas from pipelines and other infrastructure to relieve pressure and avoid acute risks. Operators often do this without informing residents, much to the detriment of those residents' air quality, immediate and long-term health, and sense of safety and calm. Any new hydrogen gas releases would perpetuate this toxic practice and interfere with ongoing efforts by fence line communities to monitor and control harmful "flaring" at oil refineries. SoCalGas must not only include the air impacts of releases or flaring in its emissions studies and leakage assessments but must also center environmental justice concerns by studying pathways to limiting releases and develop an alert and cataloging protocol to notify residents when releases and flares occur.	SoCalGas understands the importance of evaluating potential impacts of the Project on disadvantaged communities and understands this comment's concerns concerning the practice of flaring. SoCalGas is currently the largest natural gas distribution utility, delivering natural gas to approximately 21.1 million consumers across a service territory that encompasses approximately 24,000 square miles in Central and Southern California. In its current operations, SoCalGas does not flare natural gas. As part of routine pipeline maintenance activities and in response to system anomalies, SoCalGas may vent natural gas. These emissions are tracked in SoCalGas's annual SB1371 report, available at: https://www.socalgas.com/regulatory/R1501008. There are no plans for flaring to occur during operation of the proposed Project. In addition, SoCalGas follows safety protocols that may include notifying local air districts, first responders, and residents when venting occurs. Protocols for tracking emissions from the venting of hydrogen and/or alerting agencies, first responders, and/or the adjacent communities are currently in development. For concerns related to leakage, the CPUC Decision D.22-12.055 requires SoCalGas to assess the risks and mitigations associated with the potential for hydrogen leakage. (Decision, OP 6(g).) Pursuant to that requirement, the Hydrogen Leakage Assessment will evaluate the potential for hydrogen leakage associated with new infrastructure (i.e., production, compression, storage, and transportation of clean renewable hydrogen), as well as opportunities to minimize potential for hydrogen leakage. The Hydrogen Leakage Assessment will evaluate a range of values for potential hydrogen leakage, as well as opportunities to minimize the potential for leakage. This range of values will be presented as percentages for each component of new proposed infrastructure and as percentages for each minimization opportunity. Volumetric estimates of the potential for leakage will not be developed at this time because detailed infrastructure information will not be available during the stage of the Phase 1 studies

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
13.	10/13/2023	Communities for a Better Environment (Theo Caretto)	Finally, Nitrogen Oxide (NOx) and other ambient air emissions are a major environmental justice concern. Specifically, NOx is a primary ingredient in smog that causes a disproportionate increase in asthma diagnoses, respiratory infections, and other lung-related health complications in pollution burdened communities. It is critical that SoCalGas provide more details on how it will measure these emissions, and how the Angeles Link Project will work to decrease air pollution in the Los Angeles Basin. SoCalGas' Demand Study explains that hydrogen may be used in gas-fired power plants to generate electricity. Any emissions study should include emissions projections that incorporate the disparate efficacy of pollution control technology that is likely to under each demand scenario. Studies show that pollution control technology can be less effective during ramping of powerplants or in certain cogeneration configurations. Since reliance on hydrogen to meet times of peak energy demand would mean more ramping up and down, emissions estimates should reflect this. Hydrogen blended with methane can dramatically increase NOx emissions, increase risk of leakage and explosions, and with current blending capabilities does not greatly reduce greenhouse gas emissions from combustion of fossil gas. For these reasons, CBE opposes blending hydrogen into methane gas for any reason. SoCalGas' NOx emissions assessment states that power generation units such as turbines are the primary source for NOx emissions. The impacts of hydrogen combustion should be a focal point in the study. Scenarios should look at how NOx emissions impact local communities while accounting for existing air pollution.	SoCalGas concurs that reducing NOx emissions is an important step to improving air quality. Angeles Link is another major milestone in the shift to increasingly cleaner fuel in support of California's climate goals and improvement of the state's air quality. Angeles Link will be designed to deliver 100% clean renewable hydrogen to end users. While blending may occur at the power generation and hard to electrify end users, Angeles Link will not be delivering a blended fuel. The Nitrogen Oxide (NOx) and Other Air Emissions Assessment will evaluate the potential NOx and other air emissions associated with new hydrogen infrastructure (i.e., production, storage and transportation), as well as potential NOx emissions associated with end users in the mobility, power generation, and hard-to-electrify industrial sectors. The study will also identify potential NOx emission minimization opportunities to reduce potential NOx emissions, including from hydrogen combustion. The evaluation of NOx emissions control equipment for power generation combustion equipment will include a discussion regarding effectiveness of control equipment during periods of ramping up and down. In response to feedback from the PAG, the NOx and Other Air Emissions Assessment will now include a map depicting anticipated location-based NOx reductions. The estimated NOx emissions associated with Angeles Link will be geographically represented using CalEnviroScreen to layer location-based information for disadvantaged communities.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
14.	10/13/2023	Communities for a Better Environment (Theo Caretto)	II. Alternatives Assessments SoCalGas listed four hydrogen alternatives that it would study in the alternatives assessment required by the Decision: (1) electrification, (2) energy efficiency, (3) renewable natural gas (RNG), and (4) natural gas with carbon management. An energy transition will transform our communities, industry, energy generation, goods movement, and more. These changes will be especially profound for environmental justice communities on the fence line of oil refining, gas power plants, shipping and drayage, oil drilling, and industrial manufacturing. Separate and apart from SoCalGas' environmental assessments, SoCalGas must explore the impacts of each alternative in these communities. It will be critical in the Angeles Link process to understand how, if at all, hydrogen can help reduce pollution burdens, clean up communities, and remove polluting infrastructure from residential neighborhoods and how it compares with each alternative. Electrification is a clean, safe, and affordable way to meet California and Los Angeles's climate goals. While hydrogen is a popular emerging climate solution, electrolytic hydrogen is an immensely inefficient fuel source, and it will be important to assess it alongside data on electrification. Thus, in its alternatives assessment, SoCalGas must identify and explain in detail end-uses that would be better suited to hydrogen fuel than direct electrification. SoCalGas should not include in its analysis alternatives that might create new sources— or exacerbate existing sources—of air pollution in disadvantaged communities. Methane and fossil gas "alternatives," such as renewable natural gas or natural gas with carbon management, are not true solutions to the climate crisis. Continued reliance on methane or fossil gas will exacerbate existing pollution in environmental justice communities and perpetuate existing harm. To study these alternatives would be contrary to public policy, the Public Utilities Commission's directives in other proceedings, and a waste of public resources.	SoCalGas appreciates this comment and recognizes the importance of analyzing the potential impacts of the Project and potential alternatives on disadvantaged communities. The Project Options & Alternatives Study will evaluate a range of non-hydrogen alternatives that may meet the Project's underlying purposes, including electrification, energy efficiency, renewable natural gas (RNG), and natural gas with carbon management. The Project Options & Alternatives Study will look at list of alternatives to the Angeles Link Project. Alternatives that are feasible and scalable will then go through screening criteria. Alternatives that meet the criteria will be carried forward to the High-Level Economics and Cost Effectiveness study for further analysis. For additional information on how the Project Options & Alternatives Study will evaluate alternatives pursuant to specific requirements in CPUC's Decision 22-12-055. Please also see response to Comment 3. Moreover, in future phases of Angeles Link, SoCalGas will begin examining the estimated cost to ratepayers and potential cost allocation and rate design approaches for the project, with the latter informing an affordability analysis supporting the selection of a preferred route. Once the Project Options & Alternatives Analysis Study has selected the alternatives to be carried for further analysis, the Environmental and Social Justice Analysis will provide a desktop analysis of the potential environmental impacts of the Project and will compare the Project impacts to the potential impacts associated with the alternatives selected for further study. The comparison of environmental impacts will address impacts at a high-level associated with air quality and greenhouse gas emissions, biological resources, cultural and tribal resources, energy, hazards and hazardous materials, hydrology and water quality, land use planning, and environmental justice. This analysis will provide a better understanding of how the Project and the potential alternatives may impact surrounding communities. The development of Angeles Link is still in a preliminary phase, limiting the detailed analysis that can be completed during Phase 1. More detailed analysis of the Project's potential environmental impacts as compared to those impacts of potential alternatives will be evaluated in future phases of Angeles Link as more details on the proposed Project develop. In response to the comment concerning evaluation of the end-uses that would be better suited for hydrogen than direct electrification, the Project Options & Alternatives Study and the High-Level Economic Analysis and Cost Effectiveness Study will evaluate end uses as part of the electrification alternative. In response to the comment concerning reviewing alternatives that may create new or exacerbate existing sources of air pollution, the range of alternatives reviewed in the Project Options & Alternatives Study include the specific alternatives set forth in the CPUC Decision (i.e., electrification and localized hydrogen hub) as well as additional alternatives that are intended to meet the underlying purposes of the proposed Project. Those underlying purposes include supporting California's decarbonization goals and improvements to the state's air quality by displacing fossil fuel for certain hard-to-electrify uses, including the mobility sector. The screening criteria applied to the range of potential alternatives, as well as those alternatives selected and those not considered for further analysis will be further described in the draft report of the Project Options & Alternatives Study.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
15.	10/13/2023	Communities for a Better Environment (Theo Caretto)	III. Economic Assessments a. Local Economic Impacts SoCalGas' economic studies should include analysis of the social costs of continued air and climate pollution. Every year, residents of Wilmington, and similar neighborhoods across the State spend their own dollars on medical bills and sick days, air filters, inhalers, air conditioning units, fans, and more to combat bad air quality and a changing climate. If SoCalGas is intent on measuring the benefits of "creating jobs and economic benefits with the construction of a green energy infrastructure project" it too must examine any costs from the project. SoCalGas' Angeles Link application forecast "high-paying jobs for gas workers whose livelihoods are being phased out as the state transitions away from natural gas uses." Economic studies must examine where jobs will go and who will benefit. If this project brings economic benefits, they must be concentrated in communities where the project is located and ensure economic opportunities will be available for those who have been most harmed by fossil gas's toxic legacy. Local economic considerations and long-term stability through job opportunities and growth are important to the communities that SoCalGas proposes to run their pipeline through. To have a comprehensive economic analysis that adheres to the Decision, SoCalGas must include these analyses in their overall economic analyses of the Angeles Link Project.	SoCalGas appreciates the concern related to the societal costs of air pollution. The Nitrogen Oxides (NOx) Emissions Assessment will evaluate the estimated NOx and other air emissions associated with the production, storage and transportation of clean renewable hydrogen, as well as the estimated emissions and emissions reductions associated with end users. An analysis of the societal costs associated with those air emissions is currently outside of the scope of the Angeles Link Phase 1 analyses. SoCalGas also understands that local economic considerations are important to the communities that the Project's pipelines will run through and to the communities the Project will serve. The CPUC Decision 22-12-055 requires SoCalGas to evaluate workforce planning and training and the Workforce Planning & Training Evaluation will address that analysis. (Decision, OP 6(e).). Detailed analysis of job opportunities and lob locations is currently outside the scope of the Angeles Link Phase 1 analyses. SoCalGas also concurs that the development of Angeles Link must prioritize environmental justice and address concerns of disadvantaged communities. As part of the Environmental & Social Justice Analysis under the Phase 1 analyses, an environmental social justice analysis will be prepared that will involve two parts. The first part includes an environmental justice screening, which will provide a high-level overview of the disadvantaged communities potentially affected by the Project. The communities will be identified from available environmental justice screening tools, including CalEnviroScreen and the Biden-Harris Administration's Climate and Economic Justice Screening Tool. High-level maps using preliminary Angeles Link routing and GIS screening tools will be prepared. This analysis will also evaluate the Project's alignment with applicable goals and objectives in the CPUC's Environmental and Social Justice Action Plan 2.0, as well as the potential impacts and benefits to disadvantaged communities and other low-income communities of color. The second part of the Environmental & Social Justice Analysis includes development of the Environmental and Social Justice Community Engagement Plan. The Engagement Plan would be implemented in Phase 2 of Angeles Link to gather information regarding community concerns and to evaluate methodologies to mitigate impacts to historically marginalized communities. Angeles Links is committed to a participatory approach, ensuring that the project develops in a manner that is beneficial and reflective of the community's aspirations and needs.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
16.	10/13/2023	Communities for a Better Environment (Theo Caretto)	b. Concrete Costs of Hydrogen Economic studies should include true costs of hydrogen deployment in the industries identified in SoCalGas' Demand Study. If SoCalGas intends to study demand across its entire service territory, it is imperative that the costs of developing that demand are known. At present, hydrogen end-use infrastructure in Southern California is minimal. The Los Angeles Department of Water and Power has already committed at least $800 million dollars to retrofit only part of one gas generating station for hydrogen combustion. Deployment of hydrogen fuel cell electric vehicles and hydrogen fueling stations is low. Mileage of hydrogen-ready piping for end-use delivery is minimal. Infrastructure and technology for commercial harbor craft, ocean going vessels, aerospace, and many industrial end-uses are in their infancy. Projecting each of these demands is one thing, realizing them will be quite another. Understanding these economic strains is essential to assessing the economic impacts of the project and vetting hydrogen against alternatives like electrification. SoCalGas must strive for concrete cost estimates for the end-uses that provide the foundation of their estimated hydrogen demand in addition to their study of the economics of the pipeline itself.	The CPUC Decision 22-12-055 requires SoCalGas to evaluate the cost effectiveness of the Project against alternatives and determine a methodology to measure cost effectiveness between alternatives. (Decision, OP 6(d).) Pursuant to that requirement, the High-Level Economics and Cost-Effectiveness Study will assess a levelized cost of producing and delivering clean renewable hydrogen into Central and Southern California, including the Los Angeles Basin. The High-Level Economics and Cost-Effectiveness Study will also provide a high-level analysis of the costs for mobility, power, industrial sectors adaptation of clean renewable hydrogen as compared to certain alternatives, such as electrification. Cost estimates for specific end-user projects are outside the scope of the Phase 1 analysis. As explained in response to previous PAG comments, the forecasted cost of clean renewable hydrogen is not in the analysis, which focuses on the total potential of hydrogen as a fuel in Central and Southern California, including the Los Angeles Basin. SoCalGas recognizes the forecasted cost of clean renewable hydrogen is an important factor in projecting adoption and could be assessed in future phases of the Angeles Link project.
17.	10/13/2023	Communities for a Better Environment (Theo Caretto)	IV. Environmental Social Justice Analysis The projects' impact on disadvantaged communities should be considered throughout all regulatory, policy, & environmental studies, not just in the EJ analysis portion. Environmental Social Justice Analysis will utilize CalEnviroScreen data and Biden-Harris Administration's Climate and Economic Justice Screening tool. CBE recommends using additional metrics for identifying DAC communities such as participants of utility assistance programs such as SoCalGas CARE program, LADWP EZ-Save Program, LADWP Senior/Disability Lifeline ratepayers.	As part of the technical approach for the Environmental & Social Justice Analysis, SoCalGas considered various screening tools to ensure that data on disadvantaged communities could be obtained and considered in the Phase 1 analysis. As this comment highlights, the Environmental & Social Justice Analysis will evaluate the Project's impacts associated with environmental justice using the CalEnviroScreen data and Biden-Harris Administration's Climate and Economic Justice Screening Tool. SoCalGas appreciates this comment's suggestion to use additional metrics to identify DAC communities such as reviewing participants of the SoCalGas CARE program, LADWP EZ-Save Program, and the LADWP Senior/Disability Lifeline ratepayers. The SoCalGas CARE program can be implemented during the operational phase of the project to support customers who may qualify. However, SoCalGas maintains customer privacy information and incorporating data from the SoCalGas CARE customer assistance program into the Environmental & Social Justice Analysis would be inconsistent and with applicable customer privacy requirements. SoCalGas does not have access to LADWP customer information.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
18.	10/13/2023	Communities for a Better Environment (Theo Caretto)	SoCalGas has spoken favorably of Angeles Link and clean renewable hydrogen and downplayed key concerns brought up by environmental justice voices on the negative impacts of this project such as hydrogen leakage and NOx pollution. SoCalGas is not fit to execute a community engagement plan and may spread misinformation as well as make false promises to community members about safety and environmental impacts of Angeles Link. If Angeles Link were to conduct a Stakeholder Engagement Plan, all materials should be approved by environmental justice participants and the Public Utilities Commission. In addition to the several issues CBE raises in this letter, we share, attached, Equity Principles for Hydrogen, an Environmental Justice Position on Green Hydrogen in California which offers direction on environmental justice concerns for hydrogen from nine California environmental justice organizations.	SoCalGas supports open and transparent communication with all stakeholders and is preparing Phase 1 studies of Angeles Link to provide objective analysis of the Project's potential environmental impacts. Preliminary findings from Phase 1 analyses will be provided on an ongoing basis and the PAG and CBOSG stakeholders will have an opportunity to provide feedback on the analyses before final studies are published. In addition, in direct response to stakeholder feedback, SoCalGas added the development of an Environmental and Social Justice Community Engagement Plan (Engagement Plan) to the scope of the Environmental and Social Justice Analysis. The Engagement Plan would be implemented in Phase 2 of Angeles Link to gather information regarding community concerns and to evaluate methodologies to mitigate impacts to historically marginalized communities. During the CBOSG meeting on September 26, 2023, SoCalGas facilitated a break-out working group session with CBOSG members to solicit their feedback on the Engagement Plan's technical approach. The CBOSG stakeholders provided ideas for the contents of the Engagement Plan and that input will be incorporated into development of the Engagement Plan. The CBOSG will have an opportunity to review and provide additional input on the Engagement Plan, which will be submitted to the California Public Utilities Commission as part of Phase 1. Please also see Response to Comment 9 with regard to the Equity Principles document.
19.	11/3/2023	Communities for a Better Environment (Theo Caretto)	Communities for a Better Environment (CBE) submits this letter of feedback to Southern California Gas Company (SoCalGas) on the following Technical Approaches for Phase One: Production Planning & Assessment, Preliminary Routing/Configuration Analysis, and Pipeline Sizing & Design Criteria. CBE reiterates the standard of transparency set out in the Public Utility Commission's Angeles Link Decision in regard to the studies being conducted in Phase One, which SoCalGas has not yet met. CBE request SoCalGas provide more specific study descriptions, all study inputs and assumptions, and return full and clear data in study results. CBE also reattaches the equity hydrogen principles of nine major California environmental justice organizations.	SoCalGas has been actively engaging the Planning Advisory Group (PAG) throughout the Phase 1 process, including, to date, soliciting input on the scopes of work and technical approaches for the Production Planning & Assessment, Preliminary Routing/Configuration Analysis, and Pipeline Sizing & Design Criteria. In terms of transparency, SoCalGas has kept PAG members apprised of the Phase 1 process, including facilitating quarterly and interim meetings on the studies stipulated by the CPUC in Decision 22-12-055. The studies are in the early stages and work has focused on developing work plans and technical approaches, which were distributed to the PAG for input. As the studies progress, more information will become available, including preliminary findings (with data outputs, where applicable) and draft and final study reports. To further support sharing information on a timely basis and improve transparency to the extent possible, SoCalGas created a SharePoint site for the PAG. Members have access to all PowerPoint presentations, supplemental materials, transcripts, and recordings from PAG meetings and workshops. Phase 1 study documents and informational resources will also be posted to this living library as they become available.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
20.	11/3/2023	Communities for a Better Environment (Theo Caretto)	I. Production Planning Assessment SoCalGas must ensure that green hydrogen production modeled in its assessment will not draw down renewable energy supporting California's electricity grid. Production of green hydrogen is an energy-intensive endeavor with the potential to increase fossil fuel reliance and divert renewable energy from powering California's homes and businesses directly. As detailed in CBE's Hydrogen Equity Principles, it is more economically and energy efficient to directly electrify end uses with renewable electricity than to rely on hydrogen as an energy source. For these reasons, hydrogen production should not interfere with direct electrification. Therefore, the SoCalGas Production Planning Assessment must assume hydrogen production supported by new renewable electricity buildout or production only from surplus renewable energy. Without such careful planning, the production planning assessment could model a scenario that would increase reliance on fossil gas generation and eliminate any climate benefits.	The Production Planning & Assessment aims to understand the availability of renewable resources that could be added for hydrogen production. This study assumes renewables for hydrogen production are behind-the-meter systems that could be independent from the electric grid. As a result, currently it is assumed when renewables (e.g., solar) are not available for hydrogen production, grid energy will not be utilized to supplement power for production. In addition, the study will also explore how existing renewables on the California Independent System Operator (CAISO) grid that are curtailed may be reused for hydrogen production. Please also see Response to Comment 9 with regard to the Equity Principles document.
21.	11/3/2023	Communities for a Better Environment (Theo Caretto)	Production planning should also explicitly exclude carbon credits; carbon capture, sequestration, use, and storage; and other "resource shuffling" arraignments that which divert power generated by existing hydropower, solar, or wind facilities, causing increased grid reliance on fossil fuels. Carbon accounting practices further jeopardize any possible climate benefits of green hydrogen.	The Production Planning & Assessment does not assume the use of carbon credits. Pathways for producers could be considered to the extent they enable hydrogen production to meet the clean renewable hydrogen standard set forth in the CPUC's Decision 22-12-055. For instance, this study does evaluate the potential for new renewable power sources to be used for hydrogen production as well as exploring how renewables on the CAISO grid that are curtailed may potentially be reused for hydrogen production.
22.	11/3/2023	Communities for a Better Environment (Theo Caretto)	Finally, inaccurate demand study inputs and results will negatively impact the accuracy and value of the production planning assessment. As the Utility Consumer Action Network detailed in their September 25 and October 21 feedback letters, SoCalGas' "conservative" demand scenario overestimates Angeles Link's (the "Project") hydrogen demand by at least a factor of ten. Whatever demand scenarios SoCalGas proceeds with, its production analysis must include the costs associated with building out these additional renewable energy sources and electrolyzer facilities to support the Projects demand. Without a clear picture of the total costs required to produce, transport, and use the amount of hydrogen SoCalGas forecasts in its Demand Study, it will be exceedingly difficult to realistically assess the Project.	SoCalGas previously considered comments concerning projections in the Demand Study and found recommendations to lower projected demands to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. The Production Planning & Assessment Study will include costs associated with clean renewable hydrogen production from electrolytic or other production pathways that meet the clean renewable hydrogen standard set forth in the CPUC's Decision 22-12-055. The production costs will then be an input into the High-Level Economic Analysis & Cost Effectiveness Study, which will illustrate the levelized delivered cost of hydrogen (e.g., the cost inclusive of production, transport, etc.) considering the potential amount of hydrogen throughput SoCalGas forecasts to be served by Angeles Link. In addition, the results from the Demand Study provide the total potential hydrogen demand in various sectors (i.e., total addressable market) within SoCalGas's service territory. The throughput specifically served by Angeles Link is expected to be a portion of the total potential demand.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
23.	11/3/2023	Communities for a Better Environment (Theo Caretto)	II. Preliminary Routing & Configuration Assessment According to SoCalGas, this study will "(i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, and the need for new rights-of-way; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges." CBE is particularly concerned with SoCalGas using existing pipelines and infrastructure to transport and store hydrogen and locating pipelines near sensitive receptors. Much of the gas infrastructure in the Los Angeles Basin was built in and around low-income and minority residential communities without their input, taking advantage of discriminatory zoning practices, such as redlining, as well as the historical silencing of these communities. After decades living with harmful local air, water, and land pollution and climate impacts, these communities will not consent to incomplete and even harmful climate policies dictating the rollout of hydrogen in California. A poorly designed hydrogen rollout could concentrate pollution in already burdened communities even while statewide emissions decline. For the Project, SoCalGas must take pains to remedy this past environmental injustice. Therefore, SoCalGas must be entirely transparent about the existing pipelines, franchises, rights-of-way, and other infrastructure it may utilize; outline its exact plans for that infrastructure; and not proceed without informed consent and forward-looking participation of impacted communities.	SoCalGas is committed to a transparent and robust stakeholder engagement process. Our actions throughout the Phase 1 feasibility study process have upheld this commitment consistent with the requirements of Decision 22-12-055, which calls for quarterly stakeholder engagement meetings with parties in the Angeles Link proceeding and affected interest groups, including, but not limited to Environmental and Social Justice (ESJ) communities, ratepayer advocacy groups, union organizations, and state agencies. The Phase 1 feasibility studies and their findings will be published as they become available, and stakeholders have been and continue to be invited to review and collaborate throughout this process including on the Scope, Technical Approach, Preliminary Findings, and Draft Reports. In addition, as part of the Environmental & Social Justice Analysis under the Phase 1 analyses, an environmental social justice analysis will be prepared that will involve two parts. The first part includes an environmental justice screening, which will provide a high-level overview of the disadvantaged communities potentially affected by the Project. The communities will be identified from available environmental justice screening tools, including CalEnviroScreen and the Biden-Harris Administration's Climate and Economic Justice Screening Tool. High-level maps using preliminary Angeles Link routing and GIS screening tools will be prepared. This analysis will also evaluate the Project's alignment with applicable goals and objectives in the CPUC's Environmental and Social Justice Action Plan 2.0, as well as the potential impacts and benefits to disadvantaged communities and other low-income communities of color. The second part of the Environmental & Social Justice Analysis includes development of the Environmental and Social Justice Community Engagement Plan. For more information on development of the Engagement Plan (Engagement Plan), see Response to Comment 18. In subsequent phases of the Project, SoCalGas will implement the Engagement Plan and work directly with those communities that would be most affected by potential pipeline routing. For example, once preliminary pipeline routing alternatives are established, we will use this information to identify and engage with the communities that may be directly affected.
24.	11/3/2023	Communities for a Better Environment (Theo Caretto)	III. Pipeline Sizing & Design Assessment In determining pipeline sizing and design, the emphasis should be on safety, leak prevention, and appropriate inputs. Hydrogen leaks pose local and climate risks. Though hydrogen is not a direct greenhouse gas, it has significant indirect warming impacts detailed in CBE's October 13 feedback letter. The chemical reactions of hydrogen in the atmosphere increase concentrations of other greenhouse gases, like methane, ozone, and stratospheric water vapor. These climate impacts will limit or erase any benefits of the Project if leakage is not carefully monitored and strictly limited. Additionally, hydrogen leaks harm local communities. Hydrogen is even more explosive than methane, and it is odorless, tasteless, and colorless. This makes leaks dangerous to residents' physical safety and health and difficult to identify without adequate leak detection technology. It is imperative that hydrogen leaks are prevented throughout the Angeles Link Project. SoCalGas should release explicit information on planned pipeline materials, expected leakage rates, leakage monitoring technology, proposed retrofits, siting, and leakage notification and safety protocols.	At SoCalGas, safety is a core value and is at the foundation of everything we do and will be incorporated into every phase of the Angeles Link Project. The Pipeline Sizing & Design Study will include an evaluation of materials and a review of established industry codes, standards, and regulations with a focus on safety and leakage prevention. In addition, the Plan for Applicable Safety Requirements Study will include identification of specifications, standards, and protocols for leak detection and safe operation (including safety codes and recommendations) as applicable to employee, public, infrastructure, and contractor safety. Furthermore, the Workforce Planning & Training Evaluation Study will include a review of SoCalGas's existing processes to further integrate hydrogen-specific methods, technology, reporting, compliance, and safety notifications with a focus on leak survey, detection (systemwide), and mitigation. Lastly, a separate study will be completed on potential hydrogen leakage. The Hydrogen Leakage Study will evaluate the potential for hydrogen leakage associated with new infrastructure (e.g., production, compression, storage, and transportation of clean renewable hydrogen), as well as opportunities to minimize the potential for hydrogen leakage.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
25.	10/20/2023	Environmental Defense Fund (Joon Hun Seong)	Subject: Environmental Defense Fund and Natural Resources Defense Council Joint Comments on Phase One Study Technical Approaches First, with respect to the proposed initial screening and evaluation criteria, EDF and NRDC highlight following important considerations to be included: affordability, cost-allocation, and compatibility with state climate policies of proposed project options and alternatives. While such considerations may be implicitly covered by the framework proposed in the PAG meeting, we believe that they are critical enough to be explicitly highlighted. These considerations will be central in evaluating whether various uses of hydrogen or non-hydrogen alternatives are appropriate decarbonization pathways for the state to pursue. If the potential Angeles Link project were to proceed beyond the currently authorized Phase 1 studies, the "used-and-usefulness" of the project will be a key consideration. A full consideration of this issue, in turn, will necessarily involve a determination of which customer segments are "using" the project—and therefore who pays for it and how much they would be paying. As such, we believe that affordability and cost-allocation are deeply connected but distinct concerns from cost-effectiveness in that it focuses on the impacts to the right set of ratepayers; and that they should be separately examined in the technical studies as well. Also, climate and emissions impacts, while potentially falling under the broader umbrella of environmental and social justice concerns, should be highlighted as driving issues. EDF and NRDC propose altering the proposed Phase 1 project options and alternatives study technical approach per the following: Step 5: Feed alternatives into cost effectiveness study and environmental & social justice study → Step 5: Feed alternatives into cost effectiveness, *affordability, cost-allocation, emissions impact*, and environmental & social justice study	SoCalGas appreciates the considerations raised in this comment. The Project Options & Alternatives Study will evaluate the Project's and the potential project alternatives' compatibility with state climate policies. SoCalGas appreciates the questions around affordability. The High-Level Economics and Cost Effectiveness Study will evaluate the cost effectiveness of the Project as compared to alternatives, including electrification. SoCalGas believes that the more cost-effective pipeline option will lead to the most affordable outcome for ratepayers. Moreover, in future phases of Angeles Link, SoCalGas will begin examining the estimated cost to ratepayers and potential cost allocation and rate design approaches for the project, with the latter informing an affordability analysis supporting the selection of a preferred route. The Environmental & Environmental Social Justice analysis will evaluate environmental and social justice considerations of the Project and the alternatives selected for further analysis. In addition, the Nitrogen Oxides (NOx) Emissions Assessment and the Greenhouse Gas Emissions (GHG) Evaluation will evaluate NOx, other air emissions, and GHG emissions associated with the production, storage and transportation of hydrogen, as well as emissions associated with end users. Analysis of the potential environmental impacts of the Project and the selected alternatives will be included in the Environmental & Environmental Social Justice. Analysis of the air emissions associated with the alternatives will be qualitative, as the analysis of quantitative emissions impacts of alternatives is outside the scope of the Phase 1 feasibility studies. The environmental analysis of the Project and alternatives from the Environmental & Environmental Social Justice, as well as the specific quantitative air emissions analysis for the Project from the NOx Emissions Assessment and GHG Evaluation will inform conclusions on the Project Options and Alternatives Study.
26.	10/20/2023	Environmental Defense Fund (Joon Hun Seong)	Second, consideration of hydrogen pipeline alternatives—and specifically of localized hydrogen hubs—should take a comprehensive account of various concerns associated with hydrogen transport, including leakage concerns. We have consistently highlighted the importance of incorporating leakage concerns into any consideration of hydrogen projects; and appreciate the due attention SoCalGas has promised to pay to this issue as mentioned in previous PAG meetings. Put bluntly, we believe shorter pipelines run smaller risks of leakage. Focusing solely on cost-effectiveness may end up prioritizing longer pipeline options with riskier leakage integrity—which would undermine the entire reason for pursuing a clean hydrogen project. Therefore, EDF and NRDC urge a comprehensive evaluation of alternatives that takes these concerns into account.	The Hydrogen Leakage Assessment Study will evaluate leakage associated with production, storage, and transportation of hydrogen and will include identification and evaluation of potential mitigation measures. The Hydrogen Leakage Study evaluates through a literature review a range of values for potential hydrogen leakage. The range of values will be presented as percentages for each component of new proposed infrastructure and as percentages for each minimization opportunity. Volumetric estimates of the potential for leakage will not be developed because detailed infrastructure information is not available at the time of the study. Additional leakage analysis may be completed as more Project details develop in future phases. Furthermore, it is important to note that length of pipeline does not necessarily result in greater or fewer leaks. More directly related to leak management are the material of the pipeline, pipe fittings and ongoing maintenance activities. Among other things, the Pipeline Sizing & Design Criteria Study will estimate potential pipeline sizes for the pipeline route from production to end-use; identify specific materials for pipeline, fittings, and differences in operational equipment; and discuss safety considerations, pressures, and maintenance operations associated with design.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
27.	10/20/2023	Environmental Defense Fund (Joon Hun Seong)	Third, we recommend a more granular geographic analysis of the cumulative impact of various air pollutants—including, but not limited to, NOx emissions—arising from hydrogen usage connected to the potential Angeles Link project in addition to a SoCalGas territory-wide impact analysis. The cumulative impacts assessment should be performed in accordance with guidance from the Environmental Protection Agency.[1] We highlight existing resources that provide pollution impact data (including NOx emissions) on communities across California such as CalEnviroScreen and the Climate and Economic Justice Screening Tool (CEJST). EDF and NRDC recommend that SoCalGas actively utilize these tools to conduct a more granular geographic impact analysis of hydrogen usage—both in terms of the decrease in emissions from fuel substitution as well as potential emissions increases from hydrogen infrastructure as identified by SoCalGas. [1] U.S. Environmental Protection Agency (EPA), EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum, January 2023. Available at: https://www.epa.gov/system/files/documents/2022-12/bh508-Cumulative%20Impacts%20Addendum%20Final%202022-11-28.pdf	In response to feedback from the PAG, the NOx and Other Air Emissions Assessment will now include a map depicting anticipated location-based NOx reductions. The estimated NOx emissions associated with Angeles Link will be geographically represented using CalEnviroScreen to layer location-based information for disadvantaged communities.
28.	10/20/2023	Environmental Defense Fund (Joon Hun Seong)	Fourth, EDF and NRDC recommend a by-sector breakdown of NOx emissions reductions, considering the impacts of California's Advanced Clean Fleet and Advanced Clean Truck rules. While hydrogen (and the Angeles Link project) may play a part in reducing NOx emissions in the transportation sector, any emissions impact arising from these new rules will have to happen regardless. In contrast, a by-sector breakdown that separates out transportation sector NOx emission impacts from those of other sectors that do not yet have a set mandate from the state—such as hard-to-electrify heavy industries—will allow for a more accurate assessment of the unique potential impact of the proposed Angeles Link project.	The Nitrogen Oxides (NOx) and Other Air Emissions Assessment will evaluate potential NOx emissions increases and reduction associated with the Project, accounting for emissions from transmission of hydrogen, third party production, storage, and end users. The assessment will provide NOx emissions estimates broken out by sector (mobility, power generation, and hard-to-electrify industrial). The NOx emissions estimates are based on estimated demand values across those three sectors as provided in the parallel Demand Study prepared as part of the Phase 1 analyses. The NOx emissions estimates will also be prepared for those sectors by zip code in order to prepare maps in response to stakeholder feedback.
29.	10/20/2023	Environmental Defense Fund (Joon Hun Seong)	Fifth, greenhouse gas (GHG) emission potential evaluation of the proposed Angeles Link project should include not only the global warming potential over a 100-year period (GWP100) as SoCalGas is planning, but also the potential over a 20-year period (GWP20). Peer-reviewed research authored by EDF scientists have found that the GHG impacts of hydrogen are mostly short-term and indirect.[2] Therefore, an accurate assessment of the GWP associated with hydrogen—and in particular, the impacts arising from a fixed infrastructure such as Angeles Link which could serve as a continuous source of leakage—must focus on the short-term climate impacts, rather than just the longer-term ones. [2] Ocko, I. B. and Hamburg, S. P.: "Climate consequences of hydrogen emissions", Atmos. Chem. Phys., 22, 9349–9368, https://doi.org/10.5194/acp-22-9349-2022, 2022	In direct response to this stakeholder feedback recommending analysis of the 20-year GWP, a table summarizing values found in the existing literature regarding both 20- and 100-year estimated GWP values for hydrogen will now be included in the Greenhouse Gas Emissions Evaluation as part of the Phase 1 analyses. SoCalGas recognizes that the scientific understanding and research on the topic of the appropriate GWP for hydrogen is continually evolving, and we are committed to staying informed about the latest findings and incorporating them into our discussions and analyses.

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30.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	**Subject:** Environmental Defense Fund Comments on October 18th PAG Workshop Discussions First, on the topic of production planning and assessment, EDF would like to echo acknowledgement from Southern California Gas Company (SoCalGas) representatives at the workshop that, it is important to remain realistic about the actual level of hydrogen supply that can be expected from various "green" production sources. Specifically, EDF cautions overly optimistic projections of hydrogen sourced via biomass and biomethane. It is important to keep in mind—as SoCalGas expressed during the PAG discussions—that the most realistic source of hydrogen production in line with California's climate and environmental objectives will be electrolysis using renewable electricity. Moreover, any use of biomass and biomethane as feedstock for hydrogen production must adhere to general procurement standards applicable to those feedstocks as articulated by EDF in existing and on-going regulatory proceedings.[1] [1] See, e.g., previous EDF comments for the on-going biomethane standards and requirements proceeding (R. 13-02-008) before the California Public Utilities Commission.	While hydrogen produced via electrolysis is central to Angeles Link, the Production Planning & Assessment will provide a high-level analysis of other potential technology pathways (e.g., biomass/biogas) that could meet the CPUC's definition of clean renewable hydrogen in Decision 22-12-055. The use of biomass/biogas for hydrogen production will need to be compliant with any applicable regulatory standards, which is currently defined in CPUC Decision 22-12-055, Ordering Paragraph 3(a) as, "clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process."
31.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	With such general context in mind, EDF further reiterates the need to adhere to the "three pillars" of hydrogen production using renewable electricity (i.e., hourly matching, additionality, and deliverability). Any technical study conducted as Phase 1 of the potential Angeles Link project should take those "three pillars" as basic project assumptions. EDF also cautions any "leaps of faith" when it comes to comparative analysis of hydrogen with various other energy storage technologies. The lack of technical maturity or economic feasibility on the part of a comparable energy storage technology does not automatically guarantee hydrogen will be appropriate for a given use-case or demand scenario. Production planning and assessment for hydrogen supplied through a potential Angeles Link project, then, must be justified on the merits of hydrogen use itself and then compared to analogous technologies—not vice versa. In previous comments, the Utility Consumers' Action Network (UCAN) noted that SoCalGas' estimated hydrogen demand figures from even a "conservative" scenario is ten times higher than those projected by UCAN.[2] EDF expresses concern that SoCalGas is relying on a figure much higher than projected by PAG members; and that such higher figures may be a result of unrealistic demand and use-case assumptions such as the "leaps of faith" described above. Instead, EDF urges that all technical studies be based on realistic demand figures and assumptions fully shared with the PAG members. [2] Utility Consumer's Action Network (UCAN), Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings (UCAN Demand Study Feedback) submitted September 25, 2023 at 7; UCAN, Feedback for SoCalGas Regarding SoCalGas's Technical Approach for Phase One Studies (UCAN Technical Approach Feedback) submitted October 21, 2023 at 4.	The Production Planning & Assessment seeks to assess the merits of potential clean renewable hydrogen production pathways consistent with the CPUC's Decision 22-12-055. This includes the desire to understand the availability of renewable resources that could be added for hydrogen production. In addition, it will also explore how renewables on the CAISO grid that are curtailed may potentially be reused for hydrogen production. Regarding the results of the Demand Study, it should be noted that the study provides the estimated total potential clean renewable hydrogen demand in various sectors (i.e., total addressable market) across all of SoCalGas's service territory. The throughput specifically served by Angeles Link is expected to be a portion of the total potential demand. SoCalGas previously considered comments concerning projections in the Demand Study and found recommendations to lower projected demands to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. The use case assumptions of demand considered in the Production Planning & Assessment will be shared with the PAG.

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32.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	EDF also recognizes that that the demand forecast has a direct impact on overall affordability; and while no forecast will ever be fully accurate, some range of variance should be "baked in" from the onset. To that end, EDF encourages scenario analysis with the intent of understanding how a growing demand for hydrogen may be scaled up within different "stair steps" to ensure that the project is proposed at the right size with an appropriate level of confidence. To address these questions—as well as any other related questions around hydrogen demand raised by PAG members—EDF suggests a future PAG meeting dedicated to the topic of demand forecasts used in the Phase 1 studies.	SoCalGas agrees with EDF's insight on forecasting and acknowledges that a scenario analysis was performed. The Demand Study examines potential hydrogen demand from 2025-2045 in Mobility, Power Generation and Industrial sectors. Clean renewable hydrogen demand is forecasted in three different scenarios: conservative, moderate, and ambitious. The total potential hydrogen demand volumes for those scenarios for 2045 ranged from 1.9 to 5.9 MMTPY. The scenarios differed based on varying assumptions such as which sub-sectors were included and different rates of adoption. Given that SoCalGas is in the feasibility stage of Angeles Link, we agree that looking for opportunities to scale up to align with growing demand is an important consideration. A review of the Demand Study preliminary findings, including demand forecasts and scenarios, was presented last August at a PAG meeting and time was provided to the PAG and CBO members to submit comments. The draft Demand Study was released in Q1 2024 for PAG and CBOSG members to have 30 days to provide feedback on the detailed draft for SoCalGas to consider before finalizing the study. The Pipeline Sizing & Design Criteria study will also provide information on estimated potential pipeline sizes for the pipeline route from production to end-use.
33.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	Additionally, EDF notes that it may be prudent to produce hydrogen recognizes at times where no instant demand for it exists, in order to maintain hydrogen production cost-efficiency. This would indicate that understanding how the potential Angeles Link project may be configured for some level of hydrogen storage for future use would be important in production planning and assessment, since very few truly "24/7" industrial operations exist.	In coordination with other Phase 1 studies, the Production Planning & Assessment will explore the role of storage as part of a system that can help optimize clean renewable hydrogen production and demand profiles.
34.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	Second, on the issue of pipeline routing, EDF supports comments raised during the PAG meeting around the regulatory uncertainty of "inter-state" hydrogen pipeline transport. As such, EDF believes any Phase 1 study—and pipeline routing studies specifically—should focus on intra-state routing options. If SoCalGas chooses to consider inter-state pipeline connection, such options should be evaluated and marked distinctly from intra-state options; and SoCalGas should clearly identify the regulatory uncertainties and assumptions behind the studies. Additionally, EDF does not oppose use of the PIVVOT tool as proposed by SoCalGas but notes that the use of the tool should not and cannot replace on-the-ground community-based feedback. Also, since the tool is proprietary software that is not easily accessible to PAG members and other stakeholders, SoCalGas should be as transparent as possible with both the results from, and the assumptions used in the tool.	The Preliminary Routing/Configuration Analysis will evaluate only pipeline routes that are intrastate and will identify the regulatory uncertainties and assumptions behind any references to interstate facilities. Underground hydrogen storage options located in the surrounding states will be identified from a technical perspective to fully address the role that underground storage could potentially play in a hydrogen pipeline system located within California. While Pivvot presents a wide variety of information, SoCalGas agrees that it cannot replace on-the-ground community-based feedback. In subsequent phases of the project, SoCalGas will continue to engage with communities and stakeholders more directly affected by preferred route corridors. In direct response to stakeholder feedback, SoCalGas added the development of an Environmental and Social Justice Community Engagement Plan (Engagement Plan) to the scope of the Environmental and Social Justice Analysis. The Community Engagement Plan would be implemented in Phase Two of Angeles Link to gather information regarding community concerns and to evaluate methodologies to mitigate impacts to historically marginalized communities. For more information on the Engagement Plan, see response to Comment 18. SoCalGas will also provide information on the assumptions behind the Pivvot analysis and the outputs from that analysis.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
35.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	Furthermore, EDF highlights that the potential Angeles Link project is a hydrogen pipeline project, not a general hydrogen supply project. Costs to hydrogen pipeline customers served by a potential Angeles Link project—and if the project is ever included in the rate-base, rate impacts to appropriate ratepayers—will be central questions in the final evaluation of Phase 1 studies. Therefore, the pipeline routing study, as well as all other relevant technical studies, should look explicitly at what the most cost-effective option for potential hydrogen pipeline customers would be. As EDF has indicated consistently throughout this process, SoCalGas should examine multiple scenarios for the pipeline routing, including a hub model and different ways of disaggregating production, so that it can respond to overall affordability and community concerns.	The Project Options & Alternatives Study will evaluate a range of potential alternatives that may meet the Project's underlying purposes, including those required by the Final Decision, such as a localized hub alternative. The Project Options & Alternatives Study will look at a list of alternatives to the Angeles Link Project. Alternatives that are deemed feasible and scalable will go through screening criteria. Alternatives that meet the screening criteria will be carried forward to the High-Level Economic and Cost-Effectiveness Study, which will evaluate the cost effectiveness of each selected alternative as compared to the cost effectiveness of the proposed Project. For more information on how alternatives will be identified and reviewed, see response to Comment 3. Preliminary cost estimates will be calculated for both a localized hub as well as for a preferred route in the Preliminary Routing/Configuration study. These costs will be included in the Cost-Effectiveness study. In subsequent phases of the project, cost evaluation will be completed at a more detailed level to assess the cost between different alternatives.
36.	11/3/2023	Environmental Defense Fund (Joon Hun Seong)	Third, on technical approaches to pipeline sizing and design, EDF notes that current approaches as presented by SoCalGas focus on existing safety and environmental standards. EDF's PAG comments submitted July 31, 2023, included various peer-reviewed articles that highlighted the potential impact of hydrogen as an indirect greenhouse gas; and the need for far more stringent leakage detection and prevention methods in the light of such information. Specifically, studies have shown that leak detection and prevention at the parts per billion level is needed to ensure climate benefits from the use of hydrogen, while commercially available sensors—and therefore, standards—fall far short of that requirement at parts per million levels.[3] Therefore, pipeline sizing and design technical studies should also go beyond simply adhering to existing standards, instead accounting for the level of leak detection and prevention that would ensure climate benefits of hydrogen use—and actively take into account both the various studies on hydrogen leakage recommended by PAG members and SoCalGas's own leakage study planned as part of Phase 1 of the potential Angeles Link project. EDF suggests that a future PAG meeting specifically dedicated to the question of pipeline material selection to understand what level of leaks could be expected from each pipe material option. It is not in the interest of any potential customer to invest in the wrong pipeline material initially, only to have to replace the pipeline material after field operation. EDF suggests that the PAG could help provide guidance on this question. [3] Ocko, I. B. and Hamburg, S. P.: "Climate consequences of hydrogen emissions", Atmos. Chem. Phys., 22, 9349–9368, https://doi.org/10.5194/acp-22-9349-2022, 2022; Esquivel-Elizondo, Sofia, Alejandra H. Mejia, Tianyi Sun, Eriko Shrestha, Steven Hamburg, and Ilissa Ocko. 2023. "Wide Range in Estimates of Hydrogen Emissions from Infrastructure." OSF Preprints. April 13. https://doi.org/10.31219/osf.io/unzrm.	The Pipeline Sizing & Design study in Phase 1 will begin the process of identifying recommendations for materials in terms of design pressure and maximum allowable operating pressure, corrosion allowance, and pipe coating. After necessary range of pipeline diameters have been identified, the accompanying required wall thicknesses and grades will be determined per Federal Regulation 49 CFR 192 and industry best practice ASME B31.12, Hydrogen Piping and Pipelines. At this phase, a development of necessary metallurgical recommendations will be initiated with high-level consideration for leakage. Final piping materials will be selected in a future phase of the project. The draft Pipeline Sizing & Design Study will be released for review and input by the PAG and CBOSG.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
37.	10/13/2023	Food and Water Watch (Andrea Vega)	Phase One of the SoCalGas Angeles Link Project continues to provide vague and insufficient information to the Community Based Organizations Stakeholder Group (CBOSG) during meetings and workshops. As a member of the CBOSG, Food & Water Watch would like to stress that the lack of transparency from SoCalGas on this Project indicates a concerning lack of interest in substantial feedback.	SoCalGas is committed to a transparent and robust stakeholder engagement process. Our actions throughout the Phase 1 feasibility study process have upheld this commitment consistent with the requirements of Decision 22-12-055, which calls for quarterly stakeholder engagement meetings with parties in the Angeles Link proceeding and affected interest groups, including, but not limited to Environmental and Social Justice (ESJ) communities, ratepayer advocacy groups, union organizations, and state agencies. The Phase 1 feasibility studies and their findings will be published as they become available, and stakeholders have been and continue to be invited to review and collaborate throughout this process including on the Scope, Technical Approach, Preliminary Findings, and Draft Reports.
38.	10/13/2023	Food and Water Watch (Andrea Vega)	<u>Emissions Assessment</u> For the proposed Angeles Link Project, SoCalGas must create a detailed plan on how potential impacts of the Project would be measured during production, transportation, and storage. It is crucial that there also be a plan for how leakage would be measured, and how SoCalGas will ensure that leakage is measured accurately. Despite what SoCalGas representatives have been presenting at quarterly meetings and workshops, the reality is that hydrogen is an indirect greenhouse gas which has known climate impacts.	SoCalGas assumes this comment may be referring to the potential environmental and/or environmental justice impacts associated with the Project. The Environmental & Social Justice Analysis will provide a high-level desktop analysis of the potential environmental impacts associated with the proposed Angeles Link pipeline infrastructure and supporting appurtenances, as well as a high-level analysis of the potential environmental impacts associated with third-party clean renewable hydrogen production and storage. The analysis for the pipeline infrastructure, production, and storage will also address potential environmental justice impacts. In addition, a separate Hydrogen Leakage Assessment is being prepared to evaluate the potential for hydrogen leakage associated with new infrastructure (i.e., production, compression, storage, and transportation of clean renewable hydrogen), as well as opportunities to minimize the potential for leakage. Furthermore, as more details of the proposed Project are developed and refined, the proposed Project will undergo detailed environmental review that will include an analysis of appropriate avoidance, minimization and mitigation measures under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) before federal or state agencies issue discretionary approvals for the Project.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
39.	10/13/2023	Food and Water Watch (Andrea Vega)	In addition to leakage, SoCalGas must also address other critical impacts such as combustion, flaring, and Nitrogen Oxide (NOx) emissions. This Project needs to have a plan in place to alert residents in the event of leakage and fires that may result from improper operations, mechanical failures, damaged equipment, or other incidents. SoCalGas must provide a comprehensive emergency response plan that includes notification protocol to frontline communities, ongoing monitoring of emissions and leakage, and the role of government entities. Given that the Project is looking to transport hydrogen through new pipelines, the emissions assessment must also examine the impacts of installing new pipelines and an emergency response in the event of complications while those pipelines are installed.	At SoCalGas, safety is a core value and is at the foundation of everything we do. SoCalGas works proactively and collaboratively with emergency responders across its approximate 24,000-mile service territory. The Plan for Applicable Safety Requirements Study prepared as part of the Phase 1 analyses will include an assessment of applicable safety requirements for employee, contractor, system, and public safety. Safety considerations such as the physical and chemical properties of hydrogen and safety regulations and codes, including requirements for emergency response and public awareness plans, will be addressed in the study. In future phases of the Project, SoCalGas concurs that comprehensive emergency response plans, including agency and community notification elements will be developed to address the site-specific conditions. Additionally, SoCalGas would anticipate regular meetings with emergency responders, consistent with SoCalGas's existing first responder outreach program. For additional information related to analysis of potential leakage and NOx emissions, please see Response to Comments 12 and 13. In addition, there are no plans for flaring to occur during operation of the Project. For additional information related to flaring, please see Response to Comment 12.
40.	10/13/2023	Food and Water Watch (Andrea Vega)	<u>Alternatives Assessment</u> We would like to once again stress that electrification should be at the forefront when considering non-hydrogen alternatives, as it is an affordable and clean energy alternative which meets the climate goals of California and Los Angeles. When creating an alternatives assessment, SoCalGas must provide detailed information to the CBOSG of each alternative and how it compares to hydrogen based on affordability, energy needs, climate impacts, and meeting state and local climate goals.	Analysis from the Project Options & Alternatives Study, the Environmental & Social Justice Analysis, and the High-Level Economic Analysis and Cost Effectiveness Study will provide information on the Project's compatibility with the state's climate goals, potential environmental impacts, and cost effectiveness as compared to certain alternatives. SoCalGas appreciates the questions around affordability. The High-Level Economics and Cost Effectiveness Study will evaluate the cost effectiveness of the Project as compared to alternatives, including electrification. The Project Options & Alternatives Study will evaluate a range of alternatives to the Project that may meet the Project's underlying purposes, including an electrification alternative. The Project Options & Alternatives Study will look at a list of alternatives to the Angeles Link Project. Alternatives that are deemed feasible and scalable will then go through screening criteria. Alternatives that meet the criteria will be carried forward to the High-Level Economics and Cost Effectives study for further analysis. The screening criteria include whether the alternative is compatible with California's clean energy and environmental policies. The Environmental & Social Justice analysis will provide a high-level desktop analysis of the potential environmental impacts of the Project as compared to the alternatives selected for further analysis, and the High-Level Economic Analysis and Cost Effectiveness Study will evaluate the cost effectiveness of the Projects as compared to the alternatives selected for further analysis. Moreover, in future phases of Angeles Link, SoCalGas will begin examining the estimated cost to ratepayers and potential cost allocation and rate design approaches for the project, with the latter informing an affordability analysis supporting the selection of a preferred route.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
41.	10/13/2023	Food and Water Watch (Andrea Vega)	Economic Assessment For a truly comprehensive economic assessment of the Angeles Link Project, SoCalGas must also calculate the cost that community members, the state of California, and local governments would incur from ongoing or increased pollution. The use of fossil fuels results in health impacts such as cancer, respiratory diseases, and reproductive harms, which in turn result in medical expenses for impacted community members.	SoCalGas appreciates the concern related to the societal costs of air pollution. The Nitrogen Oxides (NOx) Emissions Assessment will evaluate the estimated NOx and other air emissions associated with the production, storage and transportation of clean renewable hydrogen, as well as the estimated emissions and emissions reductions associated with end users. An analysis of the societal costs associated with those air emissions is currently outside of the scope of the Angeles Link Phase 1 analyses. Please also see Response to Comment 9 with regard to the Equity Principles document.
42.	10/13/2023	Food and Water Watch (Andrea Vega)	While SoCalGas makes a vague promise of more job opportunities, the Project does not yet outline which communities these job opportunities would be going to or the long-term stability of those jobs. An economic assessment must also include an analysis of the economic opportunities of the Project's alternatives.	SoCalGas understands that local economic considerations are important to the communities that the Project's pipelines will run through and to the communities the Project will serve. The CPUC Decision 22-12-055 requires SoCalGas to evaluate workforce planning and training and the Workforce Planning & Training Evaluation will address that analysis. (Decision, OP 6(e).) Detailed analysis of job opportunities and job locations is outside the scope of the Angeles Link Phase 1analyses. Please also see Responses to Comments 15 and 18.
43.	10/13/2023	Food and Water Watch (Andrea Vega)	Environmental Social Justice Analysis Given the lack of transparency from SoCalGas towards the CBOSG and the constant downplaying of the climate and public health impacts this Project poses, Food & Water Watch is concerned that SoCalGas is not fit to responsibly engage in community outreach regarding this Project. We cannot risk the spread of misinformation on how hydrogen would impact the health and safety of frontline communities. When creating any community engagement plan, all materials must first be approved by the environmental justice participants of the CBOSG. Materials must then be approved by the Public Utilities Commission. Doing this will help prevent the irresponsible spread of misleading and inaccurate information.	Please see Responses to Comments 18 and 19.
44.	10/13/2023	Food and Water Watch (Andrea Vega)	Though the third quarterly meeting included time where members of the CBOSG met in groups to propose ideas for the community engagement, these group sessions were unfortunately interrupted by SoCalGas representatives who would steer the conversations in attempts to push their bias onto the CBOSG. We want to stress that Food & Water Watch is here to represent the voices and concerns of communities impacted by fossil fuel pollution, not to sell a product to those communities. We hope that all these concerns will be taken into consideration and the necessary changes will be made.	SoCalGas appreciates the ongoing engagement by the PAG and CBOSG and their participation in all of the meetings. During the CBOSG meeting on September 26, 2023, SoCalGas facilitated a break-out working group session with CBOSG members to solicit their feedback on development of an Environmental and Social Justice Community Engagement Plan (Engagement Plan). During the break-out sessions, SoCalGas representatives volunteered to be a scribe or present findings at the groups' request but did not participate in the break-out discussions. SoCalGas representatives took notes on the readout reports from the break-out sessions so that the input could be considered in developing the Engagement Plan. For more information on the process to develop the Engagement Plan, please see Response to Comment 18. SoCalGas has taken this feedback and will incorporate at future working sessions.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
45.	11/3/2023	Food and Water Watch (Andrea Vega)	Food & Water Watch, as part of the Community Based Organization Stakeholder Group (CBOSG), submits this letter of feedback regarding the Angeles Link Project Phase One Technical Approaches. We once again urge transparency from SoCalGas. We also continue to demand clarity in the data and study descriptions presented to the CBOSG. The lack of clarity and transparency from SoCalGas prevents meaningful, substantial feedback from being presented throughout this process.	SoCalGas has been actively engaging the PAG and CBOSG members throughout the Phase 1 process, including, to date, soliciting input on the scopes of work and technical approaches for the Phase 1 analyses. In terms of transparency, SoCalGas has kept PAG and CBOSG members apprised of the Phase 1 process, including facilitating quarterly and interim meetings on the studies stipulated by the CPUC in Decision 22-12-055. Many of the studies are in their early stages and work has focused on developing work plans and technical approaches, which were distributed to the PAG and CBOSG for input. As the studies progress, more information will become available, including preliminary findings (with data outputs, where applicable) and draft and final study reports. To further support sharing information on a timely basis and improve transparency, SoCalGas created a SharePoint site for the PAG and CBOSGs. On the SharePoint site, members have access to all PowerPoint presentations, supplemental materials, transcripts, and recordings from PAG and CBOSG meetings and workshops. Phase 1 study documents and informational resources will also be posted to this living library as they become available.
46.	11/3/2023	Food and Water Watch (Andrea Vega)	<u>Production Planning Assessment</u> There needs to be clarity on the cost of the Angeles Link Project in the production analysis. This includes any costs associated with building electrolyzers, electrolyzer facilities, and producing hydrogen. Unless the cost of the production, transportation, storage, and use of hydrogen are disclosed to the CBOSG, it will be difficult for the CBOSG to accurately assess this Project. Furthermore, these costs must also be accurately compared with the costs of non-hydrogen alternatives, namely electrification.	While SoCalGas would not produce the clean renewable hydrogen that Angeles Link would convey, as part of the Phase 1 analyses, the Production Planning & Assessment will include costs associated with clean renewable hydrogen production from electrolytic or other production pathways that meet the clean renewable hydrogen standard set forth in the CPUC Decision D.22-12-055. The production costs from that assessment will inform the High-Level Economic Analysis & Cost Effectiveness analysis, which will evaluate the levelized cost of delivered hydrogen and will provide analysis of the cost effectiveness of the Project as compared to selected alternatives such as electrification..
47.	11/3/2023	Food and Water Watch (Andrea Vega)	<u>Preliminary Routing & Configuration Assessment</u> Any existing pipeline corridors or rights-of-way, along with potential new rights-of-way, should be disclosed to the CBOSG. Given that much of the existing gas infrastructure in Los Angeles, as with the rest of California, was built in and around low-income communities and communities of color, which has resulted in a disproportionate rate of health complications due to the pollution from such infrastructure, these pipelines are a major concern. SoCalGas must be transparent about any rights-of-way it is considering using for this Project. SoCalGas has yet to provide a serious, comprehensive plan on how communities living near pipeline corridors considered for the Project will be able to provide feedback or be able to give consent to infrastructure that could impact their health and safety.	As part of the Phase 1 analyses, the Pipeline Routing/Configuration Analysis will identify and compare possible routes and configurations for the Project. This analysis will (i) evaluate preferred routing/configuration alternatives for the hydrogen system; (ii) consider existing pipeline corridors or rights-of-way (ROW) and franchise; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges. As the preferred routing and configurations develop further, SoCalGas is committed to a transparent process and will be sharing maps of proposed routing corridors with the CBOSG and PAG members. In addition, in direct response to stakeholder feedback, SoCalGas added the development of an Environmental and Social Justice Community Engagement Plan (Engagement Plan) to the scope of the Environmental and Social Justice Analysis. The Engagement Plan would be implemented in Phase Two of Angeles Link to gather information regarding community concerns and to evaluate methodologies to mitigate potential impacts to historically marginalized communities. In subsequent phases of the Project, SoCalGas will implement the Engagement Plan and work directly with those communities that could be most affected by potential pipeline routing. For more information on the Engagement Plan, please see Response to Comment 18.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
48.	11/3/2023	Food and Water Watch (Andrea Vega)	Pipeline Sizing & Design Assessment When it comes to assessing the sizing and designs of these pipelines, the priority must be on leak prevention, leakage monitoring, leakage notification, and safety protocols. SoCalGas needs to outline what safety measures they intend to implement in order to monitor leakage, and which leak detection technology they plan to utilize.	At SoCalGas, safety is a core value and is at the foundation of everything we do and will be incorporated into every phase of the Angeles Link Project. The Pipeline Sizing & Design Study will include an evaluation of materials and a review of established industry codes, standards, and regulations. In addition, the Plan for Applicable Safety Requirements Study will include identification of specifications, standards, and protocols for leak detection and safe operation (including safety codes and recommendations) as applicable to employee, public, infrastructure, and contractor safety. Furthermore, the Workforce Planning & Training Evaluation Study will include a review of SoCalGas's existing processes, technology, reporting, compliance, and safety notifications with applicability to hydrogen, with a focus on leak survey, detection (systemwide), and mitigation. Lastly, a separate study will be completed on hydrogen leakage that will evaluate literature to assess a range of values for potential hydrogen leakage and opportunities to reduce leakage.
49.	11/3/2023	Physicians for Social Responsibility – Los Angeles (Alex Jasset)	Technical Approach Comments from PSR-LA It is very difficult to provide meaningful feedback about the project without more specific details about the scale and scope of the project and information about where it will be sited and from which bodies of water and renewable energy sources it will be drawing from. This does not mean that we need additional meeting or documents about issues you're considering, but rather that we need clear and accessible information about the project details.	SoCalGas is committed to a transparent and robust stakeholder engagement process. The Phase 1 feasibility studies will be published at the completion of Phase 1 and stakeholders have been and continue to be invited to review and collaborate throughout the process including on the Scope, Technical Approach, Preliminary Findings, and Draft Reports. As a part of the Phase 1 activities, SoCalGas will share information on potential routing and preferred locations identified. Phase 2 will involve the identification of a preferred route, including design, engineering, and environmental studies for the preferred pipeline system. SoCalGas would not produce the clean renewable hydrogen that Angeles Link would convey. To provide a better understanding of clean renewable hydrogen production as part of the Phase 1 analyses, the Production Planning & Assessment Study aims to understand the availability of renewable resources that could be added for hydrogen production. The study also seeks to understand how existing renewables on the CAISO grid that are curtailed may be reused for hydrogen production. In addition, the Water Resources Evaluation will provide analysis on potential water supply sources that third-party clean renewable hydrogen producers may pursue for production. The specific menu of water sources that feed particular clean renewable hydrogen production projects would need to be developed on a case-by-case basis as more details on specific production projects are developed.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
50.	11/3/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	As far as end uses, direct electrification should always be prioritized wherever feasible, and any plan for hydrogen should prioritize the hardest-to-electrify sectors first (for example high-heat applications and displacing current grey/blue hydrogen usage), rather than end uses for which there are better alternatives or where direct electrification is feasible (for example power plants, passenger vehicles, etc.,). In order for this project to make a meaningful impact on climate goals, it must commit to utilizing green hydrogen to complement the Just Transition away from fossil fuels, and not impede or prevent it.	SoCalGas appreciates the comment concerning electrification and agrees that clean renewable hydrogen should be used in a complementary way to electrification. One of the underlying purposes of Angeles Link is to support the state's decarbonization goals, including the California Air Resources Board's (CARB) 2022 Scoping Plan for Achieving Net Neutrality, which identifies the scaling up of renewable hydrogen for hard-to-electrify sectors as playing a key role in the state achieving carbon neutrality by 2045 or earlier. Angeles Link is proposed as a high-pressure, non-discriminatory pipeline system that is dedicated to public use. The system will transport clean renewable hydrogen from regional third-party production and storage sites to end users in Central and Southern California, including the Los Angeles Basin (inclusive of the Ports of Los Angeles and Long Beach). To understand better the extent that end users may adopt the use of hydrogen, the Demand Study provides the estimated total potential clean renewable hydrogen demand (i.e., total addressable market) across the mobility, power generation, and hard-to-electrify industrial sectors throughout all of SoCalGas's service territory up through 2045. The estimated hydrogen demand projections do account for the potential adoption of end-use alternatives to hydrogen, including electrification, across all three sectors: Mobility, Power Generation, and Industrials. The Demand Study's assessment of end user's potential adoption of hydrogen versus electrification is based on several resources, including public data, market interviews, and subject matter experts such as the Electric Power Research Institute (EPRI). The Demand Study provides informed forecasts on potential hydrogen adoption given the availability and suitability of other alternatives like electrification. The Angeles Link Project is proposed to convey a portion of the clean renewable hydrogen demand identified in the Demand Study. With respect to the commitment to convey clean renewable hydrogen, the Angeles Link Project has committed to conveying clean renewable hydrogen that meets the standard set forth in the CPUC's Decision 22-12-055.
51.	11/3/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	In order to ensure that green hydrogen production doesn't increase CO2 emissions, it is essential to ensure that the electricity used for green hydrogen production is surplus and does not use carbon credits or resource shuffling tactics to divert those resources when they would be better used on the grid. Additionally, SoCalGas should clearly state that they will only transport green hydrogen produced with surplus renewable energy, and explicitly exclude other so-called "clean" forms of hydrogen that come from nuclear power, carbon capture schemes, biomass/biogas, and others.	The Production Planning & Assessment Study aims to understand the availability of renewable resources that could be added for hydrogen production. In addition, it will explore how existing renewables on the CAISO grid that are curtailed may be reused for hydrogen production. This study will assess hydrogen production pathways consistent with the definition of clean, renewable hydrogen, which states in the California Public Utilities Commission (CPUC)'s Decision 22-12-055, Ordering Paragraph 3(a) , "feasibility studies for the Angeles Link Project shall be restricted to the service of clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process." While hydrogen produced via electrolysis is central to Angeles Link, the Production Study also includes other potential technology pathways (e.g., biomass/biogas) that may meet the definition of clean renewable hydrogen from the CPUC's Decision. Please also refer to Response to Comment 21.

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52.	11/3/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Leakage is a major concern, both in terms of the potential to negate any meaningful climate impacts, as well as for safety reasons. Given SoCalGas' track record around preventing leaks (recent examples including Aliso Canyon and Valley Generating Station), how do the current plans drastically differ from existing practices? How can you guarantee that there won't be leaks of a much smaller molecule, given the severity of the risks? What kind of standards is SoCalGas willing to commit to ensure safety, and what are the financial and other penalties for failing to live up to these standards?	SoCalGas appreciates this comment concerning the potential for leakage. The Hydrogen Leakage Assessment being prepared as part of the Phase 1 analyses will evaluate the potential for hydrogen leakage associated with new infrastructure (i.e., production, storage, and transportation of clean renewable hydrogen), as well as opportunities to minimize potential for hydrogen leakage. The Hydrogen Leakage Assessment will evaluate a range of values for potential hydrogen leakage, as well as opportunities to minimize the potential for leakage. This range of values will be presented as percentages for each component of new proposed infrastructure and as percentages for each minimization opportunity. Volumetric estimates of the potential for leakage will not be developed because detailed infrastructure information will not be available during the stage of the Phase 1 studies. At SoCalGas, safety is a core value and is at the foundation of everything we do and will be incorporated into every phase of the Angeles Link Project. The Pipeline Sizing & Design Study will include an evaluation of materials and a review of established industry codes, standards, and regulations. In addition, the Plan for Applicable Safety Requirements Study will include identification of specifications, standards, and protocols for leak detection and safe operation (including safety codes and recommendations) as applicable to employee, public, infrastructure, and contractor safety.
53.	11/3/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	In order to not perpetuate the injustices of the past, it is crucial to ensure that pipeline infrastructure is not routed through the same communities that have historically borne the brunt of the region's energy burden. In order for Angeles Link to be a success, it must improve local air quality and not negatively impact water quality or quantity, reduce CO2 emissions, not increase consumer bills, and improve the quality of life for communities living near existing and proposed fossil fuel/hydrogen infrastructure. If during the assessment, the project fails to achieve any of these goals, the project design should be reevaluated until it can.	SoCalGas appreciates the considerations raised in this comment. The Project Options & Alternatives Study will evaluate the Project's and the project alternatives' compatibility with state climate policies. The Environmental & Social Justice analysis will evaluate environmental and social justice considerations of the Project and the alternatives selected for further analysis. In addition, the Nitrogen Oxides (NOx) Emissions Assessment and the Greenhouse Gas Emissions (GHG) Evaluation will evaluate NOx, other air emissions and GHG emissions associated with the production, storage and transportation of hydrogen, as well as emissions associated with end users. Analysis of the potential environmental impacts of the Project and the selected alternatives as evaluated in the Environmental & Social Justice Analysis, as well as analysis of the air emissions associated with the Project as evaluated in NOx Emissions Assessment and GHG Evaluation will inform conclusions in the Project Options and Alternatives Study. SoCalGas will continue to refine potential routing options as part of the Routing Study, including overlaying the environmental justice screening data layers with pipeline information to identify DACs. SoCalGas will also engage in a community benefits process in future phases.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
54.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	1. Summary of Recommendations • SoCalGas should end its practice of withholding data and information requested by the Planning Advisory Group ("PAG"). SoCalGas has refused to supply its: ○ Contracts w/ Phase 1 contractors ○ Demand study computer model • SoCalGas should pause work on all Angeles Link studies – including the technical approach work – until the demand study has been corrected to eliminate the errors identified by UCAN in its feedback to SoCalGas on September 25, 2023.[1] • SoCalGas should revise its work plans and technical approaches to conform to the *Equity Principles for Hydrogen* provided by the environmental justice community.[2] • Several proposals in SoCalGas's technical approach document violate D.22-12-055. SoCalGas should make the necessary changes to avoid those violations. • UCAN requests that SoCalGas distribute to the PAG the spreadsheets and computer models that are or will be used in each of the Phase 1 studies. [1] UCAN anticipates providing additional feedback on the demand study based on updated citations and methodology information provided by SoCalGas on September 29, 2023. [2] Equity Principles for Hydrogen. https://www.cbecal.org/wp-content/uploads/2023/10/Equity-Hydrogen-Initiative- Shared-Hydrogen-Position-1.pdf	Please refer to Response to Comment 19. SoCalGas has provided its updated Technical Approach document as an appendix to this quarterly report. SoCalGas also will make available technical information to the extent feasible. Please also see Response to Comment 9 with regard to the Equity Principles document.
55.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	2. Background First, until SoCalGas corrects its demand study, all other studies and work in Phase 1 should be paused. As the Utility Consumers' Action Network ("UCAN") called out in its September 29, 2023, feedback, "UCAN believes SoCalGas's 'conservative' scenario overestimates demand by at least a factor of ten."[4] UCAN detailed several major errors in the demand study that SoCalGas has yet to correct. Further, the numbers in the demand study appear similar to the figures that SoCalGas promotes as fact.[5] Both the power sector and mobility sector emissions reductions claimed in SoCalGas's "fact sheet" significantly over-state the emissions reductions that can be anticipated from green hydrogen. SoCalGas inflated the fact sheet's emissions reductions claims by significantly overestimating the future green hydrogen demand, just as the Phase 1 demand study does. UCAN recommends that SoCalGas correct its inaccurate demand study before it continues with any additional Phase 1 work. [4] The Utility Consumers' Action Network Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings ("UCAN 9-25-23 Feedback"), p. 7. [5] SoCalGas, Angeles Link Fact Sheet, 2023-06, available at https://www.socalgas.com/sites/default/files/2023-06/AL%20Factsheet.pdf.	SoCalGas appreciates UCAN's input. The fact sheet provides a summary level of information for interested parties and was released prior to the Demand Study. In addition, SoCalGas previously considered Utility Consumer Action Network's comments concerning the Demand Study and found the recommendation to lower demand projections to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. The Angeles Link Project is proposed to convey a portion of the clean renewable hydrogen demand identified in the Demand Study. Emissions will be evaluated in the Greenhouse Gas Emissions Evaluation and Nitrogen Oxide (NOx) and other Air Emissions Assessment.

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56.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	Second, UCAN has repeatedly asked for SoCalGas to provide transparency in its processes. SoCalGas assured the Commission that it would be transparent with the PAG,[6] and the Commission provided its approval of the Phase 1 memorandum account with the understanding that SoCalGas would implement transparent Phase 1 processes. SoCalGas's secretive calculations and modeling are a violation of D.22-12-055. UCAN renews its request for SoCalGas to release its contracts with Phase 1 contractors and release the demand study computer model. UCAN also requests all computer models and spreadsheets be released that will be used in any of the other Phase 1 studies. [6] D.22-12-055, p. 3 ("SoCalGas states that the Memo Account would enable it to record Project costs while providing customers and stakeholders with a transparent mechanism to monitor the planning development of the Project."	As previously noted, SoCalGas has made a tremendous effort to keep Planning Advisory Group (PAG) and Community Based Organization Stakeholder Group (CBOSG) members apprised of the Phase 1 process, including facilitating quarterly and interim meetings on the studies stipulated by CPUC Decision 22-12-055. The studies are in their early stages and work has focused on developing work plans and technical approaches, which were distributed to the PAG and CBOSG for input. As the studies progress, more information will become available and will be shared with the PAG and CBOSG. To further ensure that information is being disseminated on a timely basis and improve transparency to the extent possible, SoCalGas created a SharePoint site for the PAG and CBOSGs. On the SharePoint site, members have access to all PowerPoint presentations, supplemental materials, and recordings from PAG and CBOSG meetings and workshops. Phase 1 study documents and informational resources will also be posted to this living library as they become available.
57.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	3. Market Assessment and Alternatives 3.1. Project Options and Alternatives • Project alternatives must include: ○ A localized hydrogen hub (e.g. production and use of hydrogen to supply some of the hydrogen demand at one of the ports); ○ Electrification of end uses including all industrial heat applications, all wheeled transportation, all power sector applications, short and mid-distance shipping, and short and mid-distance air travel. ○ Hydrogen delivery alternatives including trucking and marine shipping ○ Behind-the-meter green hydrogen production and utilizations using electrolyzers supplied with electricity from on-site renewables or renewable, grid-delivered, electricity.	In accordance with CPUC Decision 22-12-055, the Project Options & Alternatives Study and Preliminary Routing/Configuration Analysis will evaluate a range of alternatives to the Project that meet the Project's underlying purposes. The High-Level Economic Analysis & Cost Effectiveness Study will assess the cost to produce and deliver clean renewable hydrogen in Central and Southern California, including into the Los Angeles Basin and compare that with the cost of selected alternatives, including electrification and the localized hub. For more information on how alternatives will be identified and evaluated in those two studies, please see Response to Comment 3. The Production Planning & Assessment Study will address producing clean renewable hydrogen with on-site renewables and curtailed renewables when feasible.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
58.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document claims that the pipeline design "will consider production capacity and demand availability at various points in time (e.g., 2030, 2035, 2040, 2045) and will identify the infrastructure required to meet those needs at that specific point in time."[7] ○ SoCalGas should assume that the hydrogen demand cannot be reliably forecast for any years beyond 2030, and even the latter years in that timeframe (i.e., the present through 2030) could see just a fraction of the demand that SoCalGas forecasts due to advancements and innovations in other sectors and other technologies. Any demand beyond 2030, should be viewed as theoretical and demand that will not be served by the initial hydrogen hub or Angeles Link. ○ The study also discusses demand generally. One can assume that the demand being considered is the demand from the demand study's preliminary outputs. The preliminary demand study estimated demand for the entire SoCalGas territory. D.22-12-055 called for a demand analysis of just the Los Angeles basin.[8] Before the work commences on the pipeline design, the demand study should be corrected. [7] Tech Approach, p. 5. [8] D.22-12-055, p. 2 and Ordering Paragraph 6(a), ("The objective of the Angeles Link Project is to develop a clean renewable hydrogen energy transport system to serve the Los Angeles Basin." and see OP 6(a) "SoCalGas shall provide the following required findings from its Phase One feasibility studies: (a) Identification of the demand and end uses for the Angeles Link Project (Project).")	SoCalGas appreciates this comment on the projections in the Demand Study. The Demand Study examines potential hydrogen demand from 2025-2045 in Mobility, Power Generation and Industrial sectors. The clean renewable hydrogen demand progression in the Demand Study is driven by decarbonization policy and regulatory timeframes that look beyond 2030 as well as our understanding to date of technical availability and cost competitiveness over time through 2045. SoCalGas has incorporated these factors into the demand analysis while also considering potential improvements in technologies and costs of alternate decarbonization solutions such as BEVs. SoCalGas does look to refine these estimates in future phases of Angeles Link. In addition, SoCalGas previously considered Utility Consumer Action Network's comments concerning the Demand Study and found the recommendation to lower demand projections to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry.
59.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	Coordination with the Demand Study • All project options and alternatives are highly dependent on the demand study. Because the demand study over-estimates demand by at least a factor of 10, any work completed on the options and alternatives prior to correction of the demand study will be unusable. All work on the project options and alternatives should be shelved until SoCalGas corrects the demand study	SoCalGas appreciates this comment concerning projections in the Demand Study. SoCalGas previously considered Utility Consumer Action Network's comments concerning the Demand Study and found the recommendation to update the Demand Study's conservative scenario to a lower demand by at least a factor of ten to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. In addition, while this comment expresses concern about projected demand in the Demand Study, the Angeles Link Project is proposed to convey only a portion of the overall demand for clean renewable hydrogen for all of SoCalGas's service territory as identified in the Demand Study. The Demand Study projects overall demand for clean renewable hydrogen throughout SoCalGas's territory by 2045 to range from approximately 1.9 million metric tons (MMT)/year (Y) to 5.9 MMT/Year. Angeles Link is proposed to convey approximately 0.5 MMT/Y to 1.5 MMT/Y of clean renewable hydrogen to end users in Central and Southern California by 2045. With respect to the timing of the studies, SoCalGas is implementing several Phase 1 studies concurrently to achieve the timeframes envisioned for the Phase 1 feasibility analyses. SoCalGas recognizes that the results from the Demand Study are interdependent with several other Phase 1 studies. While the Demand Study and other studies inform different analyses in Phase 1, several Phase 1 studies are ongoing as the Demand Study becomes finalized. SoCalGas will continue to incorporate feedback on the Demand Study as appropriate and will apply that feedback where applicable to other studies as the Phase 1 studies reach their conclusion.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
60.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document states that "[l]astly, options and alternatives to the pipeline system including hydrogen pipeline alternatives, such as a localized hub, and other alternatives, such as non-hydrogen alternatives and hydrogen delivery alternatives, will be developed and evaluated."[9] Neither the hydrogen hub nor the non-pipeline alternatives should be developed as an after thought. Those Angeles Link alternatives should commence as soon as the demand study has been corrected and Phase 1 should spend an equal amount of time and resources on each option including the Angeles Link option. Additionally, because the hydrogen hub itself does not need to serve the same hydrogen demand as the Angeles Link, the hydrogen hub could be as simple as a rooftop solar array connected to an electrolyzer to serve one of the port's hydrogen needs. That iteration of a hydrogen hub would enable one of the ports to continue to explore its green hydrogen options and to expand the system incrementally if or when its hydrogen needs increase. [9] Tech Approach, p. 5.	Please see Response to Comment 3
61.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document lists examples of non-hydrogen alternatives as: "electrification, energy efficiency, renewable natural gas (RNG), natural gas with carbon management."[10] Energy efficiency and RNG are not alternatives that can eliminate greenhouse gas ("GHG") emissions or particulate emissions. Thus, they are not alternatives to green hydrogen and should be removed from the Phase 1 analysis. [10] Ibid.	Pursuant to the requirements in CPUC Decision D.22-12-055, the Project Options & Alternatives Study will evaluate a range of alternatives to the Project that may meet the Project's underlying purposes. An explanation of how and why those alternatives were identified will be provided in that study. For more information on the selection of alternatives, please see Response to Comment 3.
62.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document lists four criteria to determine the "viability of alternatives" to green hydrogen.[11] UCAN disagrees with SoCalGas's criteria except for "The ability for the alternative to meet specific end user requirements."[12] The only considerations of the green hydrogen alternatives should be technical capability and cost of implementation. If an alternative can meet a customer's need. SoCalGas should calculate the cost of the alternative compared to the Angeles Link. [11] Ibid. [12] Ibid.	SoCalGas appreciates this feedback on the criteria and factors used to evaluate the alternatives. SoCalGas believes the other criteria cited in the Technical Approach provide useful guidance on the alternatives that should be selected for further analysis. Those criteria include: (i) the propensity to adopt alternative delivery options economically at scale; (ii) the ability for the alternative to be implemented in t a timely manner; and (iii) the technical feasibility to the extent this has not be determined in other studies. These criteria will help evaluate which alternatives may meet the Project's underlying purposes, which include achieving the state's decarbonization goals and enhancing energy system reliability and resiliency in California. State policy to meet decarbonization goals, technical capability, and meeting resiliency and reliability requirements are essential criteria to assess the feasibility of alternatives. Cost considerations will be considered and addressed in the High-Level Economic Analysis & Cost Effectiveness Study. Please also see Response to Comment 3.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
63.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	3.2 Demand Study • As detailed in UCAN's September 25, 2023, preliminary feedback on the demand study, SoCalGas's green hydrogen demand study remains deeply flawed. SoCalGas must correct the demand study before it proceeds with Phase 1 work. UCAN looks forward to a revised demand study that conforms to the requirements of D.22-12-055 and eliminates the errors that UCAN found in the preliminary analysis.	SoCalGas previously considered Utility Consumer Action Network's comments concerning the Demand Study and found the recommendation to update the Demand Study's conservative scenario to a lower demand by at least a factor of ten to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. In addition, while this comment expresses concern about projected demand in the Demand Study, the Angeles Link Project is proposed to convey only a portion of the overall demand for clean renewable hydrogen for all of SoCalGas's service territory as identified in the Demand Study. The Demand Study projects overall demand for clean renewable hydrogen throughout SoCalGas's territory by 2045 to range from approximately 1.9 million metric tons (MMT)/year (Y) to 5.9 MMT/Year. Angeles Link is proposed to convey approximately 0.5 MMT/Y to 1.5 MMT/Y of clean renewable hydrogen to end users in Central and Southern California by 2045. With respect to the timing of the studies, SoCalGas is implementing several Phase 1 studies concurrently to achieve the timeframes envisioned for the Phase 1 feasibility analyses. While the Demand Study and other studies inform different analyses in Phase 1, several Phase 1 studies are ongoing as the Demand Study becomes finalized. SoCalGas will continue to incorporate feedback on the Demand Study as appropriate and will apply that feedback where applicable to other studies as the Phase 1 studies reach their conclusion.
64.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	3.3. Production Planning & Assessment • The Tech Approach document lists hydroelectric and biomass as potential electricity sources to be used in the production of hydrogen. Neither of these sources should be considered. First, hydroelectric generation is already connected to the electricity grid. Only new sources of carbon free electricity should be evaluated. Existing sources of electricity are already tied into the electricity grid and thus supply existing electricity demand, a more efficient use of electricity than hydrogen production. SoCalGas should not divert output from existing electricity generation resources for use in a low efficiency energy cycle (i.e., hydrogen production). Second, biomass causes significant GHG and particulate pollution. Biomass based hydrogen would immediately make that source of hydrogen production a target for decommissioning. SoCalGas should not use a flawed electricity source as its starting point. Moreover, the environmental justice community in California has already rejected biomass-based hydrogen.[13] Continuing to evaluate this production option would further erode community trust in SoCalGas. [13] Equity Principles for Hydrogen: Environmental Justice Position on Green Hydrogen in California ("Equity Principles for Hydrogen") (October 10, 2023), available at https://www.cbecal.org/wp-content/uploads/2023/10/Equity-Hydrogen-Initiative-Shared-Hydrogen-Position-1.pdf	The Production Planning & Assessment aims to understand the availability of renewable resources that could be added for hydrogen production. In addition, it will also explore how existing grid connected renewables on the CAISO grid that are curtailed may be used for hydrogen production. This study will assess hydrogen production pathways consistent with the definition of clean, renewable hydrogen, which states in CPUC Decision 22-12-055, Ordering Paragraph 3(a) , "feasibility studies for the Angeles Link Project shall be restricted to the service of clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process." As a result, the Production Study includes other potential technology pathways (e.g., biomass/biogas) that may meet the Decision's definition of clean renewable hydrogen. As SoCalGas continues to receive stakeholder input and participate in the broader hydrogen discussion in the State, these topics may continue to be considered on an on-going basis, such as in future phases. Please also see Response to Comment 9 with regard to the Equity Principles document.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
65.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document states that "technologies will be compared on a qualitative basis" and that "in-house data and data obtained from vendors will be used."[14] SoCalGas has numerous conflicts of interest regarding the Angeles Link infrastructure and energy technologies. SoCalGas is not able to provide an unbiased evaluation and thus cannot not use "qualitative" comparisons or "in-house" data. SoCalGas should always depend on public third-party data from reports and entities that have not been funded by either SoCalGas or other fossil fuel companies. [14] Tech Approach, p. 11.	The Production Planning & Assessment will primarily rely on third-party data, research analysis, technical data shared by vendors, and the expertise of the consultants. Considering there may be limitations in the amount of data available for certain technologies, there may be qualitative analysis required. In addition, SoCalGas data/analysis may be used to provide information to help evaluate certain technologies. Data may include publicly available reports or analysis that is meant to broaden and inform. However, for transparency, assumptions informing the analysis will be shared.
66.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	3.4. High-Level Economic Analysis & Cost Effectiveness • The Tech Approach document states that the cost of production and delivery of hydrogen will be included. The economic analysis should also include hydrogen storage costs; electricity storage costs for renewable electricity in coordination with hydrogen production; health impacts from particulate and GHG pollution if the hydrogen will be supplied for combustion end uses; the climate change costs due to hydrogen leakage; the additional equipment upgrade costs of end users over and above the costs required for end users to electrify.	The High-Level Economics and Cost-Effectiveness Study will cover the levelized cost to produce and deliver clean hydrogen (LCOH) to Central and Southern California, including the Los Angeles Basin. Storage and electricity costs will be embedded in the LCOH. With respect to potential GHG emissions from end users, the Greenhouse Gas Evaluation will evaluate GHG emissions associated with the production, storage and transportation of hydrogen, as well as emissions associated with end users. An analysis of potential health impacts associated with emissions from end users is outside the scope of the Phase 1 analyses. In addition, the Hydrogen Leakage Assessment will evaluate the potential for hydrogen leakage associated with new infrastructure (i.e., production, storage, and transportation of clean renewable hydrogen), as well as opportunities to minimize potential for hydrogen leakage. An analysis of the potential for leakage at end users and the climate change costs due to hydrogen leakage is outside the scope of the Phase 1 analyses.
67.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4. Regulatory, Policy & Environmental Workstream 4.1. Water Resources Evaluation • SoCalGas must prioritize the safety of the California communities from which water will be procured. The study must show that the communities' water prices do not increase due to the use of water to supply electrolyzers. The impurities extracted from the water must be disposed of in a manner that will not endanger human health or the environment.	During Phase 1, the Water Resources Evaluation will evaluate various water sources for clean renewable hydrogen production throughout SoCalGas' service territory. All sources will need to be treated to meet electrolyzers' purity standards. SoCalGas anticipates that third-party hydrogen developers may utilize various water supply arrangements to meet production needs. Reclaimed water management, including management and disposal of any solids, must comply with applicable federal, state, and local requirements. Third-party hydrogen producers would ultimately be responsible for complying with all appropriate waste management rules and regulations and to properly dispose of any impurities extracted from the treated water. The Water Resources Evaluation will not address community water prices because the menu of water sources for specific projects would be developed on a case-by-case basis by third-party clean renewable hydrogen producers. The Water Resources Evaluation will identify water sources that third-party producers could pursue, and the selection of water sources would ultimately be up to the producers.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
68.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The product of this study should be a proposed set of water standards for hydrogen suppliers such that the suppliers must meet the water standard requirements, or their hydrogen will not be allowed to be transported through the Angeles Link or the hydrogen hub.	The Water Availability Study task under the Water Resources Evaluation identifies and characterizes potential water supply sources that could support future third-party production of the clean renewable hydrogen, understanding that third-party producers may draw from a menu of sources to meet the water needs to produce the clean renewable hydrogen that Angeles Link would convey. The Water Resources Evaluation will also include an analysis of the water quality requirements that may be needed to feed electrolyzers for clean renewable hydrogen production. For water that requires treatment, third-party hydrogen producers would ultimately be responsible for complying with all appropriate waste management rules and regulations and to properly dispose of any impurities extracted from the treated water. Specific water quality standards may be affected by the electrolyzer equipment, regulatory requirements and other criteria.
69.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.2. Nitrogen Oxides (NOx) Emissions Assessment • SoCalGas should not supply hydrogen to customers that intend to use hydrogen for combustion. UCAN recommended this in the September 28, 2023, PAG meeting. If SoCalGas intends to sell hydrogen for combustion purposes, it will be replacing one energy supply that harms California communities (i.e., natural gas) with another energy supply that harms California communities (i.e., hydrogen). The Equity Principles for Hydrogen released by a coalition of some of the largest environmental justice organizations in California state that "[h]ydrogen should not be combusted in gas-fired generating units to produce electricity."[15] UCAN agrees with banning the combustion of hydrogen in gas-fired generation. If SoCalGas were to restrict the use of the hydrogen that it supplies to only end users that use the hydrogen for non-combustion purposes, SoCalGas would not need to evaluate NOx emissions because no hydrogen-based NOx emissions would exist. [15] Equity Principles for Hydrogen, p. 9.	The NOx Emissions Assessment assesses potential NOx impacts associated with the Angeles Link infrastructure and anticipated end users, as mandated by the CPUC Decision D.22-12-055 (OP 6(h).). The initial NOx assessment was prepared based on information developed in the parallel Phase 1 Demand Study which evaluated hydrogen use under three scenarios including Conservative (1.9 million metric tons per year [MMT/yr]), Moderate (3.2 MMT/yr), and Ambitious (5.9 MMT/yr). Please also see Response to Comment 9 with regard to the Equity Principles document.
70.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document states that a "clean renewable hydrogen production option includes bio gasification and biogas fueled steam methane reformers."[16] These production methods should never be used due to safety and emissions issues. [16] Tech Approach, p. 21.	SoCalGas appreciates this comment. For purposes of the Phase 1 analyses that are evaluating potential options for the Angeles Link Project, the Production Planning & Assessment Study will evaluate clean renewable hydrogen production from electrolytic or other production pathways that meet the clean renewable hydrogen standard set forth in the CPUC's Decision 22-12-055. With respect to potential emissions, the Nitrogen Oxides (NOx) Emissions Assessment and the Greenhouse Gas Emissions (GHG) Evaluation will evaluate NOx, other air emissions and GHG emissions associated with the production, storage and transportation of hydrogen, as well as emissions associated with end users. The production options evaluated in those studies include production by electrolyzes, biomass gasification, and renewable natural gas fueled steam methane reformers. In addition, the Plan for Applicable Safety Requirements Study will include identification of specifications, standards, and protocols for leak detection and safe operation (including safety codes and recommendations) as applicable to employee, public, infrastructure, and contractor safety.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
71.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document states that SoCalGas will review "[p]otential NOx emissions source types from end users in three key sectors Power Generation, Mobility, and Hard to Electrify Industrial sectors."[17] These are SoCalGas's demand study sectors. The emissions evaluation cannot start until SoCalGas corrects its demand study. The current study overestimates hydrogen demand by a factor of 10. [17] Tech Approach, p. 21.	SoCalGas recognizes that the results of the Demand Study are interdependent with all the other studies and that this comment expresses concerns about the Demand Study. SoCalGas previously considered Utility Consumer Action Network's comments concerning the Demand Study and found the recommendation to update the Demand Study's conservative scenario to a lower demand by at least a factor of ten to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. The assumptions used in the Demand Study are from a combination of inputs from state and federal databases, industry subject matter experts, and peer reviews. Angeles Link proposes to convey a portion of the clean renewable hydrogen demand identified in the Demand Study. To complete Phase 1 in a reasonable timeframe, the studies have been conducted in parallel. The Nitrogen Oxide (NOx) Emissions Assessment will evaluate NOx and other air emissions associated with the Project, including emissions associated with the production, storage and transportation of hydrogen and NOx emissions associated with end uses. The projected demand estimates and proposed Angeles Link throughput will inform the emissions estimates in the NOx Emissions Assessment.
72.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach states that "NOx emissions will be calculated at the unit level and scaled based on activity data…" UCAN requests that SoCalGas release to the PAG all computer models and spreadsheets used for NOx calculations.	Supporting information will be made available to the PAG as a part of the final report of the NOx Emissions Assessment.
73.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• UCAN recommends that SoCalGas select non-combustion pathways for hydrogen production, transportation, and end use.	Angeles Link is proposed to be a high-pressure, non-discriminatory pipeline system that is dedicated to public use and will transport clean renewable hydrogen from regional third-party production and storage sites to end users in Central and Southern California, including the LA Basin (inclusive of the Ports of Los Angeles and Long Beach). The Project Options & Alternatives Study will evaluate a range of alternatives to the Project that may meet the Project's underlying purposes. An explanation of how and why those alternatives, which will include non-combustion alternatives such as electrification, were identified will be provided in that study.
74.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.3. Hydrogen Leakage Assessment • In this section the Tech Approach document includes numerous forward-looking statements and qualifiers (e.g. "potential," "proposed," "technology developments," "If specific information is not available"). These words and phrases demonstrate that current hydrogen leakage research and data provide an incomplete picture about the risks posed by hydrogen leakage and even less information on the mitigation measures that should be incorporated into a project like the Angeles Link. Until reliable third-party data becomes available, SoCalGas should not move forward with hydrogen project planning or evaluation. At this point, SoCalGas cannot assure Californians that it will be able to avoid hydrogen leakage and the resulting negative effects.	The intent of the Angeles Link project is to design a state-of-the-art system to transport clean renewable hydrogen and the system will be designed with a focus on safety and leakage prevention. Specifically, the Pipeline Sizing & Design Study will include an evaluation of materials and a review of established industry codes, standards, and regulations with a focus on safety and leakage prevention. The Hydrogen Leakage Study will evaluate the potential for hydrogen leakage associated with new infrastructure (e.g., production, compression, storage, and transportation of clean renewable hydrogen), as well as opportunities to minimize the potential for hydrogen leakage. As the Angeles Link design develops and the Project's scope becomes more defined, more in-depth analysis related to leakage and leakage prevention specific to the Project design can be implemented in future phases. Furthermore, as more details of the proposed Project are developed and refined, the proposed Project will undergo detailed environmental review that will include an analysis of appropriate avoidance, minimization and mitigation measures under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) before federal or state agencies issue discretionary approvals for the Project.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
75.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• If SoCalGas continues to move forward with Phase 1, it needs to evaluate hydrogen leakage for a behind the meter type of hydrogen hub in addition to pipeline-delivered hydrogen. If hydrogen is produced on-site by all hydrogen end users, (i.e., behind the meter configurations) California will be able to avoid many miles of hydrogen pipelines. By reducing hydrogen pipeline lengths, California will be able to minimize hydrogen leaks from infrastructure.	SoCalGas acknowledges the opportunities for behind-the-meter configurations. Given that each behind the meter assembly will be managed and maintained by the particular producer, rather than SoCalGas, leakage would be tracked and controlled by each respective producer. In addition, analysis of a behind the meter type of hydrogen hub is beyond the scope of the Phase 1 analyses. The Project Options & Alternatives Study will evaluate a range of alternatives to the Project that may meet the Project's underlying purposes. With respect to the proposed pipeline delivery system of Angeles Link, SoCalGas has decades of experience in leak detection and prevention measures. SoCalGas pipelines deliver natural gas to approximately 21 million residential and business customers. SoCalGas routinely patrols, tests, repairs and replaces natural gas pipelines when necessary. SoCalGas employees also undergo ongoing technical training and testing. SoCalGas also maintains an ongoing relationship with emergency response officials in order to prepare for and respond to any pipeline emergency.
76.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.4. Greenhouse Gas Emissions Evaluation • The Tech Approach document states that "specific technical information (about facilities, equipment, processes, throughputs, rates, costs etc.) that is available from the Demand Study… will be used."[18] The GHG study and any other study that depends on data from the demand study will be unusable because of the significant errors and inaccuracies embedded in the demand study. UCAN will continue to recommend that SoCalGas correct the demand study. [18] Tech Approach, p. 27, (emphasis added).	SoCalGas recognizes that the results of the Demand Study are interdependent with all the other studies; however, to complete Phase 1 in a reasonable timeframe, the studies must be conducted in parallel. The assumptions used in the Demand Study are from a combination of inputs from state and federal databases, industry subject matter experts, and peer reviews. SoCalGas is evaluating demand scenarios across mobility, power generation and industrial sectors and the associated pipeline throughput contemplated with Angeles Link. These results will be incorporated in future analysis, including the GHG evaluation.
77.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.5. Environmental & Environmental Social Justice Analysis • This Environmental & Environmental Social Justice Analysis should use as a guide the Equity Principles for Hydrogen that were adopted by some of the largest environmental justice organizations in California.[19] The analysis should highlight every violation of the equity principles that the Angeles Link would cause. Then the same analysis should be conducted regarding each of the alternatives (e.g. electrification, hydrogen hub, etc.). [19] Equity Principles for Hydrogen: Environmental Justice Position on Green Hydrogen in California ("Equity Principles for Hydrogen") (October 10, 2023), available at https://www.cbecal.org/wp-content/uploads/2023/10/Equity-Hydrogen-Initiative-Shared-Hydrogen-Position-1.pdf	SoCalGas has reviewed the Equity Principles for Hydrogen Environmental Justice Position on Green Hydrogen in California dated October 10, 2023. Please see Response to Comment 9.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
78.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	• The Tech Approach document states that "The Environmental Social Justice Analysis will involve… preparation of a Stakeholder Engagement Plan."[20] The Tech Approach document also states that "[t]he Environmental Justice Community Engagement Plan will establish an approach or framework for engaging disadvantaged communities with activities anticipated to occur during Phase Two, which will focus on gathering community input to address concerns and mitigate impacts and educating communities on hydrogen related topics of most interest to community members."[21] D.22-12-055 states that "SoCalGas may not record any costs for outreach and public relations activities in the Angeles Link Memo Account in Phase One."[22] Planning public outreach and community "education" is public relations. Thus, SoCalGas's intention to prepare a community engagement plan in Phase 1 is a clear violation of D.22-12-055. [20] Tech Approach, p. 35, ("The Environmental Social Justice Analysis will involve two parts: (1) conducting an Environmental Justice (EJ) screening and (2) preparation of a Stakeholder Engagement Plan."). [21] Tech Approach, p. 36. [22] D.22-12-055, p. 38.	The CPUC's Decision 22-12-055, OP 6 (l) stipulates that SoCalGas shall provide plans for addressing and mitigating impacts to disadvantaged communities and other environmental justice concerns. The Stakeholder Engagement Plan is intended to provide an outline for engaging disadvantaged communities and is being developed in conjunction with the Planning Advisory Group and the Community Based Organizations Stakeholder Group. Finalization and implementation of the plan would not occur during Phase 1 but would be submitted to the CPUC in accordance with the Decision.
79.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.6. High-Level Feasibility Assessment & Permitting Analysis • The Tech Approach doc states that "this technical approach document does not include the High-Level Feasibility Assessment and Permitting Analysis because it is a screening analysis that has already been described in the work descriptions document."[23] However, the feasibility of the project remains in question and the numerous errors in the demand study that led to SoCalGas overestimating hydrogen demand by at least an order of magnitude demonstrate that SoCalGas may not believe the Angeles Link is a feasible project if it were to incorporate an accurate demand forecast into the Phase 1 process. [23] Tech Approach, footnote 2, p. 32.	SoCalGas recognizes that the results of the Demand Study are interdependent with all the other studies and that this comment expresses concerns about the Demand Study. SoCalGas previously considered Utility Consumer Action Network's comments concerning the Demand Study and found the recommendation to update the Demand Study's conservative scenario to a lower demand by at least a factor of ten to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. The assumptions used in the Demand Study are from a combination of inputs from state and federal databases, industry subject matter experts, and peer reviews.
80.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.7. Right-of-way Analysis • A high-level right-of-way analysis is needed, not a detailed analysis. At this early stage, where the future role of hydrogen in the energy system remains undefined, and the likelihood of construction of the Angeles Link remains uncertain, the right-of-way analysis should be completed at a high level.	SoCalGas concurs that for Phase 1, the Right-of-Way analysis will be at a high-level and will primarily evaluate the potential availability of SoCalGas' existing private rights-of-way and future right-of-way location needs along potential pipeline corridors.
81.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	4.8. Franchise Agreement Analysis • This is a clear violation of D.22-12-055. The Commission's decision allows for tracking of costs for possible future recovery. Franchise agreements are a shareholder cost and all work related to franchise agreements should be excluded from the memorandum account.	The California Public Utilities Commission's Decision 22-12-055 requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). The franchise analysis is intended to determine the availability of public rights-of-way for preliminary routing purposes. Annual franchise payments, like local permit fees, are generally ratepayer funded as they are included in the cost of doing business in local jurisdictions. Costs associated with negotiating the terms of *new* franchise agreements are not included in rates and are covered by shareholders.

Comment	Comment Date	Stakeholder Name and Organization	Comment	SoCalGas Response
82.	10/21/2023	Utility Consumers Action Network (Tyson Siegele)	5. Engineering & Design • Four studies are listed under the umbrella of "Engineering and Design."[24] None of these studies should commence prior to SoCalGas correcting its Demand Study. [24] The studies are the: Preliminary Routing/Configuration Analysis; Pipeline Sizing & design Criteria, Plan for Applicable Safety Requirements, and Workforce Planning & training Evaluation	SoCalGas recognizes that the results of the Demand Study are interdependent with all the other studies; however, to complete Phase 1 in a reasonable timeframe, the studies must be conducted in parallel. SoCalGas considered previous comments from the Utility Consumer Action Network and found the recommendation to update the Conservative scenario to lower demand by at least a factor of ten to be inconsistent with both internal and external research done for the Demand Study as well as feedback from peer reviews, academia, federal and state agencies, and industry. The assumptions used in the Demand Study are from a combination of inputs from state and federal databases, industry subject matter experts, and peer reviews.

APPENDIX 3A – EQUITY PRINCIPLES FOR HYDROGEN

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May 6, 2024

Dear Environmental Justice Partners:

Southern California Gas Company (SoCalGas) appreciates the organizations representing the environmental justice community for actively participating in comprehensive learning sessions to explore the scientific aspects, risks, benefits, and uncertainties associated with hydrogen and for developing the Equity Principles for Hydrogen (the Principles document). SoCalGas has reviewed the Principles document and believes it is a foundational document that can help guide the company as we proceed with Angeles Link to foster meaningful conversation between environmental justice advocates and SoCalGas. As envisioned, SoCalGas's Angeles Link project could support the integration of more renewable electricity resources like solar and wind and could significantly reduce greenhouse gas (GHG) emissions from electric generation, industrial processes, heavy-duty trucks, and other hard-to-electrify sectors of the Central and Southern California economy. Angeles Link could also decrease demand for natural gas, diesel, and other fossil fuels, helping accelerate California's and the region's climate and clean air goals. As part of SoCalGas's Angeles Link project, SoCalGas proactively embarked on a robust stakeholder engagement process and formed two stakeholder groups: a Planning Advisory Group (PAG), composed of over 40 entities, and a Community Based Organization Stakeholder Group (CBOSG), composed of 29 CBOs, representing environmental and social justice organizations, faith-based organizations, educational organizations, affordable housing providers, industry associations, labor, ratepayer advocates, and other stakeholders. Several PAG and CBOSG members shared the Principles document for consideration.

SoCalGas acknowledges alignment with the Principles document and our vision for Angeles Link. The Principles document underscores the critical importance of incorporating equity, sustainability, and environmental justice considerations when shaping the future of hydrogen infrastructure in California. Overall, our vision for Angeles Link aligns in the following areas:

- **Prioritizing Community Engagement:** We firmly believe in the importance of a transparent process that actively involves communities and their members during the development of the Angeles Link project. Encouraging that their voices are heard and considered is crucial when it comes to establishing trust with community partners. The PAG and CBOSG, established during the first phase of Angeles Link, represent a crucial aspect of our commitment to engagement and transparency in the project's early stages. It is essential to recognize that this is just one element of a broader framework for openness and community engagement throughout the project's lifecycle. As preferred system routes are defined at the end of Phase 1, SoCalGas plans to convene route-specific community meetings to solicit input on project design. Additionally, depending on a preferred pipeline system route selection in Phase 2, SoCalGas intends to develop community benefits plans with input from community members. SoCalGas is also developing an Environmental Social Justice Community Engagement Plan (ESJ Plan) that would also be executed in Phase 2. The ESJ Plan is being developed in response to stakeholder feedback, with a focus on how to address questions and understand community concerns related to Angeles Link during project development. The ESJ Plan is also meant to identify community engagement strategies to meaningfully engage with ESJ populations and other disadvantaged communities.

- **Tribal Consultation:** We recognize the importance of engaging tribes and tribal organizations in the Angeles Link planning process and have engaged with several tribal organizations that are part of our CBOSG. Additionally, we are currently broadening our outreach efforts to include tribal governments and other tribal organizations within our service territory—those not currently represented on the CBOSG but that may potentially be impacted by the project. Tribal Nations are identified as a key stakeholder in the ESJ Plan being developed in the first phase of the project, and we will continue to meaningfully engage in productive dialogue with them.

- **Minimizing and Mitigating Environmental Impacts and Reducing Energy Pollution:** Minimizing and mitigating environmental impacts while simultaneously reducing energy pollution are crucial objectives that align with the Angeles Link project. Angeles Link has the potential to displace natural gas and diesel consumption, which could significantly reduce GHG emissions, nitrogen oxides (NOx), and particulate matter, thereby offering air quality and related health benefits especially in communities near heavily trafficked transportation corridors that are disproportionately impacted by poor air quality. As part of the first phase of the project, SoCalGas is evaluating both potential GHG and NOx emissions impacts associated with Angeles Link from transmission of hydrogen, third party production and storage, and end users in the mobility, power generation, and hard-do-electrify industries. Preliminary findings indicate that GHG emissions could be reduced by up to 9 million metric tons per year in 2045—the equivalent of 1 to 2 million gasoline passenger vehicles—and NOx emissions could be reduced by up to 5,100 tons per year.
- **Safety is Foundational Throughout the Lifecycle:** As the nation's largest gas distribution utility,[1] with decades of experience transporting gases, SoCalGas places the utmost importance on safety across its operations. The engineering and design of Angeles Link will prioritize infrastructure and public safety, and the well-being of our

[1] Based on number of customers and revenue.

workforce, including employees and contractors. SoCalGas is committed to collaborating with the community to address safety concerns and integrate community input into the project's safety design.

- **Cost Transparency**: Regulated utilities are required to operate with transparency to foster public trust and accountability. As a regulated utility, the CPUC's oversight over SoCalGas plays a vital role to ensure costs align with regulatory standards, are just and reasonable, and benefit ratepayers. [2] This transparency ensures that the costs associated with hydrogen infrastructure along with the ultimate delivery of hydrogen are just and reasonable which supports affordability.

SoCalGas's role for Angeles Link is solely in the transportation of hydrogen, focused on delivering clean renewable hydrogen to hard-to-abate sectors and impacted areas. Angeles Link would be a non-discriminatory open access pipeline dedicated to public use, allowing all end users to utilize the pipeline infrastructure under fair and transparent terms approved by the CPUC. While SoCalGas does not plan to produce hydrogen as part of the Angeles Link project, SoCalGas supports sustainable upstream production pathways as well as hydrogen usage that minimizes adverse environmental impacts. Keeping this in mind, SoCalGas is supportive of the following issues raised in the Hydrogen Equity Principles document:

- **Non-fossil hydrogen production:** SoCalGas supports clean renewable hydrogen production from non-fossil feedstocks. Further, the CPUC has authorized SoCalGas to proceed with Angeles Link feasibility studies, provided that the transport of hydrogen does not use fossil fuel in its production process.[3]

- **Hydrogen Production Regulation:** We recognize that hydrogen production projects should be subject to rigorous regulation so that community and environmental impacts are mitigated. Therefore, SoCalGas is supportive of regulation of hydrogen production and transportation.

- **Continued Research on Hydrogen End Uses**: Sustained investment in research and development is paramount to unlocking the full potential of hydrogen as a versatile and low-carbon energy solution. SoCalGas is supportive of continued research in diverse applications of hydrogen, particularly in sectors such as maritime transport, long-haul trucking, and aviation.

As we move forward, SoCalGas remains dedicated to upholding these principles and fostering ongoing dialogue with environmental justice advocates. Collaboration and shared understanding are essential as we shape the future of clean renewable hydrogen infrastructure in

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[2] Public Utilities Code section § 451 requires that the CPUC determine whether a utility's proposed rates, services, and charges are just and reasonable.
[3] CPUC Decision 22-12-055. Ordering Paragraph 3 (a). P. 73

California. SoCalGas is currently in the feasibility study phase of the Angeles Link project, with detailed project planning yet to be finalized. While we acknowledge that there are some differences in perspectives on the application of these high-level principles, we will continue to better understand the nuances in positions at this project's early stage so that we can strive for greater alignment and integration of our shared values throughout the project's lifecycle.

In light of the ongoing development of Angeles Link, we extend a sincere invitation for you to join our PAG or CBOSG or engage with us through other means. Your insights and perspectives are invaluable to us, and we believe that through collaborative effort, we can learn from all stakeholders involved. Your input and engagement are pivotal in guiding our efforts towards realizing a more resilient and inclusive energy future. Together, we can shape a project that not only meets the clean energy goals of the state but also embodies the values and priorities of our shared communities.

We appreciate your thoughtful engagement and look forward to the possibility of a fruitful collaboration. Together, we can forge a path towards a sustainable, equitable, and community-centric clean renewable hydrogen future.

Sincerely,

APPENDIX 4 – ATTENDEE LIST FOR PLANNING ADVISORY GROUP AND COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP MEETINGS, INCLUDING THOSE INVITED

CBOSG October Workshop Invitee List

Org	First name	Last name
Alma Family Services	Lourdes	Caracoza
Alma Family Services	Aida	Vega
Alma Family Services	Diego	Rodriguez
Ballona Wetland Institute	Marcia	Hanscom
Ballona Wetland Institute	Marcia	Hanscom
Breathe Southern California	Marc	Carrel
Breathe Southern California	Tigran	Agdaian
California Greenworks	Jessy	Shelton
California Greenworks	Michael	Berns
California Native Vote Project	Rene	Williams
Chinatown Service Center	Daisy	Ma
Chinatown Service Center	Kerry	Situ
Climate Action Campaign	Ayn	Craciun
Climate Action Campaign	Lexi	Hernandez
Coalition for Responsible Community Development	Ricardo	Mendoza
Coalition for Responsible Community Development	Kenta	Estrada-Darley
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Ambar	Rivera
Communities for a Better Environment	Roselyn	Tovar
Comunidades Indigenas en Liderazgo (CIELO)	Odilia	Romero
Defend Ballona Wetlands	Robert "Roy"	van de Hoek
Defend Ballona Wetlands	Jackson	Garland
Faith and Community Empowerment (FACE)	Hyepin	Im
Food and Water Watch	Andrea	Vega
Food and Water Watch	Chirag	Bhakta
Go Green Initiative	Jill	Buck
Greater Zion Church Family	Michael	Fisher
Greater Zion Church Family	Danny	Harrison
Greater Zion Church Family	Aquyla	Walker
Little Tokyo Community Council	Kristin	Fukushima
Little Tokyo Community Council	Chris	Fukushima
Los Angeles Indigenous People's Alliance	Luis R.	Pena
Los Angeles Indigenous People's Alliance	Jamie	Patino
Mexican American Opportunity Foundation	Ciriaco "Cid"	Pinedo
Nature for All	Belen	Bernal
Nature for All	Steven	Ochoa
Parents, Educators/Teachers, and Students in Action (PESA)	Seymour	Amster
Parents, Educators/Teachers, and Students in Action (PESA)	Ella	Cavlan
Parents, Educators/Teachers, and Students in Action (PESA)	Sydney	Rogers
Parents, Educators/Teachers, and Students in Action (PESA)	Ayasha	Johnson
Parents, Educators/Teachers, and Students in Action (PESA)	Araksya	Nordikyan
Physicians for Social Responsibility - Los Angeles	Alex	Jasset
Protect Playa Now	Faith	Myhra

Protect Playa Now	Kevin	Weir
Reimagine LA Foundation	Rashad	Trapp
Reimagine LA Foundation	Shawna	Andrews
Reimagine LA Foundation	Raul	Claros
Soledad Enrichment Action	Enrique	Aranda
Soledad Enrichment Action	Luis	Melliz
Soledad Enrichment Action	Nathan	Aranda
Southside Coalition of Community Health Centers	Andrea	Williams
Southside Coalition of Community Health Centers	Lucy	Castro
Vote Solar	Andrea	Leon-Grossmann
Watts Labor Community Action Committee	Timothy	Watkins
Watts Labor Community Action Committee	Thelmy	Alvarez
Watts Labor Community Action Committee	Ava	Post
Watts/Century Latino Organization	Autumn	Ybarra
Southeast Rio Vista YMCA	Gerry	Salcedo

CBOSG October Meeting Attendees

CBOSG				
Organization	**First Name**	**Last Name**	**In person**	**Zoom**
Ballona Wetland Institute	Marcia	Hanscom		X
Breathe Southern California	Marc	Carrel		X
California Greenworks	Jessy	Shelton		X
Defend Ballona Wetlands	Robert	van de Hoek		X
Food and Water Watch	Andrea	Vega		X
Go Green Initiative	Jill	Buck		X
Little Tokyo Community Council	Kristin	Fukushima		X
Los Angeles Indigenous People's Alliance	Luis R.	Pena	X	
Mexican American Opportunity Foundation	Cid	Pinedo		X
PESA (Parents,Educators/Teachers & Students in Action)	Shantal	Orea Torres		X
Physicians for Social Responsibility	Alex	Jasset		X
Reimagine LA Foundation	Rashad	Trapp		X
Soledad Enrichment Action	Enrique	Aranda	X	
Soledad Enrichment Action	Luis	Melliz	X	
Watts Labor Community Action Committee	Thelmy	Alvarez		X
Non CBOSG				
Arellano Associates	Chester	Britt	X	
Arellano Associates	Nancy	Verduzco	X	
Arellano Associates	Sohrab	Mikanik	X	
California Public Utilities Commission	Christopher	Arroyo		X
Insignia Environmental	Armen	Keochekian		X
Insignia Environmental	Julie	Roshala		X
Lee Andrews Group	Alyssa	Martinez	X	
Lee Andrews Group	Rick	Garcia		X
Lee Andrews Group	Alma	Marquez	X	
SoCalGas	Chanice	Allen	X	
SoCalGas	Andy	Carrasco		X
SoCalGas	Hector	Moreno		X
SoCalGas	Glenn	LaFevers		X
SoCalGas	Emily	Grant	X	
SoCalGas	Neil	Navin	X	
SoCalGas	Jill	Tracy	X	
SoCalGas	Amy	Kitson	X	
SoCalGas	Katrina	Regan	X	
SoCalGas	Douglas	Chow	X	
SoCalGas	Yuri	Freedman	X	
SoCalGas	Edith	Moreno	X	
SoCalGas	Olga	Quinones	X	
SoCalGas	Sebastian	Garza	X	
SoCalGas	Theresa	Dao	X	

CBOSG December Q4 Invitee List

Organization	First Name	Last Name
Protect Playa Now	Faith	Myhra
Protect Playa Now	Kevin	Weir
Ballona Wetland Institute	Marcia	Hanscom
Ballona Wetland Institute	Marcia	Hanscom
California Greenworks	Jessy	Shelton
California Greenworks	Michael	Berns
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Ambar	Rivera
Communities for a Better Environment	Roselyn	Tovar
Breathe Southern California	Marc	Carrel
Breathe Southern California	Tigran	Agdaian
Nature for All	Belen	Bernal
Nature for All	Steven	Ochoa
Climate Action Campaign	Ayn	Craciun
Climate Action Campaign	Lexi	Hernandez
Vote Solar	Andrea	Leon-Grossmann
Food and Water Watch	Andrea	Vega
Food and Water Watch	Chirag	Bhakta
Defend Ballona Wetlands	Robert Roy	van de Hoek
Defend Ballona Wetlands	Jackson	Garland
Physicians for Social Responsibility - Los Angeles	Alex	Jasset
Go Green Initiative	Jill	Buck
Chinatown Service Center	Daisy	Ma
Chinatown Service Center	Kerry	Situ
Soledad Enrichment Action	Enrique	Aranda
Soledad Enrichment Action	Luis	Melliz
Soledad Enrichment Action	Nathan	Aranda
Communities for Responsible Community Development	Ricardo	Mendoza
Communities for Responsible Community Development	Kenta	Estrada-Darley
Watts/Century Latino Organization	Autumn	Ybarra
Little Tokyo Community Council	Kristin	Fukushima
Little Tokyo Community Council	Chris	Fukushima
Reimagine LA Foundation	Rashad	Trapp
Reimagine LA Foundation	Shawna	Andrews
Reimagine LA Foundation	Raul	Claros
Mexican American Opportunity Foundation	Ciriaco "Cid"	Pinedo
Watts Labor Community Action Committee	Timothy	Watkins
Watts Labor Community Action Committee	Thelmy	Alvarez
Watts Labor Community Action Committee	Ava	Post
Alma Family Services	Lourdes	Caracoza
Alma Family Services	Aida	Vega
Alma Family Services	Diego	Rodriguez
Southside Coalition of Community Health Centers	Andrea	Williams
Southside Coalition of Community Health Centers	Lucy	Castro

Greater Zion Church Family	Michael	Fisher
Greater Zion Church Family	Danny	Harrison
Greater Zion Church Family	Aquyla	Walker
Faith and Community Empowerment (FACE)	Hyepin	Im
YMCA of Greater Los Angeles	Gerry	Salcedo
Parents, Educators/Teachers, and Students in Action (PESA)	Seymour	Amster
Parents, Educators/Teachers, and Students in Action (PESA)	Ella	Cavlan
Parents, Educators/Teachers, and Students in Action (PESA)	Sydney	Rogers
Parents, Educators/Teachers, and Students in Action (PESA)	Ayasha	Johnson
Parents, Educators/Teachers, and Students in Action (PESA)	Araksya	Nordikyan
Parents, Educators/Teachers, and Students in Action (PESA)	Olivia	Fike
Los Angeles Indigenous People's Alliance	Luis R.	Pena
Los Angeles Indigenous People's Alliance	Jamie	Patino
California Native Vote Project	Rene	Williams
Comunidades Indigenas en Liderazgo (CIELO)	Odilia	Romero
California Public Utilities Commission	Olga	Quinones
California Public Utilities Commission	Alexander "Sasha"	Cole

CBOSG December Meeting Attendees

CBOSG				
Organization	**First Name**	**Last Name**	**In person**	**Zoom**
Alma Family Services	Lourdes	Caracoza		X
Ballona Wetlands Institute	Marcia	Hanscom		X
Coalition for Responsible Community Development	Ricardo	Mendoza	X	
Defend Ballona Wetlands	Robert	van de Hoek		X
Go Green Initiative	Jill	Buck		X
Greater Zion Church Family	Chidi	Olunkwa	X	
PESA (Parents,Educators/Teachers & Students in Action)	Olivia	Fike		X
Protect Playa Now	Faith	Myhra		X
Reimagine LA Foundation	Rashad	Rucker-Trapp	X	
Soledad Enrichment Action	Enrique	Aranda	X	
Vote Solar	Andrea	Leon-Grossmann		X
Watts Labor Community Action Committee	Thelmy	Alvarez	X	
Non CBOSG				
Arellano Associates	Chester	Britt	X	
Arellano Associates	Stevie	Espinoza	X	
Arellano Associates	Nancy	Verduzco	X	
Arellano Associates	Sohrab	Mikanik		X
California Public Utilities Commission	Sasha	Cole		X
California Public Utilities Commission	Christopher	Arroyo		X
Hydrogen Fuel Cell Partnership	David	Park	X	
Insignia Environmental	Armen	Keochekian		X
Insignia Environmental	Julie	Roshala		X
Insignia Environmental	Anniken	Lydon		X
Lee Andrews Group	Rick	Garcia		X
Lee Andrews Group	Alma	Marquez	X	
Lee Andrews Group	Alyssa	Martinez	X	
Lee Andrews Group	Isaac	Martinez		X
Lee Andrews Group	Antonia	Issaevitch	X	
Lee Andrews Group	Edna	Degollado	X	
SoCalGas	Maryam	Brown	X	
SoCalGas	Douglas	Chow		X

SoCalGas	Emily	Grant	X
SoCalGas	Jill	Tracy	X
SoCalGas	Edith	Moreno	X
SoCalGas	Frank	Lopez	X
SoCalGas	Andy	Carrasco	X
SoCalGas	Darrell	Johnson	X
SoCalGas	Amy	Kitson	X
SoCalGas	Chanice	Allen	X
SoCalGas	Yuri	Freedman	X
SoCalGas	Theresa	Dao	X
SoCalGas	Olga	Quinones	X

PAG October Workshop Invitee List

Org	First name	Last name
Agricultural Energy Consumers Association	Maddie	Munson
Agricultural Energy Consumers Association	Michael	Boccadoro
Air Products	JP	Gunn
Air Products	Lorraine	Paskett
Air Products	Seth	Hilton
Air Products	Miles	Heller
Air Products	Vince	Wiraatmadja
ARCHES	Angelina	Galiteva
ARCHES	Tyson	Eckerle
Bizfed	Sarah	Wiltfong
Bloom Energy	Christina	Tan
California Air Resources Board	Steve	Cliff
California Energy Commission	Rizaldo	Aldas
California Hydrogen Business Council	Katrina	Fritz
California Manufacturers and Technology Association	Lance	Hastings
California Manufacturers and Technology Association	Robert	Spiegel
California Public Utilities Commission	Arthur	Fisher
California Public Utilities Commission	Christopher	Arroyo
California Public Utilities Commission	Christopher	Myers
California Public Utilities Commission	Matthew	Taul
California Public Utilities Commission	Jack	Chang
California Public Utilities Commission	Nick	Zanjani
California Public Utilities Commission	Nathaniel	Skinner
California Public Utilities Commission	Kaj	Peterson
California Water Data Consortium	Deven	Upadhay
City of Long Beach*	Mario	Cordero
Clean Energy	Nora	Sheriff
Clean Energy Strategies representing the Utility Consumers' Act	Tyson	Siegele
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Shara	Burwell
Communities for a Better Environment	Roberto	Cabrales
Earth Justice	Sara	Gersen
Energy Independence Now	Brian	Goldstein
Environmental Defense Fund	Joon Hun	Seong
Environmental Defense Fund	Michael	Colvin
Environmental Justice League	Russell	Lowery
GoBiz	Deedee	Myers
Green Hydrogen Coalition	Nick	Connell
Green Hydrogen Coalition	Hope	Fasching
Harbor Trucking Association	Karla	Sanchez
Harbor Trucking Association	Matthew	Schrap
Independent Energy Producers Association*	Jan	Smutny Jones
International Longshore and Warehouse Union Local 13	Sal	DiConstanzo
International Longshore and Warehouse Union Local 13	Mark	Jurisic
International Longshore and Warehouse Union Local 13	Sophia	Dubrovich
Local Union 250	Nathaniel	Williams

PAG October Workshop Invitee List

Local Union 250	Hector	Carbajal
Los Angeles Department of Water and Power	Aaron	Guthrey
Los Angeles Department of Water and Power	Marty	Adams
Los Angeles Department of Water and Power	Paul	Habib
Los Angeles Department of Water and Power	Nermina	Rucic
Los Angeles Department of Water and Power	Jesse	Vismonte
Metropolitan Water District	Deven	Upadhyay
Natural Resources Defense Council	Pete	Budden
Port of Los Angeles	Mike	Galvin
Port of Los Angeles	Tim	DeMoss
Protect our Communities Foundation	Protect Our Communities Representative	
Reimagine LA	Rashad	Rucker-Trapp
Reimagine LA	Raul	Claros
Sierra Club	Monica	Embrey
Sierra Club	Katherine	Ramsey
South Coast AQMD	Maryam	Hajbabaei
South Coast AQMD	Sam	Cao
South Coast AQMD	Aaron	Katzenstein
Southern CA Water Coalition	Charley	Wilson
Southern California Association of Governments	Kome	Ajise
Southern California Generation Coalition	Norman	Pedersen
Southern California Leadership Council	Richard	Lambros
Southern California Pipe Trades	Rodney	Cobos
The United Association	Aaron	Stockwell
UC Davis Sustainable Transportation Energy Pathways	Lew	Fulton
UCI Advanced Power and Energy Program	Jack	Brouwer
University of CA Riverside	Arun	Raju
Utility Reform Network (TURN)	Marcel	Hawiger
Utility Reform Network (TURN)	Marna	Paintsil Anning
Utility Workers Union of America 483	Ernest	Shaw
Utility Workers Union of America 483	Robin	Downs
Utility Workers Union of America 483	Anthony	Flores
Utility Workers Union of America Local 132	Joe	Moreno
Utility Workers Union of America Local 132	Mike	Cormode

October PAG Workshop - October 18, 2023

Organization	First name	Last name	In person	Zoom
PAG				
Agricultural Energy Consumers Association	Maddie	Munson		x
Air Products*	Lorraine	Paskett	x	
Air Products	Miles	Heller		x
California Energy Commission	Rizaldo	Aldas		x
California Hydrogen Business Council	Katrina	Fritz		x
California Public Utilities Commission	Arthur	Fisher		x
California Public Utilities Commission	Christopher	Arroyo		x
California Public Utilities Commission	Matthew	Taul		x
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele		x
Earth Justice	Sara	Gersen		x
Environmental Defense Fund	Joon Hun	Seong		x
Green Hydrogen Coalition	Nick	Connell		x
Independent Energy Producers Association	Sara	Fitzsimon		x
International Longshore and Warehouse Union Local 13*	Sal	DiConstanzo	x	
International Longshore and Warehouse Union Local 13	Sophia	Dubrovich		x
Los Angeles Department of Water and Power	Aaron	Guthrey		x
Los Angeles Department of Water and Power	Nermina	Rucic		x
Los Angeles Department of Water and Power	Jesse	Vismonte		x
Natural Resources Defense Council	Pete	Budden		x
South Coast AQMD	Maryam	Hajbabaei		x
South Coast AQMD	Sam	Cao		x
Southern California Generation Coalition*	Norman	Pedersen	x	
UCI Advanced Power and Energy Program	Jack	Brouwer		x
Utility Workers Union of America 483*	Ernest	Shaw	x	
Utility Workers Union of America 483*	Robin	Downs	x	
Non PAG				
Arellano Associates*	Chester	Britt	X	
Arellano Associates*	Stevie	Espinoza	X	
Arellano Associates*	Nancy	Verduzco	X	
California Strategies*	Marybel	Batjer	X	
Insignia Environmental	Armen	Keochekian		x
Insignia Environmental	Julie	Roshala		x
Insignia Environmental	Armen	Keochekian		x
Lee Andrews Group*	Alma	Marquez	X	
SoCalGas*	Frank	Lopez	x	
SoCalGas*	Douglas	Chow	X	
SoCalGas*	Amy	Kitson	x	
SoCalGas*	Katrina	Regan	x	
SoCalGas*	Yuri	Freedman	X	
SoCalGas*	Jill	Tracy	X	
SoCalGas	Hector	Moreno		x

PAG December Q4 Invitee List

Organization	First name	Last name
Agricultural Energy Consumers Association	Maddie	Munson
Agricultural Energy Consumers Association	Michael	Boccadoro
Air Products	JP	Gunn
Air Products	Lorraine	Paskett
Air Products	Seth	Hilton
Air Products	Miles	Heller
Air Products	Vince	Wiraatmadja
ARCHES	Angelina	Galiteva
ARCHES	Tyson	Eckerle
Bizfed	Sarah	Wiltfong
Bloom Energy	Christina	Tan
California Air Resources Board	Steve	Cliff
California Energy Commission	Rizaldo	Aldas
California Hydrogen Business Council	Katrina	Fritz
California Manufacturers and Technology Association	Lance	Hastings
California Manufacturers and Technology Association	Robert	Spiegel
California Public Utilities Commission	Arthur (Iain)	Fisher
California Public Utilities Commission	Christopher	Arroyo
California Public Utilities Commission	Christopher	Myers
California Public Utilities Commission	Matthew	Taul
California Public Utilities Commission	Jack	Chang
California Public Utilities Commission	Sasha	Cole
California Public Utilities Commission	Nick	Zanjani
California Public Utilities Commission	Nathaniel	Skinner
California Public Utilities Commission	Kaj	Peterson
California Water Data Consortium	Deven	Upadhay
City of Long Beach*	Mario	Cordero
Clean Energy	Nora	Sheriff
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Shara	Burwell
Communities for a Better Environment	Roberto	Cabrales
Earth Justice	Sara	Gersen
Energy Independence Now	Brian	Goldstein
Environmental Defense Fund	Joon Hun	Seong
Environmental Defense Fund	Michael	Colvin
Environmental Justice League	Russell	Lowery
GoBiz	Deedee	Myers
Green Hydrogen Coalition	Nick	Connell
Green Hydrogen Coalition	Hope	Fasching

Harbor Trucking Association	Karla	Sanchez
Harbor Trucking Association	Matthew	Schrap
Independent Energy Producers Association*	Jan	Smutny Jones
Independent Energy Producers Association*	Sara	Fitzsimon
International Longshore and Warehouse Union Local 13	Sal	DiConstanzo
International Longshore and Warehouse Union Local 13	Mark	Jurisic
International Longshore and Warehouse Union Local 13	Sophia	Dubrovich
Local Union 250	Nathaniel	Williams
Local Union 250	Hector	Carbajal
Los Angeles Department of Water and Power	Aaron	Guthrey
Los Angeles Department of Water and Power	Marty	Adams
Los Angeles Department of Water and Power	Paul	Habib
Los Angeles Department of Water and Power	Nermina	Rucic
Los Angeles Department of Water and Power	Jesse	Vismonte
Metropolitan Water District	Deven	Upadhyay
Natural Resources Defense Council	Pete	Budden
Port of Los Angeles	Mike	Galvin
Port of Los Angeles	Tim	DeMoss
Protect our Communities Foundation	Protect Our Communities Representative	
Reimagine LA	Rashad	Rucker-Trapp
Reimagine LA	Raul	Claros
Sierra Club	Monica	Embrey
Sierra Club	Katherine	Ramsey
South Coast AQMD	Maryam	Hajbabaei
South Coast AQMD	Sam	Cao
South Coast AQMD	Aaron	Katzenstein
Southern CA Water Coalition	Charley	Wilson
Southern California Association of Governments	Kome	Ajise
Southern California Generation Coalition	Norman	Pedersen
Southern California Leadership Council	Richard	Lambros
Southern California Pipe Trades	Rodney	Cobos
The United Association	Aaron	Stockwell
UC Davis Insitutue of Transportation Studies	Lukas	Wernert
UC Davis Sustainable Transportation Energy Pathways	Lew	Fulton
UCI Advanced Power and Energy Program	Jack	Brouwer
University of CA Riverside	Arun	Raju
Utility Reform Network (TURN)	Marcel	Hawiger
Utility Reform Network (TURN)	Marna	Paintsil Anning
Utility Workers Union of America 483	Ernest	Shaw
Utility Workers Union of America 483	Robin	Downs
Utility Workers Union of America 483	Anthony	Flores
Utility Workers Union of America Local 132	Joe	Moreno
Utility Workers Union of America Local 132	Mike	Cormode

December Q4 PAG Meeting - December 15, 2023

PAG				
Organization	First name	Last name	In Person	Zoom
Air Products	Miles	Heller		X
Air Products	Lorraine	Paskett		X
California Energy Commission	Rizaldo	Aldas	x	
California Hydrogen Business Council	Katrina	Fritz		X
California Public Utilities Commission	Christopher	Arroyo		X
California Public Utilities Commission	Sasha	Cole		X
California Public Utilities Commission	Matthew	Taul	X	
California Public Utilities Commission	Arthur (Iain)	Fisher	X	
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele		X
Earth Justice	Sara	Gersen		X
Environmental Defense Fund	Michael	Colvin	X	
Green Hydrogen Coalition	Hope	Fasching	X	
Harbor Trucking Association	Matthew	Schrap		X
Independent Energy Producers Association	Sara	Fitzsimon		X
International Longshore and Warehouse Union Local 13	Sal	DiConstanzo		X
Local Union 250	Nathaniel	Williams		X
Local Union 250	Hector	Carbajal		X
Los Angeles Department of Water and Power	Jesse	Vismonte		X
Los Angeles Department of Water and Power	Aaron	Guthrey		X
Los Angeles Department of Water and Power	Nermina	Rucic		X
Natural Resources Defense Council	Pete	Budden		X
South Coast AQMD	Sam	Cao		X
Southern CA Water Coalition	Charley	Wilson	X	
Southern California Generation Coalition	Norman	Pedersen	X	
Utility Workers Union of America 483	Ernest	Shaw	X	
PAG				
Arellano Associates	Chester	Britt	x	
Arellano Associates	Stevie	Espinoza	x	
Arellano Associates	Nancy	Verduzco		x
Arellano Associates	Keven	Michele	x	
California Strategies	Marybel	Batjer		x
Insignia Environmental	Armen	Keochekian		x
Insignia Environmental	Julie	Roshala		x
Lee Andrews Group	Alma	Marquez	x	
Lee Andrews Group	Alyssa	Martinez	x	
SoCalGas	Yuri	Freedman	x	
SoCalGas	Neil	Navin	x	
SoCalGas	Darrell	Johnson	x	
SoCalGas	Emily	Grant	x	
SoCalGas	Jill	Tracy	x	
SoCalGas	Andy	Carrasco		x
SoCalGas	Frank	Lopez		x
SoCalGas	Pearl	Hsu		x

APPENDIX 5 – TRANSCRIPTS

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:)
)
ANGELES LINK COMMUNITY BASED)
ORGANIZATION STAKEHOLDER GROUP)
_____________________________________)

CERTIFIED COPY

TRANSCRIPT OF PROCEEDINGS

HYBRID MEETING

Thursday, October 19, 2023

Reported by:

HANNA JENKIN,

Job No.:
44837LEE

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:)
)
ANGELES LINK COMMUNITY BASED)
ORGANIZATION STAKEHOLDER GROUP)
_____________________________________)

TRANSCRIPT OF PROCEEDINGS, held via Zoom Videoconference, commencing at 9:30 a.m. and concluding at 11:45 a.m. on Thursday, October 19, 2023, reported by Hanna Jenkin, Hearing Reporter.

ATTENDEES:

SoCalGas:	Amy Kitson Emily Grant Chanice Allen Katrina Regan Neil Navin Jill Tracy Yuri Freedman
Arellano Associates:	Chester Britt
Lee Andrews Group:	Alma Marquez
Soledad Enrichment Action:	Enrique Aranda Luis Melliz Luis Pena
PSR-LA:	Alex Jasset
Food and Water Watch:	Andrea Vega
California Public Utilities Commission:	Christopher Arroyo
Mexican American Opportunity Foundation:	Ciriaco "Cid" Pinedo
California Greenworks:	Jessy Shelton
Go Green Initiative:	Jill Buck
Little Tokyo Community Council:	Kristin Fukushima
Ballona Wetlands Institute:	Marcia Hanscom
Reimagine LA Foundation:	Rashad Rucker-Trapp
Insignia Environmental:	Julia Roshala
Defend Ballona Wetlands:	Robert van de Hoek
Watts Labor Community Action Committee:	Thelmy Alvarez
Breathe SoCal:	Marc Carrel

I N D E X

Via Zoom, Thursday, October 19, 2023
9:30 a.m.

MS. MARQUEZ: Good morning, everyone and welcome to today's Angeles Link October Workshop for the CBOSG Stakeholder Group. My name is Alma Marquez. I am the Vice President of Government Relations for the Lee Andrews Group and the CBO lead facilitator. Also joining me this morning is Chester Britt, who is the Executive Vice President of Arellano Associates and our PAG Lead, who will be assisting me in facilitating today's workshop.

Just to go over some housekeeping rules. This meeting is being recorded and a court reporter will be transcribing everything from today's meeting. So we advised you, please state your name before you make a comment so that she could capture that in her transcription.

We also encourage you to turn on your cameras for our folks who are joining us on Zoom so we can see you and we are able to engage with you.

Feel free to use the Zoom chat to provide input and ask questions, and if you'd like to speak please raise your hand. The hand button is at the bottom of the Zoom screen.

For folks are joining us here in person, we have wireless microphones that are at your table, so you can pull your card over to the side we can answer your questions.

So I just wanted to go over our agenda today, which, as you can see, is action-packed, as they usually are. We'll start with our Land Acknowledgment and then go into roll call.

And because today is the Big California Shakeout and we are Southern California Gas, we will be participating in that. So I just wanted to -- I'll be having Emily run us through the exercise when the time comes.

We also have three presentations today. The first one is the Project Options and Alternatives Technical Approach, followed with a member discussion. We will have a brief break.

As well as -- after that will be a Workforce Planning and Training Evaluation Technical Approach, followed with another member discussion, and then we will go into our Next Steps, and adjourn around noon for today's workshop.

MS. GRANT: Sorry. Hi, everybody. Good morning. Emily Grant with SoCalGas. So for our safety moment, you'll see it was listed as a "Floating Safety Moment," the reason for this is that the Great California Shakeout starts at 10:19 a.m. We don't know where were going to be in the presentation at 10:19, so it's a floating safety moment. I have an alarm set here on my watch.

When that happens, we will all drop, cover, and hold on. We would love for everybody who is participating virtually to join us in the Shakeout. So at that point, again, it's drop, cover, hold on.

I guess I am going to age myself a little bit, I thought it was something else.

Yeah. Or is that fire?

Anyway, so it's drop, cover, and hold on. So we'll all do that together and just take that brief safety moment. So if you will join us at 10:19, I'll let you know when that is, and we will all take cover under our tables. Thank you.

MS. MARQUEZ: Thank you, Emily, for that.

So with that said, I'd like to ask Thelmy Alvarez, who is joining us online if you're ready for the Land Acknowledgment? If not, we can have someone else read through this statement.

I see you, Thelmy, but I don't hear you.

Okay. Let's go ahead and have Luis Melliz, who is joining us here with Soledad Enrichment Action to lead us through the Land Acknowledgment.

MR. MELLIZ: Good morning, everyone.

Land Acknowledgment. We respectfully acknowledge the indigenous peoples on whose ancestral land we gather of the diverse and vibrant communities of Tonga, Tataviam, Serrano, Kizh, and Chumash people, who for generations have cared for these lands and make their home here today.

We honor and pay our deepest respect to their elders and descendents, past, present, and emerging as they continue their enduring stewardship of these lands and waters for generations to come.

We acknowledge our collective responsibility and commitment to elevating the stories, culture, and community of the original caretakers of this region, and are grateful for the opportunity to live and work on these ancestry lands.

We celebrate the resilience, strength, and unwavering spirit of indigenous peoples, and are dedicated to creating collaborative accountable and respectful relationships with indigenous nations and local tribal governments.

MS. MARQUEZ: Thank you, Luis.

So with that, we're going to go into our roll call. I'd like everyone to state your name and the organization that you're representing at today's workshop.

I'm going to start over with our folks that are joining us here in person, and then we'll transition over to our folks joining us via Zoom.

With that, I'm getting handed over to Chanice.

MS. ALLEN: Good morning, everyone. Chanice Allen, engineering and technology project manager.

MS. REGAN: Hello. Good morning. Katrina Regan, engineering and technology development manager for Angeles Link.

MS. KITSON: Good morning. Amy Kitson, Angeles Link director of engineering and technology.

MR. MELLIZ: Good morning, everyone. Luis Melliz with SEA.

MR. PENA: Good morning, everyone. Luis Pena, Los Angeles Indigenous Peoples Alliance.

MR. NAVIN: Good morning, everyone. I'm Neil Navin. I'm the chief clean fuels officer for Southern California Gas Company. Thanks for joining us today.

MS. TRACY: Good morning. Jill Tracy, senior director Angeles Link regulatory and policy. Thank you so much for joining us this morning.

MR. FREEDMAN: Good morning, everyone. I'm Yuri Freedman, senior director of business development.

MR. BRITT: And Chester Britt, the executive vice president with Arellano Associates, assisting Alma, and facilitating this meeting.

MS. GRANT: Good morning. Emily Grant, senior public affairs manager with Angeles Link.

MS. MARQUEZ: And in no particular order, I'll be calling out your names. If you could please unmute yourself and turn on your video, so we could see who you are.

We'll start with Alex Jasset.

MR. JASSET: Good morning, everyone. I'm sorry can't be on camera today. Alex Jasset, I'm the energy justice director at Physicians for Social Responsibility Los Angeles.

MS. MARQUEZ: Welcome, Alex.

Andrea Vega, if you could unmute yourself.

MS. VEGA: Hi, everyone. Andrea Vega here with Food and Water Watch.

MS. MARQUEZ: Hi, Andrea.

Christopher Arroyo.

MR. ARROYO: Good morning. Christopher Arroyo, CPUC.

MS. MARQUEZ: Welcome, Christopher.

Dr. Cid Pinedo, if you could unmute yourself, please.

DR. PINEDO: Good morning. Ciriaco Pinedo with Mexican American Opportunity Foundation.

MS. MARQUEZ: Welcome, Cid.

And then if we could move on over to Jessy

Shelton, if you could unmute yourself.

MS. SHELTON: Hi. Jessy Shelton, I am the program coordinator for California Greenworks.

MS. MARQUEZ: Welcome, Jessy.

Jill Buck.

MS. BUCK: Good morning, everybody. I'm Jill Buck, the founder and CEO of the Go Green Initiative.

MS. MARQUEZ: Good morning, Jill.

Christian Fukushima, if you could unmute yourself.

MS. FUKUSHIMA: Hi, everyone. My name is Kristin Fukushima. I use she and her pronouns. And I'm the managing director of the Little Tokyo Community Council.

MS. MARQUEZ: Welcome.

Marcia Hanscom, if you can unmute yourself.

MS. HANSCOM: Good morning. Marcia Hanscom with the Ballona Wetlands Institute.

MS. MARQUEZ: Welcome, Marcia.

If we can have Rashad Rucker-Trapp, unmute yourself, please.

MR. RUCKER-TRAPP: Good morning, everyone. Rashad Rucker-Trapp, executive director for Reimagine LA Foundation.

MS. MARQUEZ: Welcome, Rashad.

If we could have, Julie Roshala unmute yourself, please.

MS. ROSHALA: Good morning, Julie Roshala with Insignia Environmental.

MS. MARQUEZ: Welcome.

If we could have Robert Roy -- a.k.a. Roy unmute yourself, and if you turn on your video that be great.

MR. VAN DE HOEK: Good morning, everyone. Buenos dias. My name is Robert van de Hoek, nickname Roy. Sorry I can't show my camera right now, a little later perhaps.

I wanted to under acknowledgment add the Chumash indigenous peoples cultural nation under the Land Acknowledgment. I did hear many other indigenous peoples' cultures acknowledged, but we -- perhaps, next time Chumash can be officially added too. Thanks.

Oh, I'm sorry. Defend Ballona Wetlands president and founder. Thank you.

MS. MARQUEZ: Thank you, Roy.

Thelmy Alvarez, you can unmute yourself.

MS. ALVAREZ: Yes. Good morning, everybody. I'm so sorry. I wanted to join you in person, but I'm home with the baby with a fever, and he was fussing in the moment of the Land Acknowledgment. So I'm so sorry.

I'm here representing the Watts Labor Community Action Committee, and happy to be here.

MS. MARQUEZ: Thank you for still listening in with a sick baby, you're doing the right thing. Thanks for joining though. Thank you, much appreciated.

All right. And I believe I have everyone that I see here, if I missed anyone, if you could please unmute yourself, state your name and your organization.

It looks like I did catch everyone that are joining us online. Thanks again for being here this morning.

As I mentioned earlier, we do have a tight agenda, so I want to make sure that I keep us on time. And with that I'd like to kick it over to Neil Navin who is the chief clean fuels officer with SoCalGas.

Good morning, Neil.

MR. NAVIN: Good morning. Thanks, Alma.

And thank you all for joining online and in person, we appreciate your time.

Before we jump into the session today, I did want to acknowledge the exciting news of the DOE's announcement last week on hydrogen hubs. California was one of seven winners of hydrogen hubs fund money. That was roughly $7,000,000,000 total that was awarded, really to accelerate the idea of domestic, low-cost, clean hydrogen.

And in our final decision for the Angeles Link memorandum account, the reason we are doing the work here today, at least in part, SoCalGas was directed to join

ARCHES. So we are participating partner with ARCHES, and support them in their application to pursue those funds.

So again, recognize there only seven winners in the entire country, California being one of them. We are really, really happy to be part of that.

The leading entity that pursued those dollars on behalf of the State is an entity called ARCHES, so it's the Alliance for Renewable Clean Hydrogen Energy Systems, it is kind of a mouthful. But in essence, it's a public, private partnership that is looking at developing renewable energy, hydrogen statewide to aid the energy transition.

So again, the State of California found out last week that we were a winner. What does that mean for the work we are doing here today? As I mentioned, our final decision was very explicit, that we, at SoCalGas needed to join ARCHES in their pursuit. And our work really envisions connecting a lot of these critical energy systems, renewable energy, to end-use and uses for the hard to electrify parts of the economy.

So we are very excited to be part of it. We recognize that our work really supports ARCHES and the idea that Angeles Link may develop in phases to support ARCHES, I think, is central to a lot of the work, and some of the discussions we've had already in this forum and in our PAG firm as well.

We are excited. We want to make sure that this group, all groups involved with this Angeles Link work, that you engage. ARCHES itself as a public engagement process, so I'd encourage you to look at that and consider whether your organization participates in that.

There are community benefits meetings that are taken place and are going to take place. So again, I would suggest ARCHES is really a wealth of information on the work of the broader effort to help transition the State.

We are here today to, sort of, gather your feedback on our studies that support Angeles Link, but I would also encourage you to engage with ARCHES, engage with ARCHES leadership in their effort as well.

So I want to thank you, sincerely thank you, for your time. I recognize we have a lot of meetings we put on your calendar. We sincerely appreciate your input, and your input really is necessary for us to develop a project that recognizes the importance of community engagement.

So again, thank you very much. And we've got a packed agenda, so I'll stop here. But thank you, again.

MS. MARQUEZ: Thank you, Neil, for that opening remark, and giving us the update on the big win for California, right? That were going to be part of this big vision, and we are all grateful for that. And we are grateful for this opportunity to be a part of that bigger picture. So thank you.

Okay. So with that, we do have a question from Marcia.

Marcia, if you could unmute yourself.

MS. HANSCOM: Can you hear me now?

MS. MARQUEZ: Yes. We can hear you.

MS. HANSCOM: Great. Thank you.

Two questions. One, Neil, you suggested -- recommended that we engage which ARCHES. Can you provide us with the information as to how to do that?

And secondly, I'm a little confused. Because a couple of meetings ago I remember asking very explicitly what does Angeles Link, ARCHES, Scattergood, all of these various hydrogen-related things, how did they relate to each other, and I recall very surprised, but I wrote it down, that the answer was that none of them are related.

And now it sounds like they are. So I'm a little confused. Maybe you could clarify that.

MR. NAVIN: Yes. So Marcia, I guess answering your first question, I'd be more than happy to direct you to the ARCHES website, to their public engagement process.

And also, be happy to make sure that you get the contacts. You may or may not know the ARCHES is actually part of our PAG group here. So ARCHES actually is participating in the work that were doing here in an advisory capacity. Essentially, like many of you, providing input.

So ARCHES has been, since the beginning a group that has had a voice in the Angeles link development process. And as I mentioned, our memorandum account decision, our final decision, actually had us joining the ARCHES process as a member, as a supporting member, of that.

So you know, I would say that the work of LADWP is their own work, and it stands on its own. The work of ARCHES also involves many, many different partners. Angeles Link is an effort that will evolve over time.

And so, I think, at this stage, our work to look at the final stages of ARCHES and how it may develop over time, you know, I think that conversation, as it will, with ARCHES as they negotiate their final efforts with the DOE, I think, as new information becomes available, we'll be happy to share with you.

But you know, in some sense, all of these hydrogen works are supportive of each other, if not many of them not directly connected to each other, if that makes sense. Ultimately, this is about building a hydrogen ecosystem that helps to decarbonized the hard to decarbonize sectors of the economy. But each individual entity is working on their projects in their own manner.

MS. MARQUEZ: Link was dropped in the chat for your review, and everyone can see that at your leisure.

Are there any other questions for Neil? I don't see any hands up.

Thank you, Neil, for that response.

And Marcia, for your question.

We're going to move on to our first presentation. Our first presentation will be given by Yuri Freedman, who is a senior director of business development, who will be discussing project options and alternatives technical approach.

And with that, we'll hand it over to Yuri.

MR. FREEDMAN: Thank you, Alma. And good morning. I'm not sure the clicker is. Do you know where? Thank you.

As Alma mentioned, I will provide an overview of the technical approach of the projects options and alternatives study. As you can see on the first slide, Angeles Link purpose and need is multifold, and the key four pillars of that are:

To meet -- to help California meet its ambitious decarbonization goals, the second, which I know is very important to many of the communities in this state, is to improve California's air quality by replacing fossil fuels, the third is becoming more and more prominent every day, I would say, and that's the energy resiliency and reliability, that's the topic that we had spoken about in the past and will come back to this later today, and ultimately, bringing this all together is to provide cost effective and affordable energy at a reasonable rate.

The purpose of the project options and alternatives study is to ask and answer the question, whether there are alternatives to the project of meeting these goals. And the alternatives, as we segment them, they fall into three categories that are listed here on the right-hand side. They start from top to bottom, from non-hydrogen alternatives, and the way to think about that is just ask, do we need hydrogen at all? Or are there other ways to meet the goals listed on the left? That's the top arrow.

Middle arrow effectively it says, "hydrogen delivery," but the question is being asked is do we need hydrogen? How are we best going to be able to transfer from where it's going likely to be produced, to where it's going to get used.

And the third arrow is if we were to decide that hydrogen should be conveyed by a pipeline, then what are the routing options? What are the configurations of pipelines that we could perform these functions, that could accomplish the goals on the left?

Go to the next slide.

And again, the next light effectively summarizes what I described in the previous slide by saying that on the one hand hydrogen, again, it does enact analyzation. It really is working hand in glove with multiple other pillars of energy transition.

As we have discussed before, no single technology, no single pathway can accomplish as ambitious goals as we have in this state, it will take all of them to work together. Including electrification is going to be a big part of it. But clean fuels, such as hydrogen, is going to be very important part of that as well.

And so now, by analyzing alternatives, we are going to be able to compare their effectiveness, their ability to accomplish the goals, as well as their environmental impact, and ultimately assess what are the best ways for us to align with California's environmental goals.

Next slide has graphically -- it may be a little bit more confusing than it needs to be. And so what I would encourage you all to do, you don't need to go from left to right, and then to the left again. It's basically just, again, look at the numbers and you have to go from bottom to the top on the left, then repeat that sequence on the right.

So we start with what this graphic describes is the logic and the sequence of the process. We start from identifying the alternatives. Remember from the previous slide, to form those three categories: Nonhydrogen alternatives, non-pipeline alternatives for hydrogen, and ultimately multiple options. We identify them, we evaluate them against the identified criteria, and the next slide will dig into more the -- excuse me -- specifics of this criteria.

We then dismiss those specifics that don't satisfy this criteria, and we select alternatives that do for more detailed analysis. That's steps 3 and 4.

Step 5 is to effectively use the data for this alternative, use the numerical information to feed it into cost effectiveness studies, as well as environmental and social justice studies.

And ultimately, the end result of this would be summary analysis, which includes cost environmental impact. And again, going back to where we started from, ability of what we proposed to meet the purpose and need.

Go to the next slide.

This is a little bit more granular look at those three categories of alternatives. And the categories on the left in dark blue are categories to accomplish the objectives by means other than hydrogen.

Not surprisingly, the first on top is electrification, that's something which the State has made very significant in the roads, and will continue to make those. It is technologies which are perfectly capable to meet multiple needs.

It's also, like any other technology, likely is going to have its limitations. And we are going to explore where it can and cannot reach the goals in the sectors of interest to us. Because remember, we are focused on energy transport, on power generation, and on heavy industry.

Along the same lines, energy efficiency is not a mechanism, of course, to accomplish our goals. It can be quite simply, we meet fewer greenhouse gases by using less energy. It is something, again, energy efficiency is the direction of which the State has made significant progress, and we are going to look at the ability of this particular pathway to solve the problems that we face.

Another one is renewable natural gas and bio methane and that's the area in which natural gas has been very active, and we have our corporate goals with regards to the amount of RNG, as we call it now, system. We're going to examine it's capability to solving the problems.

And the last of those macrocategories is what we call carbon management. Another word for it is -- or another term for it is carbon capture and sequestration, that's effectively continue to use of fossil fuels, but capture carbon dioxide, and either sequestered or utilizes for other purposes.

So these are the macrolevel alternatives. They are, if you recall, the top arrow of the three arrows on the chart.

Going down to the second area, that's hydrogen delivery alternative and we will talk about this a little bit more on some of the following slides. And then going down the two last icons on the right are quite important. Because the medium icon on the right talks about various routing options, and if we were to decide that the pipeline is the best solution, then question is what other routing options we have.

And last icon is quite important, as well. It reflects the direction of our regulator. The commission, in their final decision, required us to examine the concept of the localized hydrogen hub. We'll talk a little bit more later on about what that means, but that's an important element of our analysis.

MR. BRITT: Let me just interrupt you, Yuri.

I just want to make sure that were all tracking.

So we just covered is really two sets of options or alternatives. One is hydrogen related options, the other is, you know, non-hydrogen related options. So let's just stop Yuri in the middle of his presentation, and let's see if we have any questions about those two things, in particular.

So the non-hydrogen options were electrification, energy efficiency, renewable natural gas, and carbon management or carbon capture.

And then the hydrogen related options were either a pipeline, a localized hydrogen hub, or different delivery alternative methods.

Does anyone have any thoughts or questions about that part of the presentation?

Enrique.

MR. ARANDA: My question is basic. It just has to do -- how does this all align towards ARCHES? For the mandates and everything else?

MR. FREEDMAN: My answer - I would say -- answer, Enrique, is that I will mirror what Neil mentioned.

ARCHES is something which we required to join a supporting member by the commission, which we did. The events that took place very recently with ARCHES winning the award, it is a very important milestone, and yet, is just a step in the process. Ultimately, they're going to spend likely months firming up what California hydrogen hub actually is, and negotiating the terms of that with the Department of Energy.

As this information becomes available, we'll be sure to share that, but for now, I think that's where they are in the process.

Neil?

MR. NAVIN: This is Neil. Maybe I'll just jump in as well.

So Enrique, I think there's maybe another way of answering this as well. And that is that ARCHES is looking at very specific types of project that it wants to fund as part of this initial grant from the DOE.

You know, the Angeles Link work is looking a little bit beyond that. We are actually looking at this 2030, 2045 goals for the State, and really trying to ask ourselves, with what we need to accomplish in these hard to electrify parts or hard to decarbonize parts of the economy, could you accomplish the same thing by some combination of other actions?

So as an example, Angeles Link can deliver this type of benefit. Could you get those similar benefits from simply looking energy efficiency? Or could you look at using more bio gas, low carbon gases, alternatively? Could you continue to use some combination of natural gas and other gases, and use carbon capture as an alternative to hydrogen?

And so will be asking all those questions as part of alternative study, along with all the different ways that you could deliver hydrogen, and what benefits they have, and what drawbacks they have. So it's sort of a broader view. It goes a bit beyond ARCHES.

ARCHES is a very exciting announcement, but in some sense, it's really the first step of many that the State needs to take on the way to 2045, 2050.

So Angeles Link, this study looks beyond those initial steps to say, not only what could we do it hydrogen in a number of different ways, and still try to accomplish the goals that we are setting out to do? But are there other ways like more energy efficiency and uses that would accomplish the same goal, and look at the positive and negative issues associated with those.

MR. BRITT: And just to be clear, ARCHES has it's own consultant team, doing its own outreach process. So as you heard Neil mention earlier, SoCalGas was directed to join ARCHES. There's many people associated with that application, SoCalGas is just one. So SoCalGas is not leading the ARCHES effort, they are just part of the consortium of people that are part of the application.

So their process is happening independent of this process. And this process is really focused on the 16 work studies that are associated Angeles Link is a proposed project. And we are in, as you have heard, the phase 1 process.

At the end of this feasibility set of studies, they are hoping to get approval from CPUC to go to phase 2. And that's what the whole point of these work studies and these meetings that we are having here are really focused on that.

So does that help to answer? I mean, it's a natural question to hear this great news about the State on Friday of which SoCalGas a part of, but that's not really the focus of what were doing here. Does that make sense?

MR. ARANDA: Yes, Chester, and thank you.

First of all, we talked about demystifying hydrogen a few sessions ago, and I think it's not only that. With the announcement of Friday, it just make something so historic and lofty, just more attainable, or more understandable. I think as community advocates, it makes us better storytellers of such historic change that we need to all be engaged in.

MR. BRITT: It validates the notion the hydrogen is part of the discussion that needs to be part of the State's mandates to achieve its goals, right? And hydrogen is going to be a player in that in some way, so that's the exciting part, but the details of what we're working on are really focused here on Angeles Link.

Does that make sense?

MR. ARANDA: Completely. It's a great step and I think that's why I think of the word "alignment," for lack of a better word and how it all comes together, and where does that same shared goal go.

MR. BRITT: I was just adjusting my chat.

There was a person in the chat, Yuri, that said, "I don't want to speak for everyone, but I would prefer you focus the study on energy efficiency and electrification, first, before considering other alternatives, given all the other environmental injustice considerations associated with the other options."

So again, that's the kind of feedback we're looking for.

Yuri, I don't know if you have a comment on that.

As we've discussed, there is two sets of alternatives. On the left side of the screen you can see the non-hydrogen alternative options, of which electrification and energy efficiency, RNG, and carbon management are all part of that discussion. And then on the right side, you see the hydrogen delivery alternatives, and those are the different methods of

delivering.
So in the comment here you see someone saying we should be focusing on the left side of the equation first, before the right side. And what about that notion?
MR. FREEDMAN: I think we should be focusing on all these categories because ultimately, we want the study to be comprehensive. And there's no question that were going to focus on comparison of ability of hydrogen to serve purpose and need. And compare electrification is another way to accomplish that, as well as energy efficiency.
So I think, to me, it's less of a question of the order, it's more question of the study being comprehensive, and we definitely intend to be comprehensive.
MR. BRITT: And just to clarify, Yuri, one of the things I heard you mention is one of the reasons considering the nonhydrogen options is to look at them from a cost comparison, an environmental comparison. So you have, like, a baseline understanding of what are the options for hydrogen versus non-hydrogen, so that you have that sense of understanding of what is the difference in terms of how you would produce energy, right?
MR. FREEDMAN: These are indeed some of the criteria we are going to use.
MR. BRITT: Okay. Does anyone have any other

questions about the non-hydrogen versus hydrogen alternatives? Otherwise, we can keep going with Yuri's presentation now, and get into the second part of his presentation. And we can always come back to some of these as well.

But I just didn't want to -- this presentation is a little longer than normal this time, and I didn't want to lose you guys in the process of him going through his slides, and make sure that you guys are tracking what was going on.

So I appreciate you letting me interrupt you, Yuri, but go ahead.

MR. FREEDMAN: Absolutely. I think dialog is the best way to, I think, cover these topics. Thank you, Chester.

The next slide gives you a very high level qualitative overview of the screening criteria. And going from left to right, we start from, of course, compatibility of the State Policy, as it relates to greenhouse gas mitigation.

But also, importantly to air quality goals. And on the former, it is, of course, AB 32 and SB 100, and other legislative facts, including SB 1020. On the regulatory front, these are important measures such as Advanced Clean Fleets Regulation, which is going to make profound impact on the heavy duty transportation. And we're going to examine of how what we propose help address or achieve those goals.

The second the technological feasibility, that ultimately is the question, what does -- will the alternatives actually can scale level required to do that? Again, it goes to the level ambitions of the State.

If we are aiming to decarbonized the power generation of heavy duty transport and others, the quantities of energy required to accomplish that will be significant. We want to be sure that our proposals, our options we put forth can accomplish to that scale.

The third one is a very important for the end-users because ultimately, we need this to work for the end-use customers. Again, the good example for that is transportation where whatever solutions we are developing, it ultimately has to be desired, and has to be feasible for people who are going to end up using these molecules.

In this case, it's the fuel cell electric vehicles, full power generation, of course, it's the blend, and eventually perhaps pure hydrogen. And for industry, the same approach applies. So the end-use capabilities is important element of the analysis.

And the last element is, and I know I mentioned this before, reliability and resiliency is becoming, and likely will continue to be a very important topic for the

State, as we are experiencing more influx of climate change, as we experience higher share of intermittent renewable energy, resiliency is going to be a very important topic.

Not to mention, the resiliency at the national level because of the general politics. Everything that we observe now from use involves daily basis, so we are going to closely look ability of what to propose to make sure that our energy supply is as resilient and carbon free in the future as it is today.

The next slide provides, again, it may be a little be more granular view of some of what I would call macro-alternatives, I know we talked about some of them.

Electrification, of course, to some degree self-explanatory where we can use direct electrification as a means of addressing the emissions, as opposed to using hydrogen. So it is effectively electro transverse molecule question, and there's no question that electrons, again we discussed, are perfectly suitable to address and use. They also have limitations, so we are going to examine that.

Energy efficiency, again, we talked about this in the upper right. That speaks for itself.

Renewable natural gas is a topic that, again, we at SoCalGas spend a lot of time, and as a result, very significant amounts of renewable natural gas knowledge system, as well as in the development of the State. And were going to examine this as a source of clean fuel.

And the last one is the continued use of these fuels with carbon capture and sequestration, which can be accomplished either through the capture of carbon dioxide at the source, or what we call ambient or direct capture. And both of those technologies are under development. Both actually are actually supported to the federal level, and so they're going to look at them as well.

The next slide covers the alternatives of delivery of hydrogen. There's no surprise that tracking is first. In fact, the majority of hydrogen delivered today to a fuel cell refuels -- to hydrogen refueling stations is being tracked.

Rail is an option that is active under consideration, it is something which is early -- at the early knowledge stage, but the attention is there. Marine is definitely getting a lot of interest nationally and internationally, moving hydrogen in various forms, whether it's liquid hydrogen, whether it is a form of various derivatives of chemicals.

And last but, important one is the question whether we can transmit energy from the remote areas of renewables, to the areas of demand by wire, and then ultimately make hydrogen closer to where it's needed. We are going to examine that as well.

And that brings us to the last slide. The last slide, again, what is here on the left is effectively the pipeline alternatives and the variables in which they will differ. They will differ in their -- not just in their geography, but also perhaps as Neil mentioned, are going to evolve over time, and in a way that various components of projects, such as storage and compression are going to be added to them over time.

The element on the right, again, is really important and that speaks to the idea of producing hydrogen closer to where it's needed. There may be potential to produce some amounts hydrogen closer, and we are going to have to examine that. That's what we call localized hydrogen hub.

This concludes my overview. Let me pause here and take questions.

MR. BRITT: All right. So again, this presentation is really focused on routing and alternative studies. And I really wanted to make sure that people are weighing in on the -- let me just go back to that one slide that showed the different screening criteria.

So in this slide, there's four different screening criteria: Compatibility with State Policy, technological feasibility, end user requirements, and reliability and resiliency.

Does anyone have any thoughts about these criteria? Or other things that we would consider as being important in evaluating and screening alternatives? Anyone have any thoughts on that?

I mean, the other question, I guess, I would have for you, Yuri, then is what are the biggest obstacles for, you know, citing Angeles Link routes or alternatives or refining these sets of alternatives when it comes to community? Like you know, because these things are focused on State Policy, technology, but the end user requirements, you know, I think that's where it starts to get real with the community.

How is the process taking into account the community? Potential in the community? Potential impacts? And things like that?

MR. FREEDMAN: Thank you, Chester. I think the significant part of this work will be done in their outing work, which is a separate analysis. But generally speaking, on the conceptual level, there's no questions on the one hand, an infrastructure project is going to have impact on the areas where it's being constructed, as well as in the environment where it's going to get built.

There's also the question of the impact --

positive impacts on the communities, ranging from jobs to improved air quality. And I know, I think a previous conversation I brought up the example of hydrogen probably is the ideal way to improve air quality in areas with active heavy duty transport because of the military displaced diesel trucks with the fuel cell electric vehicles.

So the community impact is multifaceted and we are going very closely and to examine this very closely.

MR. BRITT: All right. Jill just -- I mean -- Emily just informed me -- I was looking at Jill -- that it is the emergency earthquake time.

MS. GRANT: I think we are going to all go under tables for ten seconds. Come on let's do it.

MS. MARQUEZ: We'll take the questions when we come back.

MS. GRANT: Everybody drop, cover, hold on. Count to ten.

Come on, Chester.

One, two, three, four, five, six, seven, eight, nine, ten.

Everybody did it. Good job.

MS. MARQUEZ: Who needs help standing up? Raise your hand.

MR. BRITT: So that was absolutely a first for me in a meeting setting. And I honestly don't remember it being that hard when I was eight years old, underneath my desk, but at 6'5 and 58, it was much more difficult to get under the table. So safety first, I'm going have to find an awfully big table if there's an earthquake for me to get under, that's for sure.

MS. MARQUEZ: Chester, I believe we have two questions.

MR. BRITT: Okay. So that shook people up.

Marcia, you have your hand raised, so we will go to you next. You can meet yourself, Marcia, there you go.

MS. HANSCOM: Yes. Somehow the system says it won't allow you to unmute and it takes a while.

MR. BRITT: So Marcia, just be honest, did you go under your desk?

MS. HANSCOM: Yes, I did.

MR. BRITT: Okay. Well I appreciate that.

MS. HANSCOM: But I don't know that it would help. I have a little table. But I really think it's better if I run for the door.

Anyway, what I was going to ask is, it seems to me that one of the criteria really needs to be which of these is going to get us to a hundred percent genuine renewables first, and what is or is not contributing to more climate impacts.

And the reason I bring that up is I remember some of our previous meetings, you know, suggesting or telling us, basically, you know, 70 to 80 percent of the hydrogen use right now would have to be including methane gas, which is a big contributor still.

So you know, it just seems to me that that has to be a criteria. You know, I was told that might change in the future, but and how many years, and all of those questions have to be asked when were looking at the criteria for the screening.

MR. BRITT: So Yuri, would that fall under the compatibility of State Policy?

MR. FREEDMAN: It absolutely does. And thank you, Marcia, for that point.

Just for the avoidance of doubt, Angeles Link is aiming to transport clean, renewable hydrogen that was the stated intent, and it stays the intent of the project.

MS. HANSCOM: Yes, I understand that. But the end use of that hydrogen being transported, if it still requires 70 to 80 percent methane to be useful, for instance, on an electrical generating plant, then you know, then you really can't unlink the Angeles Link from its intended use.

MR. FREEDMAN: I would say that the sectors we are targeting with Angeles Link range from heavy duty transportation, which is using hydrogen in pure form for hydrogen fuel cells, to power generation, which again, today is a mix of thermal generation and renewables. I cannot speak for power generators because we are not one, of course.

They have their ambitious goals including the goals of reaching zero emissions in accordance with the State goals, and we believe that by bringing them clean hydrogen and renewable hydrogen, we are going to be very effective in helping them reach those goals.

MR. BRITT: All right.

Marcia, thank you for question.

Jill Buck, you have your hand raised, if you could unmute yourself.

MS. BUCK: Yes. Thank you so much. So many of us that are part of this group represent groups that are concerned about human health impacts.

And I know, Yuri, you just mentioned that, you know, we'll be able to quantify cleaner air quality, but on the flip side, what will be, you know, some of the impacts? Even if they end up being better than the alternative?

I mean, there still will be some human health impacts to this project, I'm assuming. And if we could quantify that at the giddy-up, that would help a lot of us who are going back to other groups be able to speak to those human health impacts and environmental justice impacts.

MR. FREEDMAN: Thank you for commenting.

I think that quantifying and assessing the environmental and air quality impact is very important to the development of the project. We have a separate study that is focused on that.

But to your point, these studies are going to be, if you will, communicating with each other, so our study is going to tap into the findings of the air quality study, and conversely, that study will inform what we are doing here as well.

But there's no question that that is a major element of what we need to explain to the stakeholders. The impact of the project is going to be a very important topic, and we are going to provide detailed information and lay it out.

MR. BRITT: All right. Anyone else in person or online?

Okay. Then we are going to go to our next part of the presentation, which just let me just advance here.

Let me introduce Amy Kitson, who is the Angeles Link director, engineering and technology, and Katrina Regan, the engineering and technology development manager.

They are going to cover pipeline routing, and also make an interesting presentation as part of their presentation on a software known as Pivvot. It's a platform that is being considered as well.

And I'm going to hand over the slide advancer to them, and they're going to be giving the presentation. A lot of great information in this presentation as well, and then we will take some more additional questions and comments.

MS. REGAN: Thank you. Good morning, everyone.

All right. So today we're going to discuss the routing study, which, as you may imagine, is a pivotal study that connects quite a few of our other Angeles link studies together, and it also creates the foundation for the pipeline project.

Routing study takes a high level of the first, concentrating on the proposed system as a whole, and then they preferred pipeline routing corridors. One of its primary objectives at this stage is to identify and recommend several preferred routes for pipeline, ensuring that we capitalize on potential, while also understanding things like terrain and environmental requirements.

This is phase 1 right now, right? This is where we really start the initial process of figuring out what the groundwork for outreach and engagement that we anticipate in subsequent phases of the project needs to look like. So at this very early stage, our goal here is to start mapping out potential pipeline corridors, using the information that we uncover on production, demand, and storage from the other Angeles Link studies. We're looking to align the information today.

Our initial routing is informed by information that we also have from other sources about existing energy corridors, rights-of-way, environmental and social, and engineering challenges. And its purpose is really to connect those areas of demand with those areas of production.

So in phase 1 -- you can see here, we have a nice break down. In phase 1 were applying, forecasting, we're gathering data, system and route evaluation is occurring at a high level, long-term state to evaluate operability, technical considerations, major crossings, elevations, terrain types, and other engineering, environmental, and social challenges.

We're creating a baseline right now, right? And a foundation for future larger systems. At the end of phase 1, there will be maps that we can provide that illustrate pipeline -- potential pipeline corridors. They will be preliminary in nature. And so there will still be an opportunity to make adjustments, and address or minimize impacts.

So right now we are really, again, just providing what -- starting to set the foundation for what this potential pipeline system could look like.

And the goal remains consistent throughout this process, to chart out pipeline routes that make sense based on where production is at and where demand is located.

In subsequent phases, like potentially phase 2, things become much more tactile, right? So desktop findings, which is what were doing in phase 1, will serve as a foundation, but then we'll be applying more detail, expanding outreach, and really looking to complete further refinement of the system as a whole, its components, and the identified routes.

And we expect this process to be really dynamic, which is why it's so critical that we get your collaborative feedback and advice now at this early stage.

As we move through these phases we'll continue engaging and looking to you for your advice and feedback on how we can do this in a way that best supports the communities are most directly affected.

MR. BRITT: Can I interrupt you, Katrina, like I did with Yuri?

This is a really important slide in the sense that it delineates between phase 1 and phase 2, and what were doing in relation to routing. So there's a lot of interest in where the pipeline potentially could be located on the ground, and this is really kind of starting to set the framework for how that process is going to evolve, and what's going to be done during this phase 1 work that were doing now, versus what could be done in phase 2 if we get approval from CPC to go into that second phase.

I just want to make sure that everybody understands what Katrina just covered. And if you have any other questions, or comments, or thoughts, about things that maybe should be going on during phase 1.

Or one of the things that she just described is happening in phase 1, and you're not completely sure what that means, or that you would like more information about that, I think now would be a great time to weigh in on that. And then we will let Katrina keep going in her presentation, so if there's anyone wants to ask any questions.

And I see, it looks like, Alex, you have your hand raised so we'll go to you.

MR. JASSET: Yeah. Thanks. I guess it would just be useful if you had any, like, just general information about where the routing is being considered. Because I think I'm a little bit unclear what the, sort of, even regional areas that you're considering are, and so, you know, if it would be helpful in sort of narrowing down what the concerns are, knowing just some general information about where it's been considered.

MS. REGAN: Thank you for your question, Alex.

Yes, so all of the studies right now at this phase are really looking at the entire broad Southern California region, and when we do pipeline routing and evaluation we are really looking to tie different components of the studies together.

So as we look at where is demand today, where is demand expected to grow, and likewise where is production today, and where is production expected to grow, we want to make sure that these pipelines are connecting those areas, right?

Because the purpose of the pipeline is to transport the gas, so it's really critical that we make sure that we have a full, comprehensive picture here. This, again, really early stage of the journey we are on, we are looking and considering the entire Southern California region, as a whole.

MR. BRITT: So Katrina, is it safe, though, to say in general terms that the source needs to be near water and renewable energy to create the hydrogen, even though

SoCalGas is not creating or producing the hydrogen, that the source would -- cause there is a thought that the source needs to be where there is a body of water or renewable energy, or is that not relevant?

MS. REGAN: So when we think about renewable energy, traditionally we think about large areas of land where we have the capability to site infrastructure needed for solar and for wind.

So I mean, I've lived in Southern California for over a decade, and I have a pretty good idea of where areas of land like that exist and where they are more challenging and tricky to come by.

So when we think about those larger areas, outside of densely populated communities, that's where were thinking is probably more likely to have that kind of renewable energy available, and there is a potential for production to be co-located.

So were definitely considering those areas, but then as we think about the system as a whole, we really need something that is resilient and reliable.

So not only do we need to connect to those sources and connect those receipt points to potential off-take, but we need to be considering how those routes interact with one another. And if there's an opportunity there to ensure that regardless of where production is at, we can get it to where the demand is located.

MR. BRITT: Great. I see someone else with their hand raised, it looks like Dr. Ciriaco.

Is that how you say your name? Cid? I'll just say Cid, that is easier.

DR. PINEDO: That's fine. It is pronounced Ciriaco, but Cid is fine. Thank you.

I been thinking about this, and I thought I don't know if I really need to say it, but I don't want leave it unsaid. For those of us that were raised in under resourced communities, work in under resourced communities, we feel that often times the pathway is always through our communities.

And we've heard that, yes, because there's a higher demand there, then you got to look at density logs and things like that. Of course there's higher density there, because the equivalent of a mansion landlocked has ten homes in our communities, right?

So my concern is that we will oftentimes the pathway of highest need and urgency, and then something always happens in our communities. And so I'm not asking you to make a commitment. I'm not asking you, you know, to promise anything like that.

My concern, and I heard a couple of other comments before about it is, when we look at pathway, when we look at these hubs, right? And I know I'm being dramatic in what I'm about to say, but when you look at the ZIP Code, is a ZIP Code in Beverly Hills going to be analyzed just like the one in South Central and El Monte other communities like that.

MS. REGAN: That's a great comment, Cid. Thank you so much.

I think that were really cognizant of that. And we want to be sure that as we move forward on this project were being considerate of, you know, all of the different types of things we need to be concerned about. You know, it is not just about whether or not the engineering works out, and it's physically possible to build a pipeline and construct and maintain it.

But it's also about those environmental considerations. What does this mean for water nearby? What is it mean for environmental species? And then really, what does it mean -- what is the human factor here? And what do we need to be doing in order to prioritize that as well?

So a lot of different things. And in this phase of the study, we're really going to start identifying what those considerations may need to be along the route so we can take into that further in subsequent phases.

MR. BRITT: And just to be fair, I mean, in your desktop study that you outline here, some of the information is going to be part of your thinking, right? And part of your process?

All right. I am sorry, Katrina, for interrupting.

Oh, do we have -- Enrique, please. You can turn your microphone on. I am sorry.

You know, and for the court reporter, we do need to announce who we are and who we are with.

MR. ARANDA: No problem. Enrique Aranda with Soledad Enrichment Action.

I wanted to actually popcorn off of Cid's question for MAOF because it's so crucially important to really highlight and underscore the importance of adverse impact to communities of color.

Because when you speak about, let's say communities of Southeast LA, not only are we talking about sources of stationary pollution, mobile sources of pollution with the 710, you're also talking about the fact that these communities are in the middle of the flight path of LAX.

And we could go on and on, so just that type of cumulative assessment, and the history of adverse impact needs to be factored for. And I think for lack of better words, we need justice.

MR. BRITT: Yep. Thank you for that comment.
All right. Katrina, I think you are okay to keep going.
MS. REGAN: All right. So next I want to walk us through a four step approach here, and it is split apart into two main areas. So mapping the future of a project like this really does require a systematic approach. We're starting from the ground up here.
And if you think about it like a puzzle, each piece represents a potential pathway. And those pathways are for a big part defined by what they do. Do they bring production to demand? How much production? How much demand?
And those dynamics are a really important. And our immediate task in this phase is to identify what the system pathways look like, and assess those which have the most promise. For hydrogen transportation in the short-term and long-term.
But potential isn't enough, and it's not the only thing we have to consider. And as we are conceptually assessing what's needed today, and then potentially in the future, we need to also evaluate how these lines connect. And that helps us lay the foundation for a really cohesive, efficient system from a long-term standpoint.
And it's here we start visualizing our preferred

route options. So that's the first two steps there step one and step two. System evaluation and a much bigger picture.

So in step three really start looking more closely at what these pipeline corridors are, and what is there that we need to consider. So questions like: What is the terrain? Are there critical habitats nearby? How will the local communities be impacted by this work?

And we start cataloging those features. We're looking to build an understanding of the landscape, and how it supports and interacts this energy network.

And by building this information up now, at this phase one, we can then zero in on the communities that are most directly affected, and in subsequent phases. And it's a really proactive approach like this that's going to allow us to access their needs, specifically, and initiate more meaningful engagement.

We know that desktop tools, they'll provide us with a lot of information, but by no means is that everything that we need. I'm an engineer, so I know that designs often times look different in the office than they do once you bring them outside.

And so we'll continue to work with you, our stakeholders, and we'll continue to engage in these meaningful dialogues to seek feedback and information that helps us fill those gaps. And this is the part of the plan for every phase of this project.

And the forethought here is critical and it's crucial because it builds a proactive baseline, and most importantly starts the conversation with you, local communities, and with experts and it's because of this and this dialogue that we think it will really help shape refine and perfect this project.

So with that, I'd like to take a step to show you this program that we are planning to leverage during phase 1. There's a lot of capabilities here and we are really just trying it out and seeing if this has good benefits for us to use at this point, and in the future.

We absolutely believe that it has benefits for phase 1, but we are really scratching the surface of the capabilities that could be leveraged.

This is a program called Pivvot, it is a third party, cloud based application that our consultant, Burns McDonnell (phonetic) will be using to help evaluate pipeline corridors from a desktop standpoint. And we just wanted to talk a little bit more about it and share with you what this looks like, so that you're aware of some of the tools we have at our disposal.

We want to talk about what it can do, and how that applies to the work that were undertaking now. And it's not a substitute for fieldwork, again. And we will need additional direct engagement with communities in the future. This just helps us be efficient in our approach at this point.

So what can it do for our project? And what will we be using it for? So it is a tool for proactive planning. It is a mapping analysis program. So it not only contains geo-spatial features, but it will also produce a variety of different reports, including the ones shown here.

Using a tool like this, we can move past just having lines and something like Google Maps, and move into describing what it is around those lines. What are the historical weather events around the line? What to the crossings look like? What you communities look like?

And these types of -- this type of information is really critical, and it sometimes difficult to get all in one place. So by using something like this, we're able to move all of that information in one place, and then produce reports that catalog and categorize all that data coming up.

So again, it is very data centric, but it starts giving us an idea of where to move forward through our engagement.

Having a program like this, too, reduces a lot of human error that could come from sourcing these datasets and tracking each one down individually. And there are hundreds of different pieces of data that go into this, and then they are updated on a really routine basis. And that keeps the information real-time, it keeps it current, and it keeps applicable.

Lastly here, just a little bit more about the program, if you've ever used GIS, it's a very similar program. It's kind of like a very robust version of GIS. And it allows for data visualization from, like I said, a huge variety of different data sources.

All of the information is displayed in relation to those pipeline corridors that are selected on the map, and the data that's used is up-to-date and it's highly validated. So in phase 1 we are really looking to start exploring what this technology can do, and if it's appropriate to leverage and subsequent phases.

During phase 1, our target will be to identify features, and to gain a better understanding of what kinds of considerations will need to be made along these routing corridors. And we're eager to ensure that even at this point in the project, these early stages, at the start of the journey we're incorporating data that can be quantified.

So if you have data sets or information that's associated with coordinates, so has latitude and longitude coordinates associated with it, feel free to recommend that information to us so that we can include that here as well.

With that, I think that's about it. So I'm happy to take any questions.

MR. BRITT: So if you could just pass me down the clicker real quick.

So I want to make sure everyone has an opportunity to weigh in on the that platform that just discussed, Pivvot.

So you heard Dr. Cid mention the importance of understanding, you know, how communities that have traditionally been impacted by projects like this, sometimes because they have a lot of density or there is a need for the alignments to go through those communities, that's part of the equation.

The Pivvot platform, specifically, it has the ability to weigh in across a variety of data sources. So one of the data sources is community, environmental justice issues. And so if you guys have access or know about datasets that could be included in that platform, it's not set up where only has certain data points and that is all it can consider.

We can add datasets into that process if you know about those. They have to have geo-spatial coordinates because it is a spatially coordinated system, and that is how it operates. And you saw the example on the screen where, you know, the results of all the datasets show up on a map.

But I do want to at least emphasis that point, that in your own capacities, and in your own constituencies, if you know about datasets that you think would be valuable or helpful, that help inform about environmental justice issues or densities of demographic information, that you think would be sensitive things that would help the program consider those things, it is very important that you would weigh in on that now or as part of that process.

So that when that platform is set up, that it can have access to all the datasets that it needs to be completely informed. Does that make sense?

And the other thing to understand is the Pivvot tool in and of itself is not an end-all, be-all tool. It is one tool in the tool chest. So I think we had a separate meeting last time we broke out into groups and we talked about the engagement plan. I think Emily covered what that would be covered in phase 2 that's a huge part of this process as well.

So it's not just an analytical exercise. It is both an analytical exercise as well as a community informed exercise and that's part of why we're meeting with, not only the PAG, but also the community-based organizations here. And we will continue to meet with you guys throughout the process.

So I just want to make sure if you guys have any thoughts about that program, or any datasets that you are aware of that you want to point us to, that you would have the opportunity to do that now.

And any other questions they have for Katrina about her presentation and about, again, the routing process that we're planning on going through.

Does anyone have any thoughts?

I know Katrina did a good job, but I can't believe you guys have no thoughts about routing.

All right. Well, if there are none, then we are going to keep going. Actually, now is the opportunity to take a break. So we are going to take a quick break.

Right now it is about ten to 11:00, so we will meet back at 11:00. And we have some additional presentations on the back end of our agenda, and will go through those. So thank so much.

(Break.)

MS. MARQUEZ: Okay. Welcome back, everyone, from your break. I believe we have a few more people that have joined us online.

If you could please unmute yourself and let us know what organization you are representing.

I see Chantal. If you could please unmute yourself.

MS. CHANTAL: Good morning, everyone. My name is Chantal. And I am an MSW intern with PES Organization (phonetic).

MS. MARQUEZ: Thank you for joining us this morning, Chantal. We love having input from your organization.

And I believe we also had Marc Carrel from Breathe SoCal. I saw him jump off, but he is joining us as well this morning.

So thanks, Marc, for joining us, again.

With that, I'm going to go ahead and kick it over to Chester, who will introduce our next speaker.

MR. BRITT: Thanks, Alma.

Before I introduce our next speaker, I just wanted to highlight that we did get a couple people chatting some things that were interesting that I wanted to highlight.

One was that, I think Andrea Vega chimed in after we did our emergency safety exercise that it would be a good idea to have the workshop on safety and emergency response plans for a nearby communities near hydrogen pipeline that are impacted by earthquakes and other natural disasters.

And so I think that we think that's a pretty good idea, and we will definitely take that into consideration for future quarterly meetings. And going into next year we are looking to set up our agendas for those, and I think that would be something that makes a lot of sense.

There was also an input from Robert van de Hoek who mentioned that he had some questions about routing. He has a background in geography and maps, so he was interested in potentially having off-line conversation at some point.

And so it occurs to me also that if others have thoughts that are occurring after these meetings, sometimes it takes a little bit of time to digest the information, take a look at it, and think about it, and then you think, "Oh, I should have asked that and I didn't." You always have the opportunity to come back after these meetings.

You can contact Emily directly. You should have access to our living library, which has all of the information that we've been presenting to you over the course of our time together with you, going back to January, all the different PowerPoint presentations, all the slide decks, all the announcement, all the fact sheets, and information we've presented, the materials.

We will keep updating this information to you, and so you will continue to have access to that. And so again, we are trying our best to keep you guys informed, we want to hear from you, these meetings are one way to hear from you, but they are not the only way of hearing from you. So we want to make sure that you understand that, and that you have the opportunity continue to weigh in.

I am now going to introduce Chanice Allen, the engineering and technology project manager. She is going to be making a presentation on workforce planning and training. And I'm looking forward to this presentation, in particular.

Because one of the highlights for any large infrastructure project is how does it benefit the community. How does the community get involved directly in participating in that project, so that it benefits them professionally and economically. This presentation will begin to start to look at some of those issues.

And again, just as a reminder, each of these topics that we are bringing to you, as we go through these monthly workshops with you, are part of the 16 work studies. We will get more than one bite at the apple of all these presentations in terms of -- not presentations, but topics as we go through this process with you.

And so this is another opportunity to talk about work force training. I know that has come up at other meetings that we have had with you, and is an important thing. I think Pastor Michael Fisher brought it up as something that his congregation would be interested in as well.

And so again, we want to continue to talk about things that are relevant to you, so I am hoping that this presentation will resonate with a lot of the participants and that you will have a lot to ask Chanice as she goes through her presentation.

So Chanice, I will turn over to you.

MS. ALLEN: Thank you, Chester.

Good morning, again, everyone. I'm usually behind the scenes and observing. So I've really been looking forward to this opportunity to meet everyone in person on online.

So with discussing the workforce planning and training of study, I did want to take an opportunity to provide a little bit of background about myself and underscore the importance of this study and why we are here today. So I'm thankful that as of this year, I'm celebrating 20 years working at SoCalGas.

And fun fact: Even though I have a civil engineering degree, my first job here was as a gas meter reader. And at that time, there wasn't really entry level positions for me coming into the company, but I knew with my upbringing, with my father and his career, working at a utility that if I just got my foot in the door, I would have the opportunity to get trained, or to obtain a skill to be able to have those opportunities within the company.

And so I did that, and today I still tell everybody that the gas meter reader job was the best job I had. You know, I was making more than minimum wage at the time. I looked great because I was always exercising, you know, you're walking for meter reading.

So my point is, you know, I knew the value of middle skill jobs and training and learning the trade, and that's due to my father because of his job and his work ethic and his union jobs that afforded me the opportunity to you are in today.

But unfortunately for him, he didn't have a lot of those opportunities when he was growing up because he was the oldest of a very large family. And it was more important for his family for him to be the one to help support my grandfather at the time, who only had a sixth grade education.

And so my dad was the main person that was working to bring in and support the family. So education was not a priority, so my dad never graduated high school. But luckily, his community helped out.

Back then, we didn't have social media, websites for jobs. It was always word-of-mouth, at the stores, down the street, about opportunities for a lot of people who didn't have education where they could find work.

So through his community, he was able to find out to get a job at a local steel mill. And he was able to get down there and actually fulfill and get an apprenticeship, and learn a trade. And then he was able to move on to another utility at a nuclear power plant, where for the next three decades, he developed his career for union jobs.

And those union jobs are what made a difference, and required him to go back, and he got his GED. It was those union jobs that got our family off of welfare because at one point, both my parents were unemployed. It was his union job that allowed a lot of overtime shifts for him to be able to save money and move us out of the South Side of Chicago. Because me and my brothers were up to no good period.

It was his union job that, you know, gave us our biggest vacation of my childhood, which was at Walt Disney World that me and my brothers, you know, still talk about today. It was his union job that allows my parents to come and visit me all the time. They were just here last week, and that's because he retired with an awesome pension.

So I'm sharing this because there are a lot of examples of that, a lot of testimonies. And not to be persuading anybody, but just to, you know, explain how impactful middle skill jobs can be, not only for our economy, for our communities, but most importantly for our families.

Because again, I know without my dad working in those union jobs, it wouldn't have afforded an opportunity for me to be here today.

So I want to -- a couple takeaways from that, and the reason why was sharing that was because I feel this is a great opportunity, this platform, just like the community was looking out for my dad, sharing information for him to know that go down to the steel mill, this is a platform for us to be looking out for our communities.

You guys are already doing that. That's why you're the community-based organizations. I'm looking forward to receiving your feedback and comments on the study.

So with that -- oh. And I did want to say for my bosses, this is my second best job. Just so you know.

So I'll go ahead and jump into the presentation.

Okay. Understanding that the California Public Utilities Commission in the decision, they had described at SoCalGas will evaluate our workforce planning and training. And so this study essentially evaluates our construction practices and operations and maintenance protocols as it applies to a hundred percent clean, renewable hydrogen infrastructure, and the workforce needed in terms of staging growth for the Angeles Link project.

We have mentioned before that there are already over 1600 miles of hydrogen pipelines in the United States, and about half of them are regulated by the Department of Transportation, so that's the Pipeline Hazardous Materials Safety Administration.

Those federal regulations are the same regulations that govern our natural gas today for SoCalGas. And so, those regulations do provide a basis for establishing the training programs and workforce planning for our company.

These rules and regulations contain requirements for procedures that cover a wide range of areas, from operations and maintenance, qualifications of pipeline personnel, and of course, importantly, our safety integrity of our pipeline systems.

So as we use these regulatory drivers as the basis for standards and protocols, the main part of the study is researching, not only our existing regulations and codes across state, federal, and even internationally, we are comparing to our internal standards and our specifications in order to identify what changes are necessary, not only for the procedures to operate at a hundred percent pipeline system, but also for our workforce personnel. And that translates into job classifications.

In addition, we will be assessing our existing SoCalGas facilities and technologies to see where there may need to be modifications. Just think of it like a domino effect. So we can use welders, as an example. So welders will have welding specifications, which are basically like, you know, your directions on how to weld right.

So knowing that we are going to have a hundred percent hydrogen pipeline system, and there are unique properties associated with it that might end up needing different materials, and so those directions might need to change for those welders, right?

In those cases, we need to make sure we identify what those changes are, update our standards and procedure welders. That also translates into what type of training might need to be changed, or how we are going to up-skill as far as their skill set, make sure they're capable of doing the job.

How do these changes translate into action for preparing our workforce? The results of the study will provide a timeline for our work force staging. So, from pipeline and routing, design study, we will be evaluating the potential changes to our procedures, facility, and our technology and human resources and completing them.

As far as how we are planning, which is the process of analyzing and forecasting our work force supply demand and identifying any opportunities that we would need to update for those next steps.

Our subject matter experts will review our staffing models used on our existing gas systems, and then utilize those standard construction project resourcing data to create the necessary work force staging and staffing plan, which, ultimately, will give us the estimate of the jobs for our construction projects. And ultimately, the number of jobs that we would need to operate and maintain the system.

This information will help develop the workforce in stages to educate and train individuals to meet the needs of these clean and renewable hydrogen jobs. So not only will this evaluation process result in preliminary information or potentially new or updated work procedures, and our operator qualifications, but it will also guide compliance with ensuring the safety of the infrastructure and how we manage our work force.

Next slide please.

So to jump start the workforce planning and developing process knowledge, sharing will be a key factor. We know that sharing information is essential in closing the knowledge gap between the hydrogen industry, government, unions, and especially our communities.

Hydrogen is very unfamiliar to most people, and understandably so. So we are using -- we are used to natural gas, gasoline, and propane. But remember from back in school, the five Ws: Who, what, when, where, and why.

Well, just like we are able to answer all of those questions when it comes to gasoline. You know where we are able to get gasoline, you know what gasoline is. We want to get to the point with sharing knowledge that when we ask that of hydrogen for anybody, they would be able to answer those same types of questions.

So we're sharing information on three levels. That would be awareness, education, and with training. Awareness being more high-level, general information, where we are just making sure that people are informed, such as the platform like this.

There's education where it's more of an organized curriculum, where we been able to provide and looking forward having a structured knowledge, in order to have people make informed decisions.

And then there's training, where there is specific content that will focus on teaching skill sets.

So as part of the study, we will be identifying sources that will be able to provide these levels of information, and support SoCalGas in extending these avenues to our workforce and our communities.

So for workforce planning, the data from the preliminary routing and design study, as I mentioned, will help determine what operational standards and operational qualifications may be necessary. Not only to build out and operate and maintain this new infrastructure, but the infrastructure in return will set the stage for a proactive planning to build out our work force.

As far as building out our job pathways, how do we promote access to all these jobs, right? That's it at the end of the day. That is what we want to know. But were providing that awareness, that education, and the training is one of the great ways that were going to start driving the interest, and to inform people of these opportunities.

This will hopefully attract new people, but also the existing oil and gas workers that already have skills that transfer naturally to these renewable energy positions. And then matching those skill sets of today, and up skilling where necessary for the new, clean, renewable hydrogen jobs for the future.

Next slide please. Go back. Thank you.

So sharing knowledge, or I like to say, knowledge sharing. Sharing and collaborating with the government, industry, employers, education, and training providers, and of course, our communities has been instrumental in informing our employees, our contractors, and public about hydrogen.

In preparation for transitioning into the hydrogen industry, addressing the knowledge gap would be a key factor in understanding the impacts to our communities.

As I mentioned in our studies, we will be identifying those potential sources that can provide education and training content. We are already effectively collaborating with the government, universities, organizations, you know, education, and trading consultants with developing conceptual, hydrogen certification pathway to educate a range of personnel.

We are initiating conversations with the Department of Energy, with the City of LA, Economic and

Workforce Development Department Center to ensure that there is just transition to be considered for our governments to provide training programs, and subsidize for renewable energy workers.

Also, keeping in mind, providing an age of programs to encourage entrepreneurship, workforce development, and job creation. These types of assistance that we want to have, especially like our government to support, can give workers access to training that they otherwise would not be able to afford.

So even our stakeholder meetings, like this, is very meaningful because this is another platform that we can exchange this information.

Of course, safety will always be first. And this is incorporated in every aspect of these engagements, whether that is guidance from the Center for Hydrogen and Safety, incorporating additional safety practices in our existing programs. We have programs in place where we have apprenticeship training programs, and updating those programs to make sure there is new safety practices in play as it would apply to hundred percent hydrogen pipeline system.

MR. BRITT: Chanice, I am going to interrupt you, like I did Yuri and Katrina. This is a really interesting slide. And you know, is really focused on a lot of the things that SoCalGas finds important and things that they're doing, initiatives that they're taking to begin to share knowledge, and inform the communities, and build that awareness and the education training and safety that so important in workforce development.

But it occurs to me, in looking at this, that when we talked about collaboration, collaboration requires two sides, right? I mean, SoCalGas can be taking the initiative, but what is it -- I mean, we have a lot of people on this call that have a lot of different influences and constituencies in groups that are very strong and powerful and have a lot of influence, and also care a lot about the communities that they serve.

It kind of dawns on me, as I'm listening to Chanice give her presentation here on this particular slide, that there's a lot of things that SoCalGas is doing, but how can we use this presentation and this opportunity come alongside of what SoCalGas is doing with the people on this call, potentially, to really make this work?

Because workforce development is a great idea, it's a great thing to talk about, in a lot of ways it can be very difficult to set up. Especially when you're talking about new industries like hydrogen, things that haven't been already done before, when you're breaking new territory, charting a new course. It's not always that simple, right?

Because there isn't programs, for example, at the junior college level, or and other workforce training programs, that necessarily have the curriculum or the thing set up.

I think we were just at the PAG meeting yesterday and we heard from one of the union representatives, Ernie, who was talking about all the new things he was going to have to learn in all of his workers were going to have to learn that weren't part of his normal training.

I mean, they are set up to natural gas and they've been doing it for hundred years, plus. And now were talking about a completely different way of doing things, of how to weld, how to do pipelines, how to do all kinds of things that aren't going to be the traditional way necessarily.

Even how things are going to be monitored, and safety programs, and all the levels of things that go into huge infrastructure projects like were talking about with Angeles Link.

So I just want to take the opportunity -- and I'm sorry to interrupt, Chanice.

But I want to take the opportunity to pause here and see what thoughts you might have about what do you think about what SoCalGas is doing, but also what you think about what you guys could be doing to assist SoCalGas to make sure the workforce training programs are set up in advance of this?

Because the worst thing that can happen is for some process like this to go on for a number of years, only to be caught flat-footed when the real opportunity is available, and yet the community hasn't really fully appreciated what that opportunity is until it's too late.

So I would love to hear, Enrique, maybe from you or from others. I saw you kind of grabbing the mic, so I'm going to take the initiative to think that you kind of had something to say.

MR. ARANDA: Right on, Chester.

Ms. Allen, it's great to hear about career pathways into the middle class for our youth. I represent an organization that -- we work with opportunity youth and a youth that's been marginalized. As much as we talk about equity, inclusion, and parity, I just, like Chester mentioned, there needs to be thinking out of the box.

You invite is to be stakeholders in this process, we definitely want to rethink what hasn't worked. When you talk about project labor agreements, I grew up in a labor household, just like you did, I am thankful for the opportunities provided by union household.

However, we know that project labor agreements haven't worked for our youth, especially opportunity youth, youth of color, they haven't worked for the formerly incarcerated. And is much as we talk about diverse procurement when it comes to local hiring and businesses, it's a very lofty goal.

And whenever is been a PLA -- and I follow most of them, whenever there's a bond deal, it just doesn't work, not because labor can't do it. It just takes a process that is so taxing and -- I can even think of the word -- just a broad-based approach that there is a reason why hasn't worked.

So here we have an opportunity to do it right. And I think the more inclusive we are, the way this process is been completely inclusive, and just allowed us to share our thoughts, concerns, and really think out-of-the-box. I think the more we have an ability to really make this a case study for the rest of, not just California, but the rest of the nation.

MR. BRITT: So how do we increase project awareness? Because we talk about awareness, it's one thing for people in the call to be aware of what is going on, right? But how do we get it into, not only just the community?

Because it would be great if people in their teenage years or their college years are aware of this and thinking, "Wow. I could I could make a career out of this," just like Chanice saw that opportunity and came as a meter reader, but that ended up in a doing her job now. That's great, but how do you also help us raise the level of awareness for, like, the junior colleges and the people that are in position to actually create the programs, their level of awareness needs to increase as well.

And I feel like you guys are in a lot of ways plugged into those groups in your efforts that you do on a daily basis, and maybe there's a way to come alongside SoCalGas, and again, partner with them to really push the initiative before it's needed, so that it's in place when it is needed.

MR. ARANDA: That is so true, Chester.

I think one, I don't see any representatives from the LA Community College -- I mean, from the California community college system, the largest workforce developer in our state, and I think that is very telling. I think there needs to be a concerted effort to be more engaging of them, and for them to be more present.

And I think it takes that level of partnership between local community colleges and indefinitely organized labor and community based organizations. Because we know what hasn't worked because we worked with the youth that historically have been disenfranchised by the process.

As much as there is opportunity and there's apprenticeships and so many other pathways, there seems to be something that's not working. And I won't pretend like I have a solution, but I could tell you as an exchange of stories, we know it doesn't work.

And I think the more you have a participatory approach, even with Katrina's presentation into data, even at that level, you need to engage youth. And you need to engage community to really look at the methods, and make sure that we've cross tabulate data sets because it hasn't really been considered.

So there so many ways to think outside of the box and to be completely fluid and participatory as we begin with the research, and move on to possible partnerships in looking at workforce development and engagement.]

MR. BRITT: So is it setting up meetings at those higher levels for SoCalGas people to come in alongside and really explain what's going on, so that they can understand the potential of this?

MR. ARANDA: There should definitely be a convening, I mean, I think of so many -- I can think of, definitely the chancellor of the California community colleges, to local presidents of community colleges that aren't present and should be.

But I think if you had a convening of community colleges and workforce development organizations that traditional workforce centers that are funded by the State and the feds, including CPOs, it's a discussion that merits its own time and space, I think.

MR. BRITT: And Neil, it is kind of difficult for us because we talk about the phase 1 versus phase 2, SoCalGas hasn't been approved you going to phase 2 yet, so this is not actually a project yet, so we don't want to get the cart in front of the horse.

But how do we balance that need to, kind of, like, begin a process of project awareness and informing junior colleges, or people in the position for workforce training to really understand what the potential of this is, and get set up so that it can be ready when we need them to be ready. How does that work?

MR. NAVIN: Thanks, Chester. Maybe I'll answer it slightly differently than that. The beauty of this slide it's really crisp, we've got some logos. I don't know if everyone knows what DNV is, but I'm happy to step aside and tell you why it's important.

But maybe we need to -- I'll add on to what Chanice is presenting. Some of the engagements we already have with the Cal State system in venues where we are directly engaging with those entities.

Just to give you a little bit more color about how we started that conversation. Because we do have those conversations, specifically talking about how we can both train the current workforce, and train the next work force on the skills.

Because a lot of this is skilled labor, so it requires apprenticeships, what have you. We are actively engaged in that. We are in the process, so now is the time to, you know, have this conversation.

But were already talking to folks like Cal State LA, folks like that who, again, are great, great avenues for folks to start learning about this. A little further north, in Kern County, we are talking to some of the community colleges there.

So we probably need to do a better job talking to you about how we've started that conversation. The conversation is not over and still this is the formation of trying to put that structure together, and now is the time to talk about it.

We've already started on it. I think one of the things we are, kind of, all tackling here is we are early in the process. So you know, we are gathering your input so that we can do some of this work. So you know, these conversations have started, they have not finished.

MR. BRITT: I think, Katrina, you wanted to chime in.

MS. REGAN: I think Neil did a great job covering that. And I did just want to, you know, echo what you said, Chester.

If anyone on the call -- you're all in positions, you know, where you're much more close to some of these things on a day-to-day basis, and we are happy to partner with you if there's an opportunity, or if there's something that you decide or your group decides you'd like to initiate, we love supporting those things.

And that some of the work were already supporting with those folks who are -- you saw some logos there. But with people based in this area, like with AltaSea, right? They have a whole bunch of programs that are really around sustainability, and using the ocean and Marine energy, and with that could look like in terms of hydrogen.

And so we are actively working with them to make sure that we are supporting that as well and we are collaborating.

So it's a little challenging to talk about it sometimes during this phase 1 here, especially because we are really looking at the technical approach for the study, and this is work that Chanice has been diligently leading throughout this phase. And it does partner and it really integrates well with the study itself, but it is somewhat separate.

So we do -- absolutely happy to share more about those efforts with you, and continue to do so in this process.

MR. BRITT: All right. Chanice, I'll let you continue.

MS. ALLEN: Thank you. And thank you again, Enrique, for your comments.

So jumping into the actual approach and methodology for workforce. Again, this is a little bit more of the meat and potatoes of the study in determining the number of jobs and the outcome for Angeles Link project.

So the methodology for resource planning for both constructing Angeles Link project in the operation and maintenance of these jobs to operate the infrastructure will consist of obtaining the business data that measures and describes the work volume, the work activities, and the labor cost in both time and money.

As the pipeline configuration is completed and the locations of the hydrogen production sites and other facility locations are developed, we'll address the effective use and scheduling of internal and external resources to build out these facilities.

This will include forecasting the direct labor, which is basically how many hours that equate to how many workers are needed to complete the task, according to the schedule, the construction schedule.

As well as we'll be forecasting the indirect labor or our supporting services, which for you will be the diverse business enterprises that -- or vendors that we use, or we contract, to provide supplies and services in support of construction, or even our operation and maintenance activities.

And then the skills and knowledge that will be required to meet the needs of these projects will be assessed. And it will be forecasted as far as how many workers are needed for these projects, how many employees, in the organization needed to maintain the infrastructure, where we would need the workers in the labor force, and what roles they would fill in this critical step in and creating training programs to make sure that we supply and provide the essential skill sets for our workforce.

Ultimately, the evaluation will also drive more accurate external recruitment. So again, at the end of the day once we identify the types of workers, the number of workers that are needed, then we manage to the actual workforce portion for any external recruitment to make sure that we have the quality in the skill sets needed.

So to develop these clean, renewable hydrogen knowledge and skill sets needed, the workforce needs access to quality and relevant education and training programs. Building up by pipeline skilled, adaptable workers for the hydrogen industry allows those opportunities to pursue various job pathways, depending on their skills, knowledge, interest, and goals.

So the journey starts with knowledge sharing, of course, and then providing those education and training solutions, and partnerships. And that's what Neil and Katrina were alluding to, where behind the scenes there's a lot of effort going on that we definitely would like to share with you.

And with those training solutions and partnerships at the communities, with the government, definitely the union, and other organization. For our youth, you know, our youth is ultimately our future, so early engagement and incorporating awareness and education in the school programs is essential.

For the development in preparation for these clean energy jobs will need to be available, whether you decide to pursue a trade, or enroll in a community college, or go to your local university, networking with the worry workforce centers. Again, with the collaboration we have with LA Economic Workforce Development Department, that will be critical in providing the ability to access, and then also the transparency for these new jobs.

SoCalGas, you know, we've always been committed to meeting the community needs and closing the iniquities as far as these types of jobs for our new workforce. And these CBO meetings are an opportunity for us to listen and collaborate with everyone in developing and employing local workers for the future for these new hydrogen energy jobs.

So I just wanted to thank you for your time, for your listening ear, and look forward for additional feedback.

MR. BRITT: All right. Thank you so much.

We did have -- I would welcome everyone who has any thoughts or comments to raise their hand, and we would love to hear from you online.

But in waiting for people to raise their hand, I just wanted to also acknowledge that Andrea Vega did provide a chat. And in her comments she's making the case that in addition to talking about workforce planning, SoCalGas should be focusing on the public health implications of hydrogen built out, and what that means to working-class communities.

And I want to just make the point that, you know, we've been trying to make over the past ten months, which is that were going through all 16 work studies. And this is -- phase 1 is the feasibility process of looking at this from all the different lenses that we can look at it from.

We've had presentations on air quality, we've talked about the environmental process that we're going through, routing, alternatives, I mean, were going through them one at a time with you guys. And I think we've been very transparent about that process.

And it's not just that we're going to cover each of the topics once, we're going to keep coming back as the process unfolds for each of those work studies, and we get to the draft reports. And you're going to have an opportunity to see all of that information, and hopefully weigh on it.

Workforce training is one of those topics, and it is relevant to this process. It is super important. It would be negligent, I think, on SoCalGas' part if they didn't at least acknowledge that there is an opportunity for people that need jobs to potentially take advantage of that.

And so I just want to make that point that it's not that we are trying to say that this is the benefit, and you get the benefit of having an opportunity to have a job. It's just that these infrastructure projects warrant looking at them from all angles, and workforce training as part of that process that we need to acknowledge.

Because they don't get built by themselves. Many people make their livelihoods in developing projects like this, and they need that training if they're going to take advantage of that opportunity, and so that's why were talking about it today. I want to just also --

Yes?

MS. GRANT: I also just want to make it clear that we feel is that the onus is on SoCalGas to make those opportunities to the community -- make those opportunities available to the community, and not the other way around. So we take ownership of that and are committed to partnering with you on that.

MR. BRITT: Enrique?

MR. ARANDA: If I could just comment to Emily. Having been in a community advocate for so many years, we're used to the IR process and community engagement is always an afterthought, so it is refreshing to be a part of this process where we really -- I feel it's very inclusive, very transparent, and it's just the way it should be.

MR. BRITT: Thank you for that, Enrique. We're trying our best.

All right. I thought Chanice's presentation was very informative, so it helped me to think of a lot of things which we've talked about. I don't see anyone else's hand raised.

Again, I just want to reiterate that, you know, we're going to continue coming back with more presentations about power topics. I think going forward, I'm going to recommend that we break out into small groups more with you guys as well. Because it seems to me that you guys thrive in that small group setting where you can talk amongst yourselves about the various issues, and we'll try to take advantage of that.

Because, you know, there's a lot of dense information that's going to be coming out through these work studies, but we also want to make sure we're hearing, you know, about the things that matter to you in terms of the community, and the local issues, and the things that you guys care about.

But we are going to be continuing to go through the work studies, and you'll see the agendas as we do that.

Let's go to the next -- I don't know who has the clicker. Let's go to the next slide, which is for Emily to talk about the next steps, and looking forward towards the end of this year, and the different meetings we have set up.

MS. GRANT: Thank you, Chester.

Okay. So before we get to the save the date for the December workshops, this isn't on the slide here because we don't have the date yet, but I did want to provide a heads up. We would like to host an additional workshop, a hundred percent virtual, should just be about an hour in November on the demand study.

We will have a draft study report for you. We don't have the date yet because we're not sure when that draft report is going to be ready. So once that is ready, we need to build in time there make sure we get it to you, you have time to review, and then will host a meeting.

So we are kind of working backwards from when that happens. So as soon as we have information available, it's pretty hot off the press, we'll get it to you. So just be aware that we are looking to have an additional workshop in November, virtual, it will be one hour on the draft study report for the demand study. So as soon as I have that we'll get that to you.

And then moving forward from there. We will be hosting our final quarterly meeting for 2023, I can't believe it, Wednesday, December 13th. We are hoping that we are going to be -- I believe most of you will remember Michael Fisher graciously offered to host us back in June at his church, so were going to make sure the technology works. Because as you know, all of our meetings are hybrid.

So we are going to go toward that venue pretty soon and see if that will work for us. That is what we are thinking about doing, it is yet to be confirmed. We have to make sure that technology component is available and will work for our online participants. So as soon as we have that nailed down, we will get that to you as well, but the date is firm.

The technical approach studies that we reviewed during today's meeting, which were project options and alternatives, routing and workforce, we'll be accepting feedback on those three studies until Friday, November 3rd.

For all of the other studies, you might have seen that we extended that deadline until this Friday, tomorrow, October 20th.

As usual, all feedback goes over to Insignia. You'll see the address listed here, and as usual today's presentation and all of the other materials will be available on the living library.

And additionally, I will add, I know that feedback deadlines are getting a little confusing because all the studies aren't on the same timeline, so we have a matrix that we posted to the living library that is a living matrix. We will, as we have additional feedback dates and windows close and that type of thing, we'll update it on that matrix, so you don't have to memorize everything I'm saying right now.

And if you have any questions let me know. Thanks.

MR. BRITT: Let me just chime in, one other thing. It might not be so obvious to everyone, we had this issue with the PAG yesterday, but the living library is essentially just a SharePoint site. Don't be intimidated by that term, if you're like, "What the heck does that mean?" You should've all gotten a link to the SharePoint site.

If you do not have the link, all you have to do is just e-mail Emily, and we will make sure that you have it. We can also get on the phone with you to make sure that you understand how to access it and get on it.

It is simply just a SharePoint site that has all the documents on it, and it should be very easy to use, very user-friendly, and you should be able to access going back all the way to January, all the information that we have presented. And we will continue to update that site as we go forward.

So in case you have any thoughts about what is the living library, that was what it was about, and that is why it was set up.

MS. MARQUEZ: And the links were sent already to the two reminder e-blasts that you received for today's meeting, so please make sure you click in there.

And as Chester mentioned, if you're having issues, please feel free to reach out to us. We can make sure you have access to that.

And then on that note, I don't know if anyone else is anything. I will go ahead and just remind everyone here with your participation you are being compensated for your time. We'll be getting those invoices out today, so please look out for those in your e-mails.

Just a friendly reminder, as soon as you get those reviewed and approved, we can start processing your payment. So you all know the drill, just wanted to send you a friendly reminder that you'll be getting those this afternoon.

And also, to remind everyone that, you know, we do have lunch provided for those folks that are here in person, so feel free to stick around with us, and ask any other follow-up questions.

And for those who are joining us online, please make sure that you follow up with any feedback for the studies that were mentioned, as Emily mentioned earlier today.

I just want to thank everyone. All the

presenters, I think, did a great job. And again, we welcome your feedback throughout this process and want to make sure that we're continuing to answer questions, and provide you a good experience in this process as we are all learning and doing it together, and just want to make sure that we are continuing on that path.

So with that said, I want to thank you, again, for being here. Enjoy the rest of your day. Thank you.

(Meeting concluded at 11:45 a.m.)

REPORTER'S CERTIFICATION

I, Hanna Jenkin, a Hearing Reporter for the State of California, do hereby certify:

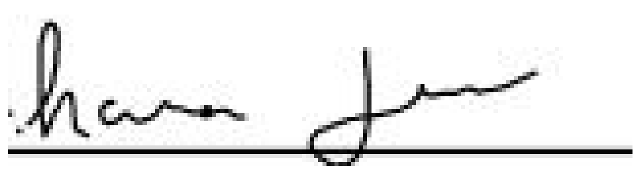
That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were duly sworn; that a record of the proceedings was made by me using machine shorthand, which was thereafter transcribed under my direction; that the foregoing transcript is a true record of the testimony given.

Further, that if the foregoing pertains to the original transcript of a deposition in a federal case, before completion of the proceedings, review of the transcript [] was [X] was not requested.

I further certify I am neither financially interested in the action nor a relative or employee of any attorney or party to this action.

IN WITNESS WHEREOF, I have this date subscribed my name.

Dated: October 19, 2023



HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:)
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ANGELES LINK COMMUNITY BASED)
ORGANIZATION STAKEHOLDER GROUP.)
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TRANSCRIPT OF PROCEEDINGS

QUARTER 4 HYBRID MEETING

Wednesday, December 13, 2023

Reported by:

Shelby Maaske,
Hearing Reporter

Job No.:
45592LEE

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:)
ANGELES LINK COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP.)

TRANSCRIPT OF PROCEEDINGS,

taken via Zoom and at Greater Zion Church Family, 2408 N. Wilmington Avenue, Compton, California, commencing at 12:30 p.m. on Wednesday, December 13, 2023, heard before ANGELES LINK TEAM, reported by Shelby Maaske, a Shorthand Reporter in and for the State of California.

Compton, California, Wednesday, December 13, 2023
12:30 p.m.

ALMA MARQUEZ: Let's go ahead and get started with this morning's meeting. My name is Alma Marques. It's my pleasure to welcome you to the Angeles Link December Quarterly IV Meeting.

I want to thank you all for being here for those that are joining us here in person and for those that are joining us via Zoom. I believe we've already allowed everyone into the room at this point.

I am the Vice-President for the Lee Andrews Group and the CBOSG Lead Facilitator. And I'll be co-facilitating with my partner here, Chester, who will be involved in today's discussion.

Before we move forward, I want to go ahead and go over some housekeeping rules. The meeting is being recorded so that everyone has access to what is being discussed at today's meeting.

And also I want to encourage folks that are going to give comments to please turn on your videos and unmute yourselves so we can hear you loud and clear. And also to remind you to give us your name and what organization you are representing. That way we are able to get that with our court reporter, who is here joining us in person.

So as we move forward in today's meeting, I want to first introduce our Emily Grant, who is our Project Manager for Angeles Link, who is going to do today's agenda.

EMILY GRANT: Here we go. Thank you, Alma. Good morning everybody. Or good afternoon. I'm so used to meeting in the mornings. Excuse me for a second. Good afternoon everyone. Thanks for being here. We're so excited to have you all today and have a great meeting.

So like Alma said, we're going to start with our safety moment and our roll call like we usually do. Then we're going to move on to a welcome from our host here, the Greater Zion Church Family. We're super excited to be here with them today.

They are going to tell you a little bit about who they, what they do in their facility. Then we're going to move into a quick ARCHES update.

We just want to let you know what is the latest and greatest with the very exciting news with the DOE award to the State of California. And then we're going to kick it back to Darrell, who is going to go over a preview of our preliminary findings for some of our air studies. And then we're going to go into some small group breakout sessions from there. So that way we have some worksheets and some questions we have developed to help get that conversation going.

But hopefully, I know we provide a lot of very complicated, dense information. And so we want to start breaking down in those conversations and having small groups and making our subject matter experts available to you so that way you are able to provide some really great feedback. So we appreciate that.

Then we are going to go into our Demand Study and Draft Report and overview of what is to come on that from Yuri. He is going to be joining us in a bit. And we'll let you know what is going on with demand.

Then we're going to have a break.

We have some delicious Porto's desserts and some coffee coming in. So after a little bit of caffeine and sugar, we are really excited to have a guest speaker with us, a third-party guest speaker, David Park, who is the Industry Affairs Director for the Hydrogen Fuel Cell Partnership.

Then we're going to go into kind of a little quick overview of what happens to your comments when you provide them and a couple of examples of comments that we have incorporated in our studies, thanks to the great feedback from our stakeholders.

And then we'd like to end by having a roundtable and hearing from you some announcements on what is going on with your groups. We just want to hear what is the latest and greatest with you.

And then we are super excited. Our president, our SoCalGas President, Maryam Brown, is scheduled to be here to provide some closing remarks to you all and we will end the day with that.

Thanks, Alma.

ALMA MARQUEZ: And as we move forward, I want to first invite Thelmi Alvarez, who will be reading our acknowledgement. She is with the Watts Labor Committee Action Committee.

(Brief pause.)

ALMA MARQUEZ: With that, we're going to go ahead and hand it back to Emily, who is going to lead us through our SoCalGas message.

EMILY GRANT: I wanted to offer here, with the Holiday season here a couple of safety reminders. So first we'll go with travel.

A couple of interesting statistics for those of you who do travel, which is more than 60 percent of us, it turns out. With over half of that travel being completed by car.

A couple of tips to keep in mind.

Make sure your car has an emergency kit, especially if you are driving to or through remote areas. Get a good night's rest and avoid drowsy driving. And lastly, leave early and just plan ahead for heavy traffic. It's probably going to happen. If you're anything like my husband, that portion of planning includes deep belly breaths, snacks and some emotional preparation as well, maybe an audio book.

A couple of safety decorating tips, which kind of made me chuckle, but they seem pretty real. Check the label of your lights to make sure you are using the proper lights, indoor versus outdoor. Replace lights that are broken or cracked. And then of course think about pets and little ones when you are decorating. So what plants are poisonous, where you place candles and glass and breakable decorations as well.

And lastly, okay, this one was really alarming to me. I had no idea, but preparing a turkey, particularly frying a turkey, which is an increasingly popular way to prepare a turkey can be pretty dangerous.

So these statistics, according to the National Fire Protection Association, turkey frying causes an average of five deaths, 60 injuries, destruction of more than 900 homes and more than 15 million dollars in property damage every year. So yes, that was pretty alarming.

At first I thought, what? And then I read that and was like, okay, this is worth sharing. So a couple tips for frying a turkey safely. Never leave a fryer unattended or use it in a garage. Keep outdoor fryers a safe distance from structures, off wooden decks and away from trees. There should be two feet between the burner and tank. Never attempt to fry a frozen turkey. And always keep children and pets away.

Thank you and happy Holidays.

ALMA MARQUEZ: Thank you, Emily, for that safety message. And as we move forward with today's meeting, we are going to go ahead and go through our self introductions. And we'll go ahead and get started with folks that are joining us this morning.

And since we're a small, intimate group, let's just go ahead and get started with Andy. And then we'll go around the room.

ANDY CARRASCO: Good morning everyone. I'm Andy Carrasco. I'm the Vice-President of Communications, Local Government and Community Affairs here at SoCalGas. Glad to be here.

DARRELL JOHNSON: Good afternoon everyone. I'm Darrell Johnson and the Programs Manager.

JILL TRACY: Hi. Good afternoon everyone. I'm Jill Tracy. Senior Director for Angeles Link Regulatory and

Policy. Good afternoon. And thank you for having me.

EDITH MORENO: Hi everyone. Edith Moreno. Regulatory Strategy and Policy Manager, SoCalGas Angeles Link.

RICARDO MENDOZA: Hi. Good afternoon everyone. Ricardo Mendoza. Chief Business Development Officer at the Coalition for Responsible Community Development, otherwise known as CRCD. Thank you guys for hosting us here.

THELMI ALVAREZ: Hello again everybody. My name is Thelmi Alvarez. And I'm the Director of Climate Services for the Watts Labor Committee and Action Committee.

FRANK LOPEZ: Good afternoon everyone. Frank Lopez. Director of Regional Public Affairs for SoCalGas.

RASHAD RUCKER-TRAPP: Good afternoon everyone. My name is Rashad Rucker-Trapp.

Director of Reimagine LA Foundation. Also City Commissioner for the Community and Family Services for the City of Los Angeles.

ALMA MARQUEZ: Okay. And I think we'll have Associate Pastor Chidi who we will introduce and then he'll go into a warm welcoming and introduction for everyone and then we'll go --

CHIDI OLUNKWA: All right. Well, good afternoon everybody. How is everyone doing? Good. Hi. So yes, my name is Chidi Olunkwa. I am the Associate Pastor here of

Greater Zion Church Family. I have been the Assistant Pastor here for about a week now. So you guys are officially my first event. So hello.

So at this time, we're going to show a video just about what the church is. And so --

ALMA MARQUEZ: We'll hold off on the video, Chidi, so we can continue introducing everyone that is joining us. And then we'll see your video.

CHIDI OLUNKWA: So we're going to do that. Anyway, my name is Chidi Olunkwa. And then we're going to continue on introducing everybody else. All right.

ALMA MARQUEZ: Let's go ahead and start with the folks that are joining us online.

And I believe I see -- let's go ahead and start with the names.

Okay. Let's go ahead and start with Jill Buck.

JILL BUCK: Absolutely. Hello everybody. My name is Jill Buck. I am the Founder and CEO of the Go Green Initiative.

ALMA MARQUEZ: Welcome, Jill.

JILL BUCK: Thank you.

MARCIA HANSCOM: Marcia Hanscom.

Good afternoon everyone. My name is Marcia Hanscom. I'm with the Ballona Wetlands Institute.

And I'm here partly because we share some space with SoCalGas at the Ballona Wetlands.

ALMA MARQUEZ: Welcome Marcia.

Christopher?

CHRISTOPHER ARROYO: Good afternoon.

My name is Christopher Arroyo. I'm a Hydrogen Analyst at the CPUC.

ALMA MARQUEZ: Okay. Let's go ahead and have Roy van de Hoek. Please introduce yourself.

ROY VAN DE HOEK: Good afternoon, Alma and everyone. My name is Roy. Robert van de Hoek, full name. Roy is a nickname. With Defend Ballona Wetlands. A biologist and geographer, educator.

And a health statement that I just heard from -- that's good for us when we're cooking with gas at the stove, to turn the vent on before turning the gas on. It does help with removing the fumes or the odors and other chemicals that might be with it for safe cooking, FYI. Thanks.

ALMA MARQUEZ: Thank you, Roy. And I see Faith Myra.

FAITH MYRA: Hi. Faith Myra, she/her. And I'm here with Protect Playa Now.

ALMA MARQUEZ: Okay. I believe I have everyone that is joining us by Zoom. If I have not called your name, if you can please unmute yourself and introduce yourself.

SASHA COLE: Sure. I'm Sasha Cole.

I'm also with the CPUC like Chris Arroyo. I'm an analyst. I work on hydrogen. And we're just here to listen. So thanks for this.

LOURDES CARACOZA: I'm Lourdes Caracoza with Alma Family Services, local nonprofit. I'm here to listen and participate and get the information.

ALMA MARQUEZ: Welcome, Lourdes.

Anyone else? Well, we think we have everyone.

And then last but certainly not least, we have Enrique who joined us in person. If you could please introduce yourself and what organization you are with.

One more time for the court reporter.

ENRIQUE ARANDA: Enrique Aranda with Soledad Enrichment Action.

ALMA MARQUEZ: Thank you, Enrique.

I believe that is everyone we have here today. And with that, we're going to go ahead and début the video that Associate Pastor Chidi is very excited about. And we are, too, because we've already had a sneak peak.

As we're pulling up the video, I just want to go over some housekeeping. Our restrooms are over here to the left for folks that are joining us here in person. And also a fun fact about Associate Pastor --

(Video playing.)

ALMA MARQUEZ: Thank you for that video. And Pastor, if you want to go ahead and say a few more remarks.

CHIDI OLUNKWA: Oh, yes. So that is Greater Zion in a nutshell. We are very glad that everybody is here. As you can see, Pastor Fisher is not here. So every year during this month or this time, we try to encourage him to sit down and try to encourage him to take a break.

He spent all year pouring into others. So we tell him to sit down, take a mental break, take an emotional break. You know, so that for the next of his pouring out, he can pour out healthy onto the people.

So that's the reason why he is not here. So he is on sabbatical. But he did send me in his place. And I do welcome you guys here at Greater Zion. If you guys need anything, I am here. Also, one of our deacons are in the back, Eric Benton. He is also as well for you guys if you guys need anything. Again, welcome to Greater Zion. And thank you. Blessing.

ALMA MARQUEZ: All right. Thank you, Pastor Chidi for opening up your doors this morning and afternoon to have this great meeting that is very much needed for our region.

So with that, let's go ahead and move forward with our agenda. I'd like to introduce our first speaker, who will be giving a preview of preliminary findings of greenhouse gas emissions, evaluation of nitrogen oxide and other air emission assessment.

Darrell Johnson, who is the SoCalGas Manager of Environmental Services. Welcome, Darrell.

DARRELL JOHNSON: Thank you very much.

ALMA MARQUEZ: I'm sorry, Darrell.

Sorry. Andy is going to give us an official welcome from SoCalGas. Sorry about that.

ANDY CARRASCO: Alma, that's okay --

ALMA MARQUEZ: I was just eager to hear from Darrell.

ANDY CARRASCO: We're good. We're at home. We're family. Really I just want to take the time to do a couple of things, just say thank you foremost -- first and foremost to the Greater Zion Church, Pastor Fisher and Assistant Pastor Olunkwa, who just provided some comments.

And really their hospitality was very gracious.

So I want to thank the Greater Zion Church.

But also we want to acknowledge the fact that we heard our CBO members here about taking it to the community. And we took that to heart and said we will do that. And Greater Zion Church offered this beautiful space. So we are gathered here and look forward to continuing to take it on the road and be in the community.

So as we think about next places, we will definitely have our CBO members and welcome any additional space that we can convene.

The other thing here is I want to thank everyone here really for leaning in. And if you can just imagine, we've bean here almost going on a year. It is a journey that all of you have leaned in and it is appreciated. And we welcome that journey as we go into 2024.

Your feedback has made a difference.

We have heard you. We are going to talk about some of that feedback later today. But more importantly, taking into account the possibility to pivot on the things that matter most to this particular group. And we've done that. So we're going to continue on doing that.

The second thing I wanted to bring everyone up to date is just ARCHES. Just a quick update. And that is, ARCHES stands for the Alliance For Renewable Clean Hydrogen Energy System and how it relates to an Angeles Link.

And during our last meeting in October, we shared the positive news that the U.S. Department of Energy recently selected California ARCHES to receive up to 1.2 billion dollars of federal funding to really accelerate the development and the deployment of clean renewable hydrogen at a hub here in California.

We also had provided an update that the California Public Utility Commission, also known as the CPUC, who is our regulator, unanimously approved a decision authorizing the establishment of Angeles Link, the Phase I Memorandum Account.

And can you believe it, it has almost been a year today. We are a couple of days shy of that December 15th announcement.

But as part of that decision, the CPUC directed SoCalGas to join, along with other entities, to be a member of ARCHES to support California's focus and application to receive the very successful federal funds that they just provided.

And it was through that application of ARCHES on behalf of the State of California chosen by the U.S. DOE to receive those funds.

And I can tell you this announcement, and you've heard it from us before.

It is really exciting. It is really positive for our State. And it really emphasizes the need and the urgency for California's focus and work in this hydrogen space.

You may have a lot of questions about ARCHES and what happens next and some of the details. And I think we've stated before that we've shared with you that we have a nondisclosure agreement with ARCHES that restricts us at this point from disclosing any information ahead of information that they provide about the projects that are associated with ARCHES until we see that formal approval to do so.

And in the meantime, as key stakeholders here, we're going to provide you updates as soon as we're able to. You'll be the first to hear. And we know that's important to you. It's important to us to share that. But let's continue to provide that opportunity to provide your input. It is extremely valuable to all of us. And we're exited to share those details as soon as we can.

I will tell you that ARCHES does have a website up and running. They also did recently talk about their community engagement plans. And as soon as they also are going to roll out, in early January somewhere, details on those community benefit plans. We'll let you know.

I just want to again say thank you.

Thank you for being here. Thank you for joining us here online and really taking the time to provide your input.

And with that, I just want to end with wishing everybody a happy Holiday season.

Thank you.

ALMA MARQUEZ: Thank you, Andy.

And now Darrell.

DARRELL JOHNSON: Thank you, Andy.

Thank you, Alma. So I have the opportunity to present our preliminary findings of our greenhouse gas and NOx. And part of the process, we are going to kind of take you through some of the overall findings and break that down accordingly.

Oh, there we go. All right. So just first we'll start off with just a high-level recap of our methodology for greenhouse gas. We typically are using the information from our Demand Study. And the Demand Study has three scenarios. Low, medium and high. And we use that demand to basically evaluate the emissions for the individual sector. So mobility sector.

We evaluated the replacement of diesel and gasoline and then of power generation and hard to electrify sectors of the replacement of natural gas with hydrogen fuel combustion equipment.

And for infrastructure, we evaluated equipment like electrolysis, renewable natural gas, steam methane reforming in the production sector and various elements like the equipment and structure for transmission and storage.

Next slide, please.

So this is our overall preliminary results for greenhouse gas. And to hit the nail with a hammer, the projected emissions show potential reduction of 36 million metric tons of CO_2 equivalent by 2045. That is primarily coming from the mobility sector.

The mobility sector, we looked at replacing diesel fuel and gasoline with substituting it with hydrogen fuel cells. And hydrogen fuel cells are, you know, a hundred percent CO2 free. So we got some large reductions in that area.

For the power generation sector and the industrial sector, they also contributed about 29 percent and 12 percent overall in the reductions respectively. So it showed some really good benefits from removing, you know, carbon from the combustion equation.

Next slide. Here is our overall preliminary results for NOx. Again, we're looking at a potential reduction of about 20,000 tons per year by 2045. And the lion's share again of these reductions comes from the mobile sector by eliminating the fuel source and replacing it with hydrogen fuel cells. We get 95.6 percent of our overall reductions from the mobile sector.

And we anticipate that the NOx associated with fuel, substituting of hydrogen for natural gas is going to be about, combined between the two sectors, about a half a percent of the overall reduction.

So the lion's share of the reduction is going to come from the mobility sector. But we do anticipate that either the emissions from the power sector and industrial are going to stay the same or we could anticipate a small decrease.

And that is primarily based on the fact that, you know, areas like South Coast Air Quality Management District have strict regulations that they are not going to ease up on.

So the design of equipment and the requirements of that equipment was anticipated to not be changed because of the fuel source. So that was the primary foundation for our evaluation of those emissions.

So we're going to break down some of those overall numbers that I just spoke to for greenhouse gas and NOx. Again, the mobility sector is the largest source of greenhouse gas reduction. It accounts for 59 percent of the overall reductions as noted. And 61 percent of the 59 percent comes from heavy-duty vehicles.

The majority of the reduction that we see comes from heavy-duty vehicles and medium-duty vehicles. Because obviously replacing the diesel fuel and/or gasoline fuel cells reduces greenhouse gas by 100 percent.

Similarly, in the overall NOx findings, the mobility sector is again, as noted in the overall piece, the largest source of NOx reductions. I said 99.5 in the wrong area. I'm going to bring it back now. Because again 99.5.

Will you close? I'll close. Sorry.

I guess I'm now loud enough. Okay.

So the mobility sector is the main source of NOx reductions, 99.5 percent. And 75 percent of that again comes from heavy-duty vehicles. We're getting our biggest bang for the buck by removing diesel and gasoline from the mobile sector. Overall, we're anticipating a significant reduction in NOx based on that.

Next slide, please.

So our preliminary results from the power generation sector, substituting hydrogen for natural gas reduces the greenhouse gas emissions from the power generation sector about 99.6 percent. And there is a small bit of N2O from the combustion side, which is a greenhouse gas. So we don't get quite a hundred. And I think some of that might even be from lubrication oil. But that represents 29 percent of our overall reductions in the 2045, where we have our highest demand.

Equivalent, so you have the greenhouse gas equivalency of removing about, with the equivalent of electricity, of about three million homes. So it's substantial.

Our NOx findings, our NOx permitted emissions are expected to stay again about the same or anticipated a small decrease. So if you look at the number of that

99.6, we have about 0.5 percent of that associated with NOx reduction, potential NOx reduction. And about 0.3 percent for other areas that represent the overall four percent of that 99.6.

Next slide, please.

So now our preliminary part to electrify. This is the other portion. So I -- we're looking at it contributing to about 12 percent of the overall reduction in greenhouse gas. Again, that is equivalent to replacing about 600 homes in one year based on our projections for 2045 in greenhouse gas.

On the NOx side, saying the remainder of that point three percent, we're looking at again it remaining about the same or potentially a very small reduction. And that reduction is estimated to be up to about 0.3 percent for NOx and the hard to electrify sector.

All right. So one area where we anticipate a small increase, but it's a very, very, very small overall portion of the reductions, is in the combustion emissions associated with infrastructure. We've got to develop some infrastructure to make the Angeles Link possible.

So there is a potential increase of 0.2 percent in greenhouse gas and the potential increase up to 4.7 percent for NOx respectfully based on infrastructure combustion.

And we're looking at production of using technologies like electrolysis and biomass gasification, which have basically zero NOx and zero greenhouse gas. We're also looking at some renewable natural gas, steam methane reforming, which has a tiny bit. But normally associated with some of the byproducts like lubricant oils.

Okay. In the storage and transmission sector, we have the opportunity to reduce emissions by the utilization of electric-driven compressors that have no greenhouse gas or NOx. And hydrogen fuel engines and turbines may have a minor greenhouse gas and NOx contribution to overall emissions.

In addition to evaluating both greenhouse gas and NOx, we also looked at some preliminary results around air emissions and clean renewable hydrogen. It eliminates some very important contributors to air pollution, such as diesel particulate matter.

So when we remove the diesel fuel, we remove the diesel particulate matter. And also hydrogen doesn't directly produce volatile organic compounds. So we -- by replacing fossil fuel, the majority of VOC and the represented projected reductions for diesel is 82 percent when compared to South Coast Air Quality Management Districts 2037 productions for particulate matter and 2.5

microns. And equivalent to about 80 -- or 28 percent of the forecasted VOC emissions in 2037, again from South Coast Air Quality Management District.

So in general, we get a really big bang for our buck by removing the diesel particulate matter and potential VOC from other fuels and replacing that with hydrogen.

We're having a small technical difficulty.

ALMA MARQUEZ: Okay. Thank you, Darrell, for that. Okay. So what we're going to do next is we're going to break out in groups.

And we're going to go over some questions that are here.

So since we have four people here that are in person, we're going to have one in-person group. And I'm going to have Alyssa, who is in the far -- my right, your left -- that's going to take the group. And we're going to ask these questions. We're going to spend the next 40 minutes going over these questions. So you guys can ask.

And feel free to ask any questions you have regarding Darrell's presentation. He is also here to accept clarification from you. If you have a clarifying question for him, he will be here.

And we have some folks that will be joining online. So we will have Isaac and Antonio who will be taking those groups for the next 40 minutes so we can go over these questions.

This is something that our CBOs ask for us to do, to have more smaller group interaction so we get a better assessment of what you all are thinking regarding the presentation that Darrell just gave us and we could get some more feedback from you all.

So we're going to take the next 40 minutes. After that, we're going to spend another 15 minutes to report back to the general group and we can hear what everyone's thoughts were in your breakout sessions.

So for those of you who are not part of the groups, feel free to have some more refreshments. And we'll regroup at 2:00, if not sooner, depending on how much you all have to say in your groups. All right.

Any questions? Okay.

So we'll have Ricardo, Enrique and Rashad join Alyssa. I'm going to try to meet you where you are at. Thank you, Frank.

All right. Looking forward to hearing you guys report back. Thank you.

Thank you. So we have four questions. And the exercise -- oh, we have a few more people that are joining, coming back from the Zoom room. So just to remind everyone, we have three breakout sessions. Two that were virtual and one in person.

And so we want to hear from everyone on the four questions that were prepared for your groups. They were all the same questions that were asked to everyone. And we're very much looking forward to hearing all your feedback. So with that, I'd like to invite Ricardo to report out on Group One.

RICARDO MENDOZA: All right. Thank you, Alma. And I'll try to be as concise. We had a pretty good conversation and dialogue on all of these questions. But more specifically on number one.

How can SoCalGas achieve transparency in sharing emissions information related to Angeles Link? And it really comes down to getting information out into the community. So having more and more of these forums, not just with organizations but like ourselves. I think we're all happy to share a space to have some of these kind of meetings, but making it accessible to the community and allowing for the communities to incorporate their vision into how this ends up impacting their community.

Some way that current levels of emissions impact health, local business. We talked about there is disparities in health and asthma rates in some of these South LA, Southeast LA and neighboring communities.

Educational impacts. Zip codes should not indicate your health, but we see that it really is when we look at the data.

What factors should SoCalGas consider when evaluation emissions? We should look at what are the factors that are going to impact the communities where some of these centers are going to be, one that is getting built after the fact. And what are some of the community benefits that may come thereafter as a result of some of these developments.

Are emissions an area of concern for your community? Why or why not.

They are. I think it's a conversation that we've seen that's become much more elevated in our communities. And it's coming close in alignment with some of the other issues and challenges that we looked at where it's housing and security -- food and security. And bridging some of those conversations with what is accessible and how we can start transforming the communities.

I think I captured most of everything. All right.

ALMA MARQUEZ: Thank you, Ricardo.

And we're taking very good notes of everything that you said. So thank you to your group for participating in breakout group one.

Next we'll have the breakout room from Antonio's group. Someone from your group that's going to report out.

ANTONIO: I'm going to be reporting out for the group. So for question number one, how can SoCalGas achieve transparency in emission reporting? We were talking about providing consistent reporting, sending information out to people as mailers. So that it's not just relied on the people that are signing up for newsletters. Someone mentioned that.

Provide information in multiple languages, connecting with Spanish radio and TV stations to reach community members where they are listening to information.

Then we are having a third-party reporter in reporting emissions.

And then for our next question.

What are some ways current levels of emissions impact health, local business, workforce and youth? Someone brought up -- I think it was Jill Buck -- that in that area which she serves, which is primarily Compton, there is a 60 to 70 percentile rate of people experiencing asthma.

But we also had Faith, who represents West LA, mention fossil fuel leaks that have happened in West LA.

And then Marcia was speaking about the gas storage facilities and other chemicals that are used in them and the emissions that those chemical cause. Then the different cancer-causing chemicals in the gas storage facilities.

Question three. What factors should SoCalGas consider when evaluating greenhouse gas and NOx emissions? Jill Buck was pointing out the U.S.

EPA EJ screening and mapping tool which breaks down communities in showing the different environmental impacts that they are facing.

Measuring ozone particulate matter. Looking at cumulative impact using the mapping tool.

We were also looking a lot about looking at impacts locally and maybe more by zip code, instead of on a wider scale and bigger, so that we can specify in communities.

A greenhouse gas study. So they were talking a lot about leaks and not just emissions reporting. Looking to where pipelines are located and then doing targeted research with the group, local reporting.

And we also talked about differentiating between the current and projected levels of NOx.

And then for our last question. Is NOx and greenhouse gases emissions an area of concern for your community? They are saying yes. Jill Buck was saying for the -- for Compton, with her experience that people see greenhouse gas emissions as more of an environmental impact and NOx emissions as having more of a health impact on people.

And then in West LA, we were talking about the facility that is currently emitting NOx.

And that facility might be transitioned into using hydrogen. So they were just talking about the concerns from the community about this facility.

And that concludes our comments.

ALMA MARQUEZ: Thank you, Alyssa, to you and your group.

And last but certainly not least, we have Isaac, who is going to be reporting out from his group.

ISAAC: Hi. Hello. Can you hear me?

ALMA MARQUEZ: Yes. We can hear you.

ISAAC: Okay. So for the first question, we shared inhouse how SoCalGas can achieve transparency in emissions reporting. Some really great ideas that were brought out by Roy and Olivia were having creative strategies and communication media, such as utilizing TV, radio, tabling different events, social media to reach the youth and different channels of messaging to reach different parts of the public audience.

For question two, in certain ways that SoCalGas can, you know, report about the impacts to the community and local businesses, the workforce, the youth. One was about the impacts to outdoor workers with temperatures increasing, respiratory health impacting youth and perhaps having ways in which to capture certain air emissions and the impacts that it currently has now.

Now, for question three. What factors should SoCalGas consider when evaluating emissions? For certainly visual -- visually, both air pollution as well as in the way that it looks when emissions are visible. Air quality, water quality, the cost of energy and a cost-benefit analysis and visibility of emissions.

For question four. Are emissions an area of concern in your community? We gathered that they are a concern as well as an increasing level of concern. And as the community would need more transparency in the future for these emissions reports. And that would conclude it all. Thank you.

ALMA MARQUEZ: Thank you, Isaac. So it sounds like most all the groups reported out similar conclusions. You know, definitely looking at the studies that are affecting communities locally, making sure that the information is being distributed locally using CBOs from the communities and understanding what mechanisms they use to disseminate information for the first question.

The second question, it sounds like everyone was very much speaking the same language regarding making sure that whatever is coming in, you are looking at the health issues in the area and making sure that awareness is very much part of the conversation for the CBOs in these communities.

And for the third and fourth questions. Again, the communities are very much concerned and want to make sure that the information is being disseminated using local CBOs as resources because they are familiar with their communities and would be the best resources to disseminate the information for the project. So that's the summary that I received from the three groups here.

So I just want to really thank you all for taking this time to break out in your groups and really have fruitful discussions. And as I mentioned, we'll make sure this is all taken -- we are taking all your notes or Post-its as we put it in a summary and for you all to look at.

So again, thank you for having taken this opportunity to be part of the breakout sessions. I want to encourage everyone from the in-person to please go back to your seats.

I believe we have one question from Marcia. We'll go ahead and take your question, Marcia. If you could please unmute yourself.

MARCIA HANSCOM: Yes. Thank you so much. I just wanted to highlight something that wasn't mentioned but that we did talk with Darrell about in our small group. And I just want to make sure the CPUC people hear it and the rest of the SoCalGas executive team here.

And that is that if you really want to have transparency, which was the question, question number one, then it is really important to tell the whole story. Not to just have a nice sound-bite that sounds good.

For instance, with the power generation, we were told at previous meetings that the power generation -- you know, that using hydrogen for power generation and for a number of other things, but definitely for power generation is not out of place yet, the hopeful scientific people are saying yet. But we don't know if it will ever be able to be replacing gas if it's mixed with gas more than 30 percent at the moment.

So in other words, if you are saying then it's taking 99.6 percent of the greenhouse gas out or 96.9, whatever it was. It sounded like a lot. But it's not -- it's only 99.6 percent or 96.9 percent of the 30 percent, not of the whole amount because you are still using 70 percent methane gas. And I think that's really important for the public to understand, for the regulators to understand, that the power generation, the science isn't there yet. That hydrogen and methane together cannot be used to totally replace methane gas.

So in other words, we're still going to be using a lot of methane gas. And I know that that's in SoCalGas's interest at the moment. But hopefully it's in our collective humanity's interest to not be using it, to really getting away from it. And that hydrogen may not be the end-all be-all for the power generation part of this. And especially given the current international Convention on Climate right now, that that has apparently become one of the big issues that is part of the agreement for all the countries that less methane gas is -- you know, that really need to stop using methane gas because it is really clear how much -- how much of a contributor that is to climate change.

ALMA MARQUEZ: Okay. Thank you for your question, Marcia. I believe Darrell has a response for you.

DARRELL JOHNSON: Perfect.

ALMA MARQUEZ: And I do see a couple other hands. So we'll get to you in just a moment.

DARRELL JOHNSON: So Marcia, there are a couple of things. And we talked about it a little bit. But there is a couple things so that everyone is clear. One is that the reductions that we referred to are totally based on the Demand Study. Right. And so we're saying what the achieved -- the 99 percent achievement is from that that is replaced natural gas. Right. So we're not talking about the whole of it.

But I know -- when you speak to 30 percent in one regards, you are speaking to the ability to blend fuel, which is another concept.

Right. So I don't want to confuse the two concepts. There are some considerations of, you know, what's the appropriate blend between natural gas and hydrogen. That's a totally different topic.

When we were discussing the possibilities or the reductions achieved from combustion, we were saying for the demand that is proposed, these are the reduced amounts.

Now, you have to understand that we're projecting demand. It could be more. It could be less. This is the projection. But this is the emissions associated with that projection.

So to be transparent, maybe at our next presentation we ought to do a better job of kind of clarifying that. And then the other piece that I wanted to maybe address in your kind of question and statement was that a lot of what we know today is based on existing technology. And we understand that technology will develop and grow as we project into the future.

We're looking -- you know, this study is from 2030 to 2045. We're in 2023. So the concept of equipment designed specifically for combustion of hydrogen is in its fledgling stages in comparison to that of, you know, natural gas, which has been combustion for centuries.

So that is another element that is going to evolve over time. These are evaluations and feasibility projections. But as has been the case in NOx and other combustion areas, technology changes. Technology grows. And most of the technology available today is available on natural gas combustion because the engines, the majority of engines in the world offer natural gas.

But as we develop new technologies that are specifically developed for the combustion of hydrogen, which will, you know, consider residence time, amount of oxygen, you know. A number of factors that we use to control in NOx today with natural gas will also be used from a design standpoint and a control standpoint to address hydrogen as we move forward into the future.

So there was a couple elements that 30 percent is more of a blending and a transport consideration and not necessarily a combustion.

And then the second piece is we should -- I will make it more clear as to what I am referring to when I say reduction. I am speaking to the projected demand of fuel.

Hydrogen fuel and what it will potentially supplant as it relates to other fuels like natural gas, gasoline. Hope that happens.

ALMA MARQUEZ: Thank you, Darrell, for your response. I believe we have a couple more questions. We'll take the next one from Sasha. If you could please unmute yourself.

SASHA COLE: Yes. It's not a question. I'm actually a CPC analyst along with my colleague Chris. And Marcia, I appreciate you.

You just kind of specifically called us out, that you wanted us to pay attention. And I just wanted to -- first I wanted to ask what your organization was. And then -- because I'm fairly new, so I'm not familiar with it.

We are definitely on these questions and we are definitely -- like we don't just take -- but was your criticism that you thought that this was a best case and not very realistic scenario that was being presented? I wasn't clear. And I just want it to be clear since you said CPC take note and we are here.

MARCIA HANSOM: Sure. And I appreciate that you take note. I am with the Ballona Wetlands Institute. And we're interested in all of this primarily because we share space at the Ballona Wetlands State Ecological Reserve, where there is a big gas storage facility underneath this ecological reserve and surrounding it.

And we were hoping it was going to be closed. Because it is really not appropriate there. And it's already been deemed the most dangerous storage facility in the State by the California Council on Science and Technology to the legislature, et cetera.

But now, you know, they are talking about, well, we are going to keep using the methane gas for Scattergood Power Plant, for instance, down the road. That's owned by LADWP.

And we had thought we were phasing out methane gas in this area, particularly in the LADWP gas storage or gas power plants. Gas-powered electricity plants.

And so what we were told is by the scientists who told us here in this forum, but also in a webinar that were invited to -- that SoCalGas put on. There were scientists from a number of universities there. And they were all telling us that -- and this is a little different than I think what Darrell said. They were telling us that for combustion as well that they cannot use one hundred percent hydrogen yet. That they are hopeful that it will change over the years and that might be a good thing.

The question is do we have that much time with time with climate change impacts. And so, you know, I know that some of the lobbyists from SoCalGas told an LA

City Council person we want to keep using the methane as long as we can.

So you know, that might be a business decision for SoCalGas. But I'm concerned about the communities and the community of human -- humanity on the earth.

SASHA COLE: So it sounds, Marcia, though, like the people you want to talk with are LAWDP. They are the ones -- if you are concerned about the specific Scattergood --

MARCIA HANSOM: No, but okay. But I just want to --

SASHA COLE: No, let me just finish.

ALMA MARQUEZ: Okay. Because we do have a timeframe for this. So --

SASHA COLE: Okay. Got it. I just -- yes.

MARCIA HANSOM: We have a timeframe on earth for humanity, too.

SASHA COLE: Well, you and I can talk offline. You can get my information. I can put it in the chat for you. That will save people -- but just generally, we oversee SoCalGas. And so, you know, the jurisdiction on hydrogen is still unclear. But we are here listening and that is still being determined.

But in terms of specific generation facility Scattergood, that is LAWDP. And it's really, they have their own jurisdiction.

MARCIA HANSCOM: I understand that.

But my point was that they told us -- these scientists told us this was for all of the power generating, power electric, gas-powered electricity generating plants, that they could not use one hundred percent hydrogen. That they could -- the most they can use right now is 30 percent blended with methane.

CHESTER BRITT: Why don't we take this conversation offline. Obviously you guys need to have a separate conversation. So for the benefit of the group, we're going to keep moving forward. And I think Roy, you had your hand up.

We want to make sure we hear from you before we get onto the next --

SASHA COLE: And I'll drop my E-mail in the chat for you, Marcia.

CHESTER BRITT: Yes. Thank you.

ALMA MARQUEZ: Yes. And I just want to encourage everyone and remind everyone, we are on a time frame. We want to respect everyone's time for this afternoon. So if we can please just stick to the agenda. And we'll be more than happy to follow up with you after the meeting. And with that, we'll take Roy's question. If you could unmute yourself, Roy.

ROY VAN DE HOEK: Okay. A mixture of question and comment. So Isaac did a really good job in being the facilitator of our breakout.

And the terms of transparency and society impacts were very thought-provoking and make me have a lot of questions. And I -- here's what -- just in the last few days, our U.S. Secretary of Agriculture, you know, appointed by President Biden. His name starts with a D. I think it's Delvante.

Something like that.

And an international climate person at the conference and she pronounced things as "methane" instead of methane. I thought that was interesting. More like the British pronunciation.

Well, the question here -- observation is that the Secretary of Agriculture was confronted about methane or methane from cattle, livestock industry. So that's beef, cattle, meat. And I'm thinking about how we cook it on our stoves with gas.

And since society -- and the other part of the question for us was to think about society. The amount of people becoming vegetarian and vegan but still cooking on the stoves is an audience of transparency that's very honest people because they are speaking about these animal advocates are doing it for the health of the planet, health of themselves as individuals and animals not being slaughtered, you know, and hurt.

You know, whether it's the dairy industry or cattle for beef for food.

So the idea here is that the gas company could have part of this messaging that is towards the animal rights community and vegetarians and vegans about cooking on the stove and helping -- actually, if you are cooking vegetarian on your flue gas stove, which is putting gas, fossil fuel, methane into the atmosphere. If you are cooking vegetarian meals, you are taking methane out of the atmosphere because you're not using the beef industry.

So this is an interesting thing where I don't know if you are getting my drift here, but the gas company and the agricultural, the nonanimal husbandry animal agriculture could be -- nonanimal agriculture, you know, the regenerative agriculture, plant-based using the soybeans and legumes that enriches the soil, that's actual -- and has nitrogen fixing bacteria.

We're like getting to a place where that could be the future of the gas company not to be trying to sell to the meat eaters anymore but more towards the vegetarian, vegans, which is healthier for us as individuals, healthy for society, healthier for the planet, the soils, and helps with the climate.

So that was really creative and out of the box, I think. And that came from the breakout and the part that

that worked. Thank you.

CHESTER BRITT: Thank you, Roy.

That was a very interesting conversation. But we do need to move on with our agenda. We are going to be going to the Demand Study, which is the first of our 16 work studies that we have a preliminary look at the draft results of our report.

But before we do that, I just wanted to recognize that Maryam Brown, the President for SoCalGas, has joined us. We're very excited to have her today. And she is going to be making the closing remarks today. So we look forward to that.

But we are going to move on to Yuri, who has joined us. He is the Senior Director of Business Development with SoCalGas. We've heard from him before at other meetings. He does a terrific job of presenting the information.

As I mentioned, the Demand Study is the first of the 16 work studies that we are going to get a preliminary look at the results of this draft study. And it is really a study that impacts, as we have already heard from Darrell and others, a lot of the other work studies.

A lot of the information in the Demand Study is what the other work studies are predicating their results on. So it is very important to understand what the results of the Demand Study are and what it's looking like. And so I'm going to turn it over to Yuri.

YURI FREEDMAN: Thank you, Chester.

Good afternoon everybody. I'm very glad to be here. I'm glad to continue the conversation about demand. As Chester said, it is a real important parameter we have been working on. And that's why I'd like to start with recap, just stepping back what is the objective of the Demand Study.

The objective is to estimate the total market. If you go for hydrogen, the total need for hydrogen in a 20-year time frame beginning in 2025 for 2045, close to mid century, for three key sectors. These three key sectors are mobility with a focus on heavy-duty long-haul transportation, power generation. And the third sector is the industrial sector, which in itself incorporates a fairly wide variety of sectors.

In analyzing total need for hydrogen in these sectors, we were looking at these from the standpoint of four factors. And I listed here in the first slide. The first one is policy and legislation, what was a very large part of the organization and the direction of policy, State and federal policy legislative acts. The second parameter is very equally important. It's the technology feasibility.

It's what other options are there to address the need. Commercial availability is right next. So effectually the question of technological maturity and to what degree the companies are prepared to offer these technologies and business readiness is the fourth component.

So these four between them cover various aspects of what would it take for hydrogen to be adopted again in each of these three sectors. Mobility, power generation and those sectors.

When we were designing this model, and I'll talk about this more in the next slide, but here I wanted to just stress that we were fairly conservative in our assumptions. For example, you may all hear a lot about the potential growth for electricity demand. Some say it could double. Some say it could triple. And that could result in substantial need for -- demand for -- well, substantial demand or need for clean molecules such as hydrogen. We did not factor this into our forecast.

So there are several ways in which we were trying to be conservative not to overestimate the need for hydrogen.

So let's go to the next slide. And the next slide again is a quick recap of the structure of our analysis. We started with model definition, effectively establishing a set of objectives, scope and approach for the analysis.

And we also assessed the previous work done on that because we don't want to reinvent the wheel.

We want to be fully informed of the work that the auto industry and academic parties have conducted on that. Then we proceed to build the model out to effectively create those linkages, those mathematical relationships between various parameters of need and the quantities of hydrogen would entail. Like any other model, it is not being created perfect. So model refinement is a very important step. We call it iteration.

It is looking at the outputs of the model, going back and fine-tuning the model, making sure that the outputs make sense with that and the logic holds.

And the fourth box at the bottom is perhaps among the most important. We really need to understand we aren't conducting this in a vacuum. We wanted to make sure that we have as many qualified, experienced eyes on that as we can. So we talked to market participants, academics, to experts to make sure that our approach, our inputs, our assumptions makes sense.

That's the process we should run through in order to get the results, which we are going to share with you on the next side.

So we'll start with mobility. And mobility demand is substantial. It's really driven to a very large degree, especially in the heavy-duty sector. By the regulation that is known as ACF or Advanced Clean Fleets, which effectively mandates by a certain date that the transportation, especially heavy-duty, long-haul transportation is going to become zero emissions.

So it is no longer a choice whether to have diesel truck or procure electric vehicle. It is going to be an imperative that is obviously a major driver.

Within that we need to assess within zero emissions whether it is going to be battery electric vehicles or fuel cell electric vehicles.

And if you recall, they are both electric vehicles that are complimentary.

And the appropriation of characteristics that shows the range requirements, the payload or effectively the need to carry large amounts of fluid, what we call duty cycle. And importantly the fueling or charging time points to the heavy-duty as a very important sector for adoption of fuel cell electric vehicles. Because these vehicles have their attributes for the purpose. They can carry large amounts of load over long distances. And they can fuel fast compared to the battery vehicles that are fit for some purposes but not seem to fit well for the long-range applications.

So that is the sector that drives between -- and you see the top bullet on the slide between million and a million point seven tons per year in demand for hydrogen by mid-century by 2045, depending upon the assumptions.

And a large part of what is going to facilitate that is the regulations known as LCFS, which stands for Low Carbon Fuel Standard that specifically was proposed a while ago by California Air Resources Board. And the recent notifications on the maintenance that they proposed were those would create additional incentives not just for production but also importantly for refueling infrastructure.

So that's to recap. The numbers suggest between a million and a million point seven million tons per year demand from transportation by 2045.

Let's go to the next slide. The next slide is power generation. And this is a very important element of demand because that is something which the State increasingly recognizes as a very essential element of the future energy base. California Air Resources Board and their planning documents called scoping plan forecasts about nine gigawatts of hydrogen capacity, which will be needed in addition to capacity which we have in place today.

There are other sources that suggest what they call clean firm power, which is to say power that you can dispatch instantaneously, is going to become not less important but more important as the share of intermittent renewables grows. And some of this analysis, developed by parties such as Environmental Defense Fund and others suggests that we may need between 25 and 40 gigawatts of clean firm power, which may not be only hydrogen. But clearly hydrogen is one of the prime candidates to serve the purpose of this clean firm power.

So with that, once we run through all the numbers and create the range of scenarios, the demand for clean hydrogen from power generation in our assessment is between point seven and two point seven million tons per year again by 2045, which really is to a large degree a function of two variables. One is how much generation capacity we think we are going to have.

And I just quoted you the data from the State itself suggested the ranges are significant but those numbers are small. They start from nine and go up, nine gigawatts.

And the second important number is the -- what we call capacity factor, which is to say how much of the time these plants run. So we don't know the exact numbers yet. We are going to learn more about that in the next phase.

We are going to understand what power market looks like on the various scenarios. We are now on the range of scenarios which we developed on a high level that creates this range that we see in front of you between point seven and two point seven million tons per year by 2045.

Let's go to the next slide. And the next slide summarizes the conclusions for industrial demand. This range, as you can see, is fairly wide. It's between point two and one point five million tons per year. You can appreciate that there is a large range of sectors here. And their demand for hydrogen varies. The important element here is that the most ambitious case here has to do with the refineries, which are large consumers of hydrogen are going to switch from grey hydrogen, which they use today to green hydrogen.

But the other two cases, our moderate and our conservative cases don't assume that. Key drivers of the switch are going to be cogeneration, which is basically power generation facilities inside the fence of industrial plants, refining as I just mentioned and fuel switching from mainly the users of natural gas from natural gas to hydrogen for heat generation purposes.

Now, importantly, we do not consider expansion production capabilities within California. That's not a conservative aspect of the study to the extent that would be factored in that will obviously increase the demand.

Let's go to the next slide. The next slide brings it all together in a pictorial format. You can -- you see that when you add the three sectors, which we just reviewed, you end up with a range of total demand between one point nine in a conservative case and six in an ambitious case million tons per year of clean renewable hydrogen demand. That is comprised as we just described.

But the mobility which you see here is the dark blue power generation, which again varies depending upon the assumption they described. And the top section is the industrial demand.

Let me stop at this point and turn it over to Chester for discussion, comments and questions.

CHESTER BRITT: Thank you, Yuri. So let's just start by any general questions. We did provide a worksheet, which is highlighted for the Demand Study purposes to assist you in thinking through Yuri's presentation. I know it was technical, had a lot of detailed numbers in it.

But this kind of summarizes that. It will be kind of the basis for our group discussion.

But before we get into this, does anyone have any general questions about Yuri's presentation or any clarification, things that you would want him to help you understand or explain? Someone has their hand raised. That looks like Andrea.

ANDREA: Yes, can you hear me?

CHESTER BRITT: We can hear you, yes. Go ahead.

ANDREA: Hi. Good afternoon. Yes, I do have a few questions in terms of the demand. Currently hydrogen is -- the biggest demand for hydrogen is in refineries. And as we move to electrified transportation and other uses that we currently have for oil, how could you anticipate that demand slowing down significantly. Because we're not going to use that much refineries eventually. So that is going to be a big factor, I think, that needs to be considered.

YURI FREEDMAN: Thank you, Andrea, for a comment. And I think a correction that there is definitely an expectation that as we are going to decarbonized transportation, the demand for petroleum fuels may significantly decline.

Partially that's why we include refining only in our ambitious case. Another comment I would make is that a lot of refineries are looking at operating on what they call, abbreviation SAF, which is sustainable aviation fuel. Which is really zero emissions fuel, but that still needs refineries to produce that.

And maybe another comment to make is that some of the refineries are looking at carbon capturing sequestration as the way to produce the zero-emissions fuel because obviously to the extent you are going to capture and sequester or utilize the CO2 and you are going to come up with the zero.

Now, a day will come when ultimately we are going to switch from liquid petroleum fuels or liquid hydrocarbon fuels altogether. But I think the majority of the analysis suggests that just because of the turnover of stock there will be steadied because diminishing demands for those fuels for quite some time.

CHESTER BRITT: Andrea, does that answer your question?

MARYAM BROWN: Chester, can I offer just a simplified --

CHESTER BRITT: Sure.

MARYAM BROWN: Andrea, this is Maryam with SoCalGas. And I think your question is a very thoughtful one. And I would summarize it in a very basic way. I think Yuri covered it.

But I just want to add just a -- I mean, what we are talking about is using hydrogen in a completely different way. Hydrogen right now is an industrial feedstock primarily used at refineries.

And I'm interpreting your question as, well, we're not going to need refineries anymore. So then why do we need hydrogen? And it's exactly because hydrogen is going to get used to displace, replace, take the position of traditional natural gas and use it in things where we're using natural gas right now. Use it in power plants and in those trucks that otherwise would have been using diesel from the refineries for heavy-duty trucks they are talking about using hydrogen and also to use it for things that we're going to keep needing like glass and like steel and manufactured products.

So you are exactly right. Hydrogen won't be needed in the refineries in the same way.

But hydrogen will be needed for new and different things. And it is so clean. So for example, the Angeles Link initiative, this Angeles Link project that you are helping us to think through and think through smartly, it's about replacing -- the concept is to replace 25 percent of all of the natural gas that SoCal uses now. Replace it with hydrogen.

And I realize, because there was a previous comment about we'll still have methane.

They talked about it as a transition. You can't just flip the lights that one day we're on natural gas and diesel and the next day we're on something completely different and clean. It's about steps and it's about transition. There is no jump to the top of the building. It's step by step. But this is an important huge step in that process.

CHESTER BRITT: Thank you, Maryam.

And I would just ask Yuri that you would further clarify -- you touched on it. But we have three different scenarios, the conservative, moderate and ambitious scenarios.

What are the primary drivers that differentiate those scenarios?

YURI FREEDMAN: Thank you. That is a great question, Chester. I know we had materials on this in the previous presentations but not in this one. So let me go by memory. And let's see how well I can do. I think on the mobility, the key assumptions there are share of fuel cell electric transportation in those zero-emission fleets.

Because we all know that according to the Advanced Clean Fleets, fleets are going to switch from diesel to zero emissions. And there are two main options for that. It's battery electric trucks or fuel cell electric trucks. The share of fuel cell electric trucks in that pool is an important variable that drives some range in transportation demand.

In power generation, I mentioned two parameters. Again, in the simplest way it is actually not quite complicated. It is how much hydrogen capacity we are going to have, how many hydrogen power plants we are going to have and how much they are going to run. The first number of how many plants we are going to have, by the State's own assessment, it begins from nine gigawatts and goes up. So we're talking about like that double-digit number of gigawatts.

That's a lot. Let me just say that that's -- it's multiple power plants.

And the second number, which we admittedly don't know exactly is how much these plants will run. So where we start from is looking at the utilization of the existing thermal generation today. Thermal generation the plants that run today on natural gas. Today if you do the -- take all the plants and add all the generation today, all the times when they generate and ask what's the percent of the total time they run, it's about 30 percent. So they run about a third of the time.

Our scenarios for hydrogen assume 10, 20 and 30 percent what we call capacity factor. So we admit that we have not yet done the work that we need to do to get that number in more precise fashion. But we believe that that 10, 20, 30 percent covers that range. And that's what drives the difference between conservative, moderate and ambitious case.

And the last, of course, is the industrial sector. With that, you have to go sector by sector. I will say to Andrea's question that a significant portion of that swing there is in that ambitious case looks so much greater for the industrial sector in assumption for refineries.

But the other two cases do not have that. They seem to look at this sector by sector.

You've got Maryam's point, steel glass, and many other heat intensive industries and make a range of assumptions about how many of them will switch to hydrogen.

CHESTER BRITT: And by doing the conservative, moderate and ambitious scenarios, you end up with a range essentially of where you project demand to be. There are a lot of unforeseen factors and determined factors that are not completely clear yet that will evolve over the next coming years that will, you know, essentially place that demand in that range.

And the other 16 work studies are being -- are looking at the demand results in that same fashion, conservative, moderate and ambitious for their analysis as well. Is that right?

YURI FREEDMAN: So I think you are absolutely right about the range of uncertainties like many other forecasts, we have to deal with that. I will say that what there is no uncertainty about is general direction of the policy.

CHESTER BRITT: Right.

YURI FREEDMAN: And it's actually not -- the statements, these are the legislative and the regulatory acts which are laws of the land. In transportation, it refers to Advanced Clean Fleets. These fleets will convert to zero emissions, which leaves me with the options battery or fuel cells.

It is, by the way, also the case for power generation because many of you may know about the law called SB 100, which mandates a hundred percent emissions-free generation by 2045.

What is less well-known is that there is now the law called SB 1020, which mandates 90 percent emissions-free generation by 2035, which is really just around in our business, and 95 percent emissions-free by 2040.

The trajectory is set and the goals are clear and the goals are binding. That's what allows us to create that range of scenarios within the confidence of a general direction policy.

CHESTER BRITT: And it's really important what Maryam said, too, because you are not going to go from the bottom of the building to the top of the building in one step; right? You have to take steps. And the policies you are referring to are basically setting in motion the idea that there has to be a transition. You have to use hydrogen in some capacity. It is not going to go from one to another without using hydrogen.

MARYAM BROWN: Exactly. There is no elevator to the top. It's about steps. But this is a big step. So we are trying to identify the areas that is the easiest for adoption of hydrogen as it slowly starts to fold into and replace natural gas and other fuels. That's what the Demand Study really shows is what that future really looks like depending on policy.

Does it go primarily to the trucks, to the heavy-duty trucks? Does it go primarily to the power plants to be able to clean those up? And that's something that the Demand Study sort of fleshes out. But also will be worked through over time with our regulators and policies.

CHESTER BRITT: And Yuri, I will just ask for more thought. The Demand Study looks at a horizon year of 2045. Can you just explain why that year was chosen? I think it's maybe kind of obvious. Because a 20-year horizon is a good model assumption year. I know in modeling 20 years, 25, 30, it gets a little, you know, iffy.

But I think 20 years is -- it brings it down to a place where you can kind of look and see the future a little bit more clearly.

YURI FREEDMAN: I think you're right, Chester. I think there are a couple of things. I will start from the general statement about why we are developing this project. We are developing this project to enable and help the State of California to achieve their goals. It is really as simple as that. It is our -- and not just our, but I think it's broad consensus that we need both electrons and molecules to get to those carbon neutrality goals. We need those molecules at scale. That's what this project is going to do.

So 2045 is the date that not we but the State has put down in the State to keep those goals. Even how long it takes to build infrastructure. That's why we are starting now.

That's maybe the simplest answer. It's also true that many of the State's planning documents deal with a 20-year time frame. So I think it all makes sense because that's ultimately the infrastructure developing timelines that we are creating with that.

CHESTER BRITT: All right. If you want to break out your little guideline in the back, there are some guiding questions that we want to at least touch on and see if anyone has any thoughts or questions on.

The first question is what hydrogen impacts are the most valuable considering the following areas. Workforce, youth, health emissions and cost. And I was just sitting here thinking about some others even. Maybe environmental or things that might be important to you.

What we really want to understand is from the community-based organization perspective, what are the things that matter to you. I mean, demand is essentially creating a threshold of what would be necessary to make that demand happen in terms of supply. So you know, that sets in motion a whole cascading list of things, whether it comes to jobs or workforce training or environmental issues or health and emissions, cost. There are a whole range of things that that sets in motion.

So one of the questions that we want to explore with you as community-based organizations, each of you come from your own perspective. You have your own orientation of what's important to you, why you created your community-based organization to begin with and what you're focused on. And maybe you came into this process, and hydrogen for you was like the new frontier. I mean, you had no idea really what hydrogen was about. And through these last 10 months, now you're beginning to understand and beginning to think about that.

So I'm curious to know from your perspective, because each of you have very different perspectives, what do you think about hydrogen when it comes to demand? What that might set in motion for you as an organization? If you guys have any thoughts, just raise your hand or tilt your little placard forward and we'll take your comments.

ALMA MARQUEZ: We'll make sure you have a microphone as well.

CHESTER BRITT: Okay. Roy, you have your hand up online. Go ahead and start us off.

ROY VAN DE HOEK: Okay. Real short this time. As a -- I would be okay with hydrogen blending with methane gas if it was a process we were going to be doing but phasing out within five years. None of these dates of -- you know, it was pointed out that we're going to have to depend on transition gas for a transition time of 10, 20, 30 years or more. But I think the whole concept where we even hear our President of the United States and other nations talking about emergency, a war kind of. A climate emergency. We had a World War II that we defeated, you know, Nazi and World War II in five years. If the nation were to have a -- call it an emergency and that I think we could go all the way in this country and the world to solar and wind in five years.

So we don't have to have these longer time spans that are there. That's if we are going to do things incrementally slowly. But I think that -- has anybody made a model -- probably some environmental organizations have.

But has anybody -- is there any, like a credible sort of model to show how much we would have to change in society if we wanted to do it in five years? Because we do have a climate emergency.

Is there a model out there that shows how dramatic we have to change our lives and how a gas company would have to change?

CHESTER BRITT: That's a good question. So Yuri, I mean, that's obvious -- oh, Maryam.

MARYAM BROWN: Chester, do you mind if I take a crack at that?

CHESTER BRITT: Yes, please.

MARYAM BROWN: And I'd be happy, Yuri, to hand it over to be far more specific and analytical than I could possibly be.

I think, Roy, this is a very thoughtful question. And you know, it is an issue where we need time to be able to transition. And the reason for it, you know, at a very high level is this, is that energy has to be a lot of things all at the same time. It has to be safe. It has to be reliable. It has to be affordable. It has to be clean. It has to be equitable.

It's almost like it's a Rubiks Cube.

And you can't privilege one over the other; right? And that's what we're trying to balance as we make sure that we deliver the clean energy future that we're all very, very committed to.

To your question about did anybody ever look to see can we do this faster, actually, the State of California did. Our Air Resources Board. That's our primary agency that oversees air quality in this State. They looked at a scenario that went all electric and faster, just like you're saying. Not in five years. But they had it in 10. I believe it was 2035.

And the takeaway from it was that we were going to lose lots of jobs. It was going to be extremely expensive. And the State didn't pick that direction. The direction they picked was the second option, which was bringing more hydrogen online to displace traditional natural gas and diesel sooner rather than later. And that is actually one of the underpinnings, one of the foundations of this Demand Study that Yuri was highlighting.

I think that I can appreciate the frustration that the world hasn't moved fast enough. But what I can tell you is the world is definitely moving. The world is definitely moving with a lot of alignment across the industry to bring these technologies and this change. But I appreciate your desire. Can we move faster? We need to move as fast as we can in a way that continues to deliver safe, reliable and affordable energy and consistent with our rules and regulations here in this State and that it is supported to move forward.

CHESTER BRITT: And Maryam, is it safe to say that SoCalGas is just one piece of that, you know, complicated puzzle; right? I mean, you're not in a position to make all the decisions. You are a contributor to this bigger organism that is trying to solve these problems. So ambition in a singular way is not really possible because you have to be dependent on so many other factors around you; right?

MARYAM BROWN: For sure. This concept of Angeles Link, it's just the connective tissue --

ROY VAN DE HOEK: Exactly.

MARYAM BROWN: To a whole lot of other pieces that have to come into play. We do need approval and support from our regulators.

But you also need the solar and wind producers, you know. Because Roy, you are talking about why can't we bring more -- why can't we bring more renewables with more urgency.

We've got a wealth of renewables here in the State of California and in the United States of America. But they aren't where it is that we all live. You have to bring those renewables into the population centers. So by converting those renewables to hydrogen and piping it into our population centers, that is SoCalGas's role.

And so one thing that we do with an initiative like this is one of the biggest costs associated with hydrogen is actually transporting it. Because right now we transport it with trucks. If you can transport it with pipelines, it dramatically brings it down. But another big thing that it delivers is it actually connects those renewables, where it is that they are, and brings them to where it is that people are.

Right? So it doesn't do us any good at the Port of Los Angeles and the Port of LA if we don't have roads to be able to take those goods anywhere --

ROY VAN DE HOEK: Right.

MARYAM BROWN: -- right? Where are those roads that brings it in? So we are one piece of it. But I think that we have an outsized important role.

And that's why we have the dedicated process we have here to answer these kinds of questions.

It's a great question.

CHESTER BRITT: Do you have anything else, Yuri, that --

YURI FREEDMAN: Very little. I am very empowered and out of exhaustion.

CHESTER BRITT: I'm not surprised.

Maryam did a great job.

MARYAM BROWN: Thank you.

CHESTER BRITT: Does anyone else have any thoughts? I really don't want to move off this question too quickly. Yes, Ricardo.

RICARDO MENDOZA: Hi. And great information. I think the demand piece is just really interesting and it is very much driven along policy. I think on our end, because we work a lot with workforce development and we work a lot with youth, is bringing it back to equity.

Where do we start some of those training elements, particularly in the communities where we're going to see some of this built out.

And what role can organizations play to support SoCalGas and other entities to ensure that it is an equitable process?

CHESTER BRITT: Maryam? You want to take that particular -- you are popular here.

MARYAM BROWN: Well, I just want to clarify the question. Is the question about the jobs opportunity with

an initiative like this? Is that the question?
RICARDO MENDOZA: Yes.
MARYAM BROWN: That's a great question and I really appreciate it. There is a completely different work stream from the one we're discussing today. But it's part of this conversation, the workforce study. That is underway. And I know that you all had an inside into the scope of work revolving around that.
That is work that is still under way.
But what I would want to be able to forecast for you is that the potential new jobs opportunity with an initiative like this, not just for the pipeline but to build the energy facilities on the upstream side of the pipeline.
And then the jobs on the downstream side of the pipeline, they are very significant and I would say probably one of the biggest jobs initiatives that the State will have.
I think one of the biggest concerns I have is whether or not we have enough workforce to be able to build and construct this project.
But I'm also very, very proud of the incredible workforce that we have at SoCalGas.
Half of our workforce is representing labor. And they actually are the ones that operate our system today.

They will be operating this system when it is modernized with Angeles Link. And your community can apply for a job at socalgas.com.

And we'll be hiring there.

And I think that the third point that I would make that is really important is, you know, this clean energy transition, if we don't do this right, that it creates new jobs and maintains new jobs.

We could lose jobs; right? We could lose jobs to other states. We could lose jobs to other countries. And I think it's probably one of the initiatives that is one of pieces that is the most important for that equity piece. There is more to that equity piece. And I you know you don't need me telling you that. But that is a big part of the equity piece of this effort and I really appreciate the question. I think that we'll get to the workforce component results in the spring. Right.

RICARDO MENDOZA: That's right.

MARYAM BROWN: Is that the time frame for that?

CHESTER BRITT: Can I add onto that just a little bit? Ricardo, thank you for that question. And I think that's a question that has consistently come up from this group and a very important question.

You know, and I will also add to the existing SoCalGas workforce. Not only will we be able to train in this new way with hydrogen, but we also have to take a look at our aging workforce. And we're not the only industry that's facing that silver tsunami that we all knew is coming. Of our workforce, over 2,000 of our employees have 20-plus experience. And we know within that next 10-year period, while we are looking at this project, they will get to the 30 years and then looking at retirement.

So it's not only about the opportunity that exists. It's that we're going to have to look at the next generation of workforce that is coming. And we are one industry and we are focused on ours. But there is a big pressure on making sure that that next workforce is available and is trained. And it's coming through local means. So we've got to look at all partnerships, whether it's a community college or whether it's a CBO. Because we know that workforce is going to be needed.

CHESTER BRITT: And I'll just add one more thing. I think you were at one of the other meetings where Emily presented what the outreach was going to be focused on in Phase II.

And that is going to include a lot more things like what are talking about, where you are going to be able to be more directly involved as a CBO organization and influencing what Andy and Maryam was just talking about.

So this is just Phase I. Remember, this is just the feasibility process to kind of ascertain where we are with hydrogen. But there is subsequent phases that are going to come online. And during those phases, there will be more in-depth communication going on and workforce training and a lot of other things as things become more clear as to what is needed.

Because right now it's not even completely certain as to what is actually needed in terms of workforce training.

ALMA MARQUEZ: I think Enrique had a question.

CHESTER BRITT: Enrique, did you have a question?

ENRIQUE ARANDA: Yes. Thank you, Chester. Maryam and Andy, thank you. And thank you for convening, having this convening and content. As nonprofit organizations, there is an old adage that we fill the void of government.

And nowhere is that more pronounced than in places like South LA and Southeast LA and East LA.

With that said, we are looking for a very comprehensive community benefits agreement that is all-inclusive, incorporating proactive.

And you know, Maryam, something you said about renewables and bringing -- how to bring those renewables.

The question of -- or the section injustice or inequality with equity, I mean with -- with everything that is happening with this new green economy, it makes me think -- I drive a Mirai. And I live in Southeast LA. But I have to drive to Orange County every day, too. I mean, every -- maybe three to four days I need fuel. So I think of that to just make this -- how emblematic this injustice question is.

We know adverse impact. We know the impact of the 710. We know the impact of the Alameda Corridor. And the promise and power it had over 20 years ago in terms of permanent jobs to this community. We haven't seen that. So when we see a Project Labor Agreement or promised jobs for the opportunity with the CRCD and Organization WCUC and work with that. It's just an empty promise.

So with so much lip service, we were speaking about in our group how there is a very strong distress in the efficacy of government.

Just like there is a very strong historic distress because this pattern and practice of injustice with regulatory agencies like the AQD and SoCalGas. So we have a historic opportunity to do this once and do it right.

And I'm just happy to be seated here. And with everything that -- and I think, Maryam, you really answered what I had the question. I was just sharing with

Edith how amazing it is to hear you being at the helm of this agency and the message that is being given.

So we're here as partners. We understand you have a lot of collective bargaining units that work with SoCalGas. We're just hoping that as nonprofit agencies, you consider us as partners with the same boots on the ground and the same power and promise as organized labor. Thank you.

CHESTER BRITT: Thank you.

Enrique --

MARYAM BROWN: Do you mind, Chester?

CHESTER BRITT: Yes, please.

MARYAM BROWN: Enrique, thank you so much for being here in person. Also, Ricardo as well for being here in person. Because I think it really helps with the dialogue and with us understanding what a priority is for you. We definitely want that opportunity to have a community benefits -- community benefits agreement or whatever it is that the right term is to use to make sure that the community is benefiting from these investments that we are making.

But I think that you hit a really important point that I want to emphasize that it's kind of the elephant in the room, which is the trust issue. Right? And you know the best way that we build trust is this kind of opportunity to meet and hear from each other and understand each other. But I totally get that there are trust issues with government counterparties, with business counterparties.

And maybe there is something poetic about the fact that we're meeting here at Greater Zion. Because Greater Zion -- the "G" in Greater Zion, it stands for something. It stands for "Give in spite of." That's what it means. So I hear you. That there is reluctance. There is a trust question. And what we are doing -- what I would ask is can you give in spite of and have this dialogue with us so that we can identify, hear from you what the problems are. Hear from you what you think the solutions are. Let us work on those solutions with you. We might bring some ideas of our own and get ourselves to this better place. But the idea here is for the community to see benefits in this. I see it.

We -- everybody on the SoCalGas team sees it because we know the health benefits that it could bring. But it won't bring it if -- if -- if it doesn't have your input and your guidance on what it's going to take.

ANDY CARRASCO: Very well said.

Thelmi?

THELMI ALVAREZ: Hi, Maryam. Hi everyone. Thanks again for having us here. I just -- in this first question I want to just bring us back a little bit. Because I do want to say that one of the things that is missing on this list is really safety and environment. And I know that you had talked about that. And as we are talking about hydrogen pipelines; right? That term pipeline is the trigger for a lot of communities, especially communities like Watts, where we have petroleum pipelines that are underneath the Alameda Corridor that have been impacting the community and are impossible to clean up and are still continuing to impact the communities that are under it and even the communities where the groundwater is flowing has been impacted by those pipelines.

So there has to be a lot of transparency in talking about where these pipelines are intended to be put, what are potential safety issues, how are we going to mitigate those issues, and how are we going to involve communities in making sure that they are able to understand those potential impacts and hazards. And they are able to keep us safe -- as safe as possible. Hydrogen is different than petroleum in a lot of different ways.

CHESTER BRITT: Yes.

THELMI ALVAREZ: And it's very highly combustible. And people are really afraid and challenged by that. So that's a conversation that I think should be front and center. And we should really address that element in the group.

CHESTER BRITT: Maryam?

MARYAM BROWN: Chester, please.

Because -- Thelmi, also thank you very much for being here in person. And I could not have said it better than you just said it. The priority that we need to have on the conversation on safety. You know, for us to make this clean energy transition as fast as we can. Even if it is not as fast as -- Roy, as we would like it to be.

We do need size and scale for clean hydrogen to be able to match electrification. To be able to bring that -- that clean energy future; right? We need size and scale. But -- and you will hear people talk about size and scale, these two S's. But to me there is a third S and you just said it. It's size, scale and safety.

Right.

And I -- we know that hydrogen can be handled safely, that safety can be engineered on hydrogen, just as you so eloquently said. But in our communities, they are unfamiliar with it.

Right. And I think that we need to be proactive on this issue. I think that too often we are waiting for the question to come up and then to respond to it. And that's too late in my mind because they are not hearing whatever you're saying. Because in the back of their mind, they are wondering but is it safe. Right.

Hydrogen has been handled safely in the United States of America and around the globe safely for decades. But that doesn't change that we need to be -- we need to get back to basics and be very direct with our communities and talk about this in a way that people can understand. And I just really appreciate that you put emphasis on this point. Because this is something that all of us as a team are talking about.

And SoCalGas itself is a leader on this, developing a lot of industry standards with others that -- that builds comfort on safety for hydrogen. But we also need to do things like 101 education things and things like that. And it's not -- to Chester's point, it's not all on SoCalGas. There is a broad, wide range of government and endusers and policymakers that all need to be part of this chorus. But your point was so eloquent and so well said. And I just -- I just really -- I appreciate that you raised the point.

CHESTER BRITT: Yes. Thank you so much. Roy has his hand raised. We're going to take Roy's question or comment. And then we're going to go to a break. Because we do have a lot of things still on our agenda. I think we're a little bit behind schedule. This is a terrific discussion. And obviously, we needed to have it.

And that's why we're here.

But we do have a guest speaker here we want to hear from as well. And some closing remarks from Maryam. Although she might have given a lot of her closing remarks already. I don't know. We'll see. But if we could take -- Roy, if you could be brief and give us your comment. Then we'll move forward.

ROY VAN DE HOEK: Okay. The national parks -- thanks. The National Park Service has shown in Alaska and other national parks that they've gone to zero and negative emissions. So most -- and to sustainability. And so we should be looking at national parks as a model. And the gas company should find a way to, you know, connect to that. And the Santa Monica Mountains is a national park in our area. The Channel Islands. We may have more national parks.

In fact, the San Gabriel Mountains coming soon.

And I think that's -- that's really important to do. And there's more I want to say, but I'll just leave it at that for partnerships and collaboration that needs to happen.

I do want to just add quickly that the famous John Steinbeck and all his novels that address cultural issues. You know, like the Grapes of Wrath and Tortilla

Flat. And he had a famous friend named Ed Ricketts who he made famous the dock in Cannery Row. Well, they had a boat that went to the Sea of Cortez in Mexico. And they learned about indigenous people, while they were studying marine life. And the boat has been recreated as the Western Flyer. And it was a diesel boat in 1940. But when -- it has just been put back on the water. It's got a harbor in Monterey. It's going to be coming in Monterey.

It's going to be coming into Marina del Rey at times for -- and it's goal was to educate inner-city youth to study science.

But the boat is now electric motors.

And got rid of the diesel motors. And it really -- so my point here, too, is that models -- I mean, examples help to push us towards the Hundredth Monkey idea. You know, where all of a sudden a complete shift happens so that we can go faster than the 10 years or 20.

If we -- and so the gas company needs -- just like if you donate money to baseball programs in LA and other things. Get some real key donations into the gas companies, donations in to -- like the Western Flyer Educational Foundation Project. Thank you.

ANDY CARRASCO: Thank you, Roy.

I'll just speak for myself. I really enjoyed visiting the ERC facility for the first time. I really knew very little about hydrogen when I joined this team. But it was really -- it was -- it just showed you the power of the demonstration; right? Of seeing it an action. Like it looks -- it sounds so complicated. But then you see it.

And it's like -- well, but this is not much different than how I live in my own house. You know, I can -- I could do this, you know.

And it makes it more tangible when you see it.

And even the safety issues. You know, you think about it like -- and then you see it burning on a stove or cooking a cookie. And it's like, this is the demystifying of some of the things that are misinformation or things that you worry about that you are really not sure about.

Because you really just don't know what's really the reality of the safety mechanisms that are in place.

So a lot of this is good discussion.

I'm glad we had it. We are going to take a quick break. Let's keep the break to just five minutes to 3:15. And then we'll pick it back up. And we'll get going with the rest of our agenda and hopefully finish on time. Thank you so much.

ALMA MARQUEZ: There is some coffee and pastries. So please help yourselves.

CHESTER BRITT: Oh, yes. There is coffee and pastries. Please help yourself.

Can everyone hear me? It sounds like the speaker got turned down. All right.

So I want to introduce our next speaker. We have a third-party presenter who was courteous enough and gracious enough to join us today. His name is David Park. He's the Industry Affairs Director for Hydrogen Fuel Cell Partnership. We've been having third-party presenters come to the CBOSG meetings, which I think has been very helpful. It was one of the things you guys recommended early on that we do hydrogen education throughout our meeting series with you. So we've been trying to do that. And this is another example of that.

Just to remind you, we will be turning the chat off for this presentation. We document all of our meetings and make -- you know, keep track of all of your input. But the third-party presenters are really not part of the collection of input that we're receiving. It's more of a benefit for you. So we're turning the chat off as he is making his presentation. We will take a couple questions at the end. We're not to going to want to grill him with a bunch of questions. But if there is anything we need to clarify or if there is questions about his presentation that are curious to you, we would want to hear what those are. And then we will continue on in our agenda.

So with that, I'm going to turn it over to David for the presentation.

DAVID PARK: Great. Thank you, Chester. And good afternoon everybody. I'm very happy to be here. And I really enjoyed that conversation, that exchange. Because I wasn't sure, you know, what level of conversation we would be having today. And it sounds like you all are actually very much up to speed. And so I am going to go over some stuff that is probably a little bit redundant. But you know, it will level set a little bit. And then we can move into the bigger picture and topics. I'm okay with being grilled if you want with questions.

CHESTER BRITT: I was trying to protect you, but --

DAVID PARK: It happens to me quite frequently. So why don't we go ahead and get the presentation started.

CHESTER BRITT: David's presentation is separate from the main presentation. So it's just going to take a second to load it.

DAVID PARK: No worries. It's a large file. That's how large it will be. So I'll just get started while it's being pulled up.

The Hydrogen Fuel Cell Partnership is a 24-year-old organization. We were founded by the

California Air Resources Board in 1999. And the goal of the partnership was to initiate a hydrogen fuel cell vehicle economy here in California. It started out as the California Fuel Cell Partnership. We changed to the Hydrogen Fuel Cell Partnership just this year in 2023. And we are a -- an official nonprofit, 501(c)(3) organization. SoCalGas is a member of the Hydrogen Fuel Cell Partnership.

And one of the interesting facts is this organization, until this year, so for 23 years, it was an organization based on an MOU that was established by the California Air Resources Board with auto manufacturers, fuel providers, station developers. And so for 23 years, this economy has been developing based on a handshake, basically. And I think that's one of the most amazing things I've ever witnessed in my life.

The question is, why hydrogen? And I'm here to answer that question. But a lot of you have already answered that, I can tell. But we'll get into those details. Again, this is Compton. And we are just adjacent to the I-710 Corridor. I myself live in Long Beach, about a quarter mile from the I-710. So I'm very, very familiar with the Corridor with the ports. And I also was involved in the LA Metro 710 widening deliberations that have been going on, that had been going on for decades or over a decade. So again, I'm very, very well-versed in the truck traffic that applies to the 710. I'm very much aware of the environmental policy around diesel truck pollution. I've spent over 30 years in this industry focused on transportation.

A lot of my early career as -- my career started out when diesel trucks were completely uncontrolled. And U.S. EPA implemented -- and the Air Resources Board implemented regulations to control diesel exhaust.

Those are the three primary pollutants of concern related to diesel, diesel particulate matter, nitrogen oxides and carbon dioxide.

Diesel particulate matter and nitrogen oxides are -- they are considered criteria pollutants by the U.S. EPA. And they are regulated by the Federal Clean Air Act. And those criteria pollutants, the EPA is mandated to determine what the exposure limits to criteria pollutants are due to health impacts. And so those pollutants are very much impactful on human health.

The carbon dioxide, which is actually the bulk of the emissions that come out of the vehicles, that's a CO2. It's a byproduct of emissions. But it's a byproduct of life really because we all emit CO2 from our bodies. It is a climate gas.

And the way I look at it is CO2 and greenhouse gases, those are related to socioeconomic impacts. The impacts they have are climate related. The heat, drought, you know, massive changes in weather. Those are -- those are all, I feel like, socioeconomic impacts. You know, I'd like to make like a demarcation between health and socioeconomic. But they both impact our lives.

The California Air Resources Board has implemented, you know, more stringent and more stringent restrictions on diesel exhaust. And specifically on the particulate matter side, which is considered a human carcinogen, that has been decreasing and continues to decrease into the future. Diesel engines are about as clean as they will ever get right now with the modern emission control systems. But we need to reduce them further. And so -- and also, these emission control systems do not reduce CO_2.

So the next phase is to phase out the combustion engines and move into these electric drive technologies, which are these zero-emission trucks.

So the Air Resources Board requires all vehicle sales, not just trucks but automobiles as well, to be zero-emission vehicles by 2035, in the 2035 time frame. They are basically going to homogenize all of their motor vehicle requirements for, you know, road transportation to achieve zero-emission vehicles. And that will effectively start to reduce particulate matter, NOx and CO2 all simultaneously.

So but that's a huge step. If you look at how many motor vehicles are on the road and how many vehicles are in society and how many electric vehicles are in society, there is a long way to go to a get to a fully electrified transportation system.

So let's see if this cooperates.

There it goes. So we have battery-electric trucks and then we have fuel cell, hydrogen fuel cell trucks. And so I'm here to address the hydrogen fuel cell truck and that market. The -- delay.

It will move in a second. I know because I was told if I hit it twice it's going to fast-forward.

One more time. All right. See if it goes -- there it goes. Okay.

So a hydrogen fuel cell truck is a truck that's powered by hydrogen. Whoops. Yes, it did go twice. But the hydrogen is stored as usually a compressed gas onboard the truck. And then that is run through a fuel cell. And I have another slide on the science of the fuel cell.

But I'm not going to get into it unless -- if there is a request, I will get to that. But it's in my backup slides.

But that fuel cell produces electricity. And what's very interesting about this, it's different from a combustion reaction is this is an electrochemical reaction. It's very, very efficient. So what happens with a combustion reaction in an engine, you know, you have a -- you know, you put the fuel in the cylinder. The cylinder -- the fuel ignites. It pushes the piston. You have a mechanical creation of energy.

With a fuel cell, you have a direct conversion of your chemical elements, which is hydrogen, from the fuel tank and oxygen in the air reacting in the fuel cell to produce electricity.

And so your efficiency numbers actually go up -- or it's a very efficient system. You don't have those -- the massive heat loss and then mechanical, you know, losses due to friction. And so you have a very efficient vehicle.

And I heard one of the -- the gentlemen that was here, he drives a Mirai. You know, those vehicles get, you know, on the order of about 60, 65 miles per gallon equivalent. You know, which -- you know, relative to a gasoline vehicle. So that's -- that's an efficient vehicle. And it carries -- you know, an automobile carries about five kilograms of hydrogen on board, which is about the equivalent of five gallons of gasoline. So imagine going, you know, 300 miles on five gallons of gasoline.

And you know, the byproduct is pure water. What comes out of the tailpipe is pure water. That's it. Nothing else.

But why should this matter? You know, where is hydrogen used today? And where will hydrogen be used tomorrow? And the engineers in the room will tell me the -- we already are a hydrogen society. We already use hydrogen in our economy in the production of fossil fuels, in steel manufacturing, in fertilizer manufacturing.

But now we're talking about transitioning basically the entire transportation system to electric vehicles. This is not just a California goal. This is a U.S. goal.

And I'm going to fast-forward two slides. I apologize. I'll have to back it up.

Second slides. I'm going to wing it.

So the federal government has increased its spending on climate reduction. Yes.

As basically, a previous slide showed, you know, multiple -- multiple multipliers on federal spending on climate from about nothing to about 66 billion currently, which is a massive amount of spending. And we have two Acts that happened, you know, basically that were really influenced by the pandemic. And that was the JOBS Act and then the infrastructure. The -- I can't think of what the acronym is. The IRA. Inflation Reduction Act.

Thank you. Thank you for that.

But you know, the U.S. went from almost no climate -- spending on climate to massive investment in climate reduction more so than any other country on earth. And Europe, you know, at all the previous climate conventions had, you know, looked at the U.S. and said, how could you not be funding this. And all of a sudden in, you know, one year basically, the U.S. lapped all the other countries on climate spending.

One of the things that came out of this, and I saw that you had an ARCHES speaker earlier, was the hydrogen hubs. The U.S. DOE Hydrogen Hubs Grant, which is an investment of seven billion dollars into the development of regional hydrogen production hubs.

ARCHES, the California Hub, is one of the beneficiaries of that grant. They were just -- it was just announced in August that California would be receiving up to one point two billion dollars to develop a hydrogen production hub. And this is a Clean Hydrogen Production Hub in California. So meaning that this is carbon-free hydrogen. So that is going to benefit the transportation market.

And so this is a hydrogen fueling station in

Wilmington. It serves the drayage trucks that work at the Port of LA. And it is one of very few heavy-duty hydrogen fueling stations in the nation and in the world actually. This is actually one of the first heavy-duty hydrogen stations in the world.

And this is a map of all of the heavy-duty hydrogen fueling stations in the U.S.

And they are all right here in the LA Air Basin.

There actually is one more that just came on line in the fall in Oakland to support a Port of Oakland Project. But they are all right here.

This is the center of the Global Hydrogen Transportation Economy.

So imagine when this economy extends to the entire transportation system; right? So this is a map of not all of the gas fueling stations but the largest fueling stations in the State of California. And those are all two kilometer grids. So there are multiple fueling stations in each of those grids. And you know, you see it on your corners. You have multiple fueling stations per corner.

As we move to this electrified transportation economy, what happens to all those gas stations? You know, as the vehicle fleet transitions to electrified vehicles, what happens to the gas stations? Yes, they can put chargers in. But hydrogen fits into those business models very well. Hydrogen offers a fast fill and vehicles that can drive long ranges and vehicles that can haul heavy loads. And that fits into the commercial transportation network very, very well.

So the question comes to why a hydrogen pipeline. And so this is a map of U.S.

DOEs hydrogen hubs or Hydrogen Act Scale Initiative. Sorry. There are so many projects going on, I'm getting them all mixed up.

But if you look on the right-hand side, there are -- you know, those are kind of the traditional hydrogen -- the traditional places where hydrogen is used in the economy. But it is going to expand to support transportation and then also the grid.

Hydrogen -- what hydrogen offers is the ability to store energy, excess electricity.

So when the renewables are pumping out more energy than the grid can -- or than society can use, that excess electricity can go into, for instance, the electrolysis of water and hydrogen production.

And that hydrogen can be stored in things like salt domes and can then be used during high demand periods to reinforce the grid when the grid does not have enough -- or has more demand than it can produce.

What's on the bottom is the gas infrastructure. And that gas infrastructure serves two purposes. And that is the transmission of gas. Hydrogen is a gas. And then it actually serves as a massive storage mechanism for -- for gas as well. So it adds to the overall stability of our energy economy.

So today, if you go to a hydrogen fueling station, then yes, there are -- there are 65, 66 hydrogen fueling stations in the State of California that serve the light-duty automotive market. Right now we are having actually a lot of outages of the stations. We only have about 54 stations operating today. But that's very few hydrogen stations in the State of California. So it's a very new marketplace.

If you look at the price, the price per kilogram in the image to the right, it's 36 dollars a kilogram. And that price has actually jumped -- it's almost tripled in the last year, which is causing the drivers to really throw their arms up in the air.

And so when I say you can throw hard questions at me, your questions -- the questions you ask me are not going to be harder than the questions the drivers ask me. Because they are, you know, beyond annoyed.

So at 36 dollars a kilogram, that's the equivalent of 18 dollars per gallon of gasoline equivalent. That is extraordinarily high. And well, why a pipeline? Well, a pipeline reduces the distribution costs. Right now the way the hydrogen gets to the stations is it's trucked in. There's a picture of a truck, a fueling delivery truck on the next slide. So it's going to jump over that. So I apologize.

So the progression of hydrogen transportation to the fueling stations is to go from truck early market. And that -- what you saw in that previous slide was the equivalent of a tube trailer. So it delivers gaseous hydrogen to the stations.

Today we're in this -- we're already in the midterm phase of the economy, believe it or not. Today the dominant fueling stations that are being installed are stations that store liquid hydrogen on site. So you can bring a liquid hydrogen tanker truck to the station, drop about a thousand kilograms of hydrogen in a single delivery. And that reduces the distribution costs. And the station doesn't have to take as many deliveries. And therefore, it's a little more resilient.

In the future, pipeline transport, that is the image that the industry has is that if we would like to get to the pipeline transport of hydrogen as quickly as possible. Because it creates a -- first of all, a more resilient system. You have a more resilient supply chain and it reduces the distribution costs. So --

CHESTER BRITT: David, can I interrupt you.

DAVID PARK: Yes.

CHESTER BRITT: What does that term "Cold G" on that last slide --

DAVID PARK: Yes.

CHESTER BRITT: On the pipeline, it said "Cold." What does that mean? "Cold GH2 delivery."

DAVID PARK: That is a good question that I am not quite sure because I pulled this off another report. Yes, I can look it up. I actually have the paper.

CHESTER BRITT: It caught my eye.

DAVID PARK: Yes, that's a great --

ALMA MARQUEZ: Maybe very, very cold.

DAVID PARK: Well, you know, liquid hydrogen actually is pretty close to absolute zero, which is negative 240 degrees C. Something like that. But -- there you go. Thank you.

So again, why does this interest you? And it gets back to -- I think the ARCHES award really summarizes everything very well. One point two billion dollars invested in hydrogen production just in the State of California.

The multiplier on each of those hubs applications is about 16 times. It's not even 10 times. It's 16 times the amount of public investment that's going into this. Private industry is matching with 16 times that amount of money. That is a massive amount of money that's going into the economy. And what it gets to is -- well, first of all, it's for a good cause.

Reducing criteria air pollutants. Reducing greenhouse gases.

And we're creating a massive number of jobs. We're creating an entire new energy economy. If you think about the economy, it started out as, you know, burning wood. And then they want went through all the stages. Whale oil, coal, petroleum, natural gas, nuclear, electricity. This is a brand new PEET branch of the energy economy tree.

And so the way I like to -- if we -- if you think about -- well, if you get involved now, and I'm very happy to be involved in this industry now because that means that I have a lot of runway ahead of me. And we all have a lot of runway ahead of us. And the earlier we can get our children involved in this economy, the better off they will be. Because petroleum is going away. And if you look at how much petroleum we use, it's -- that chunk of the pie, if that goes to nothing, something has to replace it.

So I like to think of us as we're in a Model T moment right now. Really we are.

We're -- you know, Henry Ford just created industrialized, you know, vehicle manufacturing.

And think of the runway ahead of the Model T, you know, starting in 1914.

So thank you very much. I appreciate the time. I'll take any questions.

And if you'd like, I can go into fuel cell science. But if not, I totally understand.

CHESTER BRITT: That was a very informative presentation, David. Thank you.

Does anyone have any clarifying questions? Or it looks like, Roy, you have your hand up. And I'm sorry. Thank you.

ROY VAN DE HOEK: Okay. That is a great presentation. Again, three questions. You had the one map that showed all these hubs. Being a geographer, I saw that Colorado is between the LA Hub and the Great Lakes Hub. But -- or North Great Plains Hub. But Colorado has got a sizable population. It's very modern-thinking, progressive with things.

So is Colorado going to have its own mini-hub? That's one question.

The other question I have is when thinking -- when the -- what you said, H20 comes out of the exhaust pipe of trucks or vehicles, it's as vapor, I imagine; right? It's as gas. So it's water gas vapor. And it's going to go into the atmosphere. And if you have millions of cars all exhausting water vapor, is this going to form cloud formation? Or as it rises, and it's going to, is that going to change climate or make more rain in some places? And then if you are running all these cars in a cold climate and the water vapor is coming out of the tailpipe, it's probably going to condense because of cold ice. You know, freezing weather in certain parts of the U.S. And it's going to then become ice on the road right away or precipitate or have water runoff off of roadsides. So that's kind of curious to me. All these kinds of things.

And then water will -- water vapor or water gas will -- is a part of what with oxygen contributes to rust. Like so all the pipes coming out of car engines and truck engines, are they going to rust? And is there going to be some sort of waste? You know, and then I got to thinking about the cold absolute zero temperature of hydrogen in these tanker trucks. What kind of metal is in the tanker trucks? And how long does that last before that becomes weak and either has to be discarded as a storage container? Some technical -- not technical but not simple. Okay. Thanks.

DAVID PARK: Those are all great questions. I'll start with Colorado. Colorado is very interested in establishing a vehicle market.

They were not awarded -- there were actually many parts of the country that were not awarded hubs.

We're not leaving them behind. And there will have to be a connective tissue between each of those hubs. We're looking at the freight network as being that connective tissue and that stations will have to build out along those corridors.

It just -- what the production hubs does is it just distributes the production of hydrogen equitably across the country so that it -- you know, just as an example, the early market for fuel cell electric vehicles was -- we were actually trucking our hydrogen from the Gulf Coast. And how much sense does that make? It doesn't make much sense at all. Right now we have more local production. We're bringing hydrogen from California sites. And then from -- you know, places like Las Vegas. So we're not leaving those other places behind. It's just how we deal we had to establish production hubs, you know, kind of of equitably across the country.

On the vapor side, it does come out -- I think of it as kind of a halfway exhaust pipe, halfway drain. Correct? The fuel cell -- there is heat produced in the fuel cells. So the water vapor comes out definitely as a vapor. And it does condense. But in terms of the production of water, it's not going to be much more than what we see on the fossil fuel side. Because if you think about what happens in the combustion of fossil fuels, water is actually a major byproduct of fossil fuel combustion. You know, water, carbon dioxide and then what are called products of incomplete combustion reserve. Or you know, kind of carbon monoxide and the nitrogen oxides.

So in terms of contribution to global moisture, it's not going to be more than or much more than the -- what we're already putting out and digging out of the ground. It's just we'll be shifting the fuel from fossil fuels to hydrogen.

On the cold climate side, because the water -- the exhaust comes out as a heated water, there will be quite a bit of evaporation involved, especially in cold climates. Cold, dry climates, you'll have a lot of evaporation. But honestly, I don't know, you know, in terms of will it drain onto the roads and create more icy conditions? That's possible. I honestly don't know. And automakers would probably have a better response to that than I can.

On the distribution of liquid hydrogen and the resilience of the distribution trucks, again, that's not my area of expertise.

But I know that cryogenic liquids have been distributed, you know, for instance in the medical industry quite frequently. So I imagine that's a relatively mature industry.

ROY VAN DE HOEK: I'll just add to that, we currently put out liquid nitrogen at 360.

So it's colder than the hydrogen being. So the metal structure or strength to cold liquids is already there. Yes.

CHESTER BRITT: I think we have one more who has raised their hand. And then we're going to move on. I'm sorry, Thelmi. Let's go to you. And then we'll go to the online person.

THELMI ALVAREZ: Looking at the future, I was just wondering. You had mentioned that the current gasoline infrastructure would transition well into hydrogen. I'm wondering what would happen with existing underground storage tanks and would those be used to store hydrogen? Or how are they stored currently in those very few hydrogen fueling stations --

DAVID PARK: Sure.

THELMI ALVAREZ: -- that exist?

DAVID PARK: Sure. Yes, that's a great, great question. The hydrogen is actually stored above ground.

And that's because you have to deal with either compressed gas tanks or -- and then there actually is a refrigeration cycle that's required before fueling. And to service, you know, underground equipment is very challenging. And so currently, the stations all -- the predominant equipment is above ground.

How to decommission, I don't think that the existing gasoline storage and petroleum storage facilities can be repurposed for hydrogen because those are liquid versus compressed gas.

And those probably would have to be decommissioned.

CHESTER BRITT: All right. Andrea.

If you could unmute yourself so we could hear you.

You should be able to --

ANDREA: Can you hear me?

CHESTER BRITT: Yes, we can hear you now. Go ahead.

ANDREA: So when you show that slide about different uses for hydrogen, you also have green fertilizer. Is that as ammonia?

DAVID PARK: Yes. Yes. So hydrogen actually is used -- one of the major uses of hydrogen today is in fertilizer production. And ammonia is a big part of that. In fact, ammonia is considered one of the hydrogen carriers, you know, for distributing hydrogen, you know, when we're distributing as a chemical.

ANDREA: So would you be looking at storing hydrogen as ammonia? DAVID PARK. That is possible.

That's possible. Right now people are talking about it. I don't see many commercial applications of hydrogen being used as a -- or ammonia being used as a hydrogen carrier. Where here, you know, the discussion of ammonia as a hydrogen carrier is a lot of times on the marine side when you have large tanker ships and you know, very, very large bulk vessels.

ANDREA: Thank you.

CHESTER BRITT: All right. Thank you. Yes, one more.

SPEAKER: In terms of storage, what does like the storage proximity of like communities look like?

DAVID PARK: Sure. Yes. That's a great question. There actually is a very -- and the partnership in large part, because this partnership exists, but we've worked with, for instance, CSA and other groups on the Codes and Standards side. Along with the NFPA, which is the National Fire Protection Organization that sets -- basically sets fire code.

And so there is a, in the Code of Regulations, a code called NFPA 2. And that sets -- establishes setback distances for hydrogen storage tanks from roadways and other, you know, potential people that would be exposed.

SPEAKER: So like does it have to -- say that, does that mean like, I guess, distance wise? So let's say here in here in the community lots. Would that mean they would have their own storage tank? Or would that storage tank be elsewhere in the mountains or so? Are we talking about that property? Or are we talking like --

DAVID PARK: I see. You're talking about like bulk storage, basically?

SPEAKER: Yes.

DAVID PARK: Bulk storage is a completely different beast. Actually, these gentlemen are probably more equipped to talk to about bulk storage. If you're talking about on the station side, there is a set regulation regarding setback distances of the fire -- you know when -- for instance, a fueling station has to go through the permitting process.

That's one of the actual major issues of finding an appropriate site to place a fueling station is having adequate space for the setback distances from the storage tanks. And then also having, for instance, adequate radius for trucks to turn and deliver hydrogen. But yes, those are all very mature and established. And in fact, the Governor's Office of Economic Development, which is also a member of the Hydrogen Fuel Cell Partnership, they have their Hydrogen Permitting Guidebook. And it has a list of all the codes and standards that people have to look at to permit these stations.

CHESTER BRITT: Great. Okay. We're going to -- thank you, David, for your presentation. I really appreciate you making time out of your valuable schedule to be here today.

We're going to now move on to Jill Tracy, the Angeles Link Senior Director of Regulatory and Policy. She is going to give us a rundown on the stakeholder comments and incorporated changes to our technical approach.

JILL TRACY: Thank you, Chester.

And before I begin, I'd like to give a big thank you to the Greater Zion Church for being such gracious hosts for this event. You know, being greeted in the parking lot and escorted in. And it's been very lovely.

I'd also like to thank everybody for taking the time out of your busy schedules to join us this afternoon. I know, you know, school is getting out. Getting ready for the Holidays. And so really, really appreciate it. I will try and be brief.

I want to give you an update on our stakeholder review and response process relating to our Phase I feasibility studies.

Like Maryam said, there is no elevator to the top in getting hydrogen infrastructure in the ground and used in our clean energy society. Well, there is also no express elevator to the top in finishing our feasibility studies in Phase I. There is a lot of stops along the way. Those stops, we call them milestones.

And I think your -- many of you are familiar with those milestones. We have our scopes of work for milestone one. We've got our technical approaches. And then we've got our preliminary findings. And then finally our Draft Report. And we have 16 feasibility studies.

We're all very, very busy.

And incorporating your comments has been very, very important to us. That's why we're here. We're here to share the information. But more importantly, we're here to listen to your concerns and your comments. And so we just wanted to take a brief moment to give you an update about where we are in that process.

And so thank you for everybody who has provided comments, not only in these meetings but also in writing. We really do appreciate it.

We do want to mention, though, that if you find that your comments might not be adequately addressed verbally in these meetings, to please reach out to us via E-mail to send your writings, your comments and followup if you feel like at any time we haven't adequately addressed them. Okay.

So I have gone through the milestones. And so we have a process in place. I think you know as -- for each milestone, we share that milestone. Either it's the scope of work -- we're now in the technical approach. The preliminary -- oh, could you go back for just a second? Sorry.

In the preliminary findings and then with respect to like the Demand Study, we're almost in the Draft Report phase. And once we issue that milestone, then that triggers a comment period. It's typically four to six weeks for each of those milestones. We also then have a stakeholder meeting. It's either a workshop or a quarterly meeting like one of these.

We then take back those comments that we receive either in these meetings or in writing. And we have our subject matter experts go through those comments and then assess potential changes to those milestone parts of our studies. And then we wound up incorporating some of the comments into those studies, those milestones.

Just so you know, we have received a significant amount of comments between our PAD group and this CBOSG group. Over 500. So just like we did with our study descriptions and when we redlined them and issued them in a meeting.

We're also doing the same thing with your comments to our technical approaches. And we expect to issue a redlined document to each of you and upload it into our living library -- I hope that's working out for all of you -- at the beginning of next year.

And so we'll go into the next slide.

And so this slide is a really good depiction of the four categories of the different types of comments that we have received from our CBO and PAD groups. One is we get the comment. It looks good. And we incorporate it into the applicable Phase I study. Either it can be a technical approach. It can be a work description. And in the future, it could be preliminary data and findings. And then it can also be a Draft Report.

Another category is that comment has already been addressed. Or it's part of that applicable study or another study. And that will be a category that we'll address it in. And then also there is a large number of studies. There are great, great comments on a lot of these studies. But they are just not appropriate at this very, very preliminary Phase I of the study.

And then some things are just beyond the scope or outside of that particular milestone.

You might be making a comment that really addresses a technical approach. And we're really in the scope of work phase. And so those are kind of like a really broad overview of the different categories.

And then we'll go onto the next slide. We wanted to give you some examples of some revisions. Oops.

CHESTER BRITT: It has a mind of its own today.

JILL TRACY: What are you doing, Chester?

CHESTER BRITT: It has a mind of its own today. I'm trying not to do that. But it's --

JILL TRACY: There we go. Okay. So we wanted to give you an example to make this more tangible for several revisions that we did make to the technical approaches. One example is we received several comments from the Environmental Defense Fund and Communities for a Better Environment relating to our GHG Emissions Study that Darrell has been gracious enough to present on today.

And one of those was to add the global warming potential of 100 and global warming potential of 200. As a reminder, the G -- or 20.

Excuse me. I don't think there is 200.

So GWP serves as a metric that is assigned to gases that illustrate their greenhouse gas potency. And so it's very, very critical to understanding and quantifying the environmental impact of certain gases and their contribution to global warming over time.

And so in short, GWP 100 is the number of years -- in this case 100 -- energy absorbed by a gas over time. And GWP 20 is based on the energy absorbed over 20 years. And so we received those comments and we have incorporated them into our technical approach.

And another category is -- and this might be very familiar to many of you -- this relates to our Environmental Justice Study. And we received comments from the Utility Consumers Action Network, or UCAN, and CBE and also Physicians for Social Responsibility relating to a recent Environmental Justice Study that related to the Environmental Principles For Hydrogen, Environmental Justice position on Green Hydrogen in California. It was issued in October 2023. It was issued after we started our Environmental Justice Study.

But we received it and we thought that it was a really good idea. And we're going to incorporate the principles of that study. This study was authored by several environmental justice organizations that are actually part of our CBOSG group, including CBE, Pacoima Beautiful, SEHA Environmental Health Coalition and others.

And some of the examples of these environmental justice principles applicable to hydrogen infrastructure include a commitment to green hydrogen produced via electrolysis and the use of surplus water and additional renewable energy.

Some of these relate to hydrogen production centers. Angeles Link does not propose hydrogen production centers. We are studying hydrogen production. But some of the principles involve tribal consultation and consent and community consent and engagement.

Another environmental or equity principle is safety and leak detection technology and regulation for the transport and storage of hydrogen. And as you know, we are studying emerging technologies for leak detection and safety as well as part of our Phase I studies.

And then also there is a focus on managing leaks throughout the lifecycle of the design, implementation and management and maintenance of hydrogen infrastructure. And that's another topic of our studies.

So another principle is the consideration of community impacts when citing hydrogen transportation and storage infrastructure as well as the cost of hydrogen infrastructures to be clear and transparent to ratepayers and consumers.

So we really appreciate the suggestion. And a lot of these principles are already being included in our Phase I studies.

And then this also allows us the opportunity to take that information that we are developing in our other studies and integrate it into our Environmental Justice Study. So thank you. We really appreciate that.

And then also, you know, we really want you to continue to engage. We really appreciate everyone's engagement. And so thank you. And I'll turn it back over to Chester.

CHESTER BRITT: All right. Thank you, Jill. We did have on our agenda the next item to be the CBOSG roundtable, where we were going to allow everyone to give us any community announcements.

We are really behind on our schedule. We're actually exceeding our closing time. And we want to hear from Maryam, who has been here today to hopefully be able to talk and give us a closing statement.

So if there is any -- I do want to be respectful, though. If there is anyone that has anything, a community announcement that is timing, you know, you need to say something before the end of the year or related to Christmas.

MARYAM BROWN: Chester, I would way rather yield my time to any priority that the community has.

CHESTER BRITT: So if anyone has anything. But we will bring this item back on the agenda in future meetings. Because --

MARYAM BROWN: I think this is a great idea.

CHESTER BRITT: Yes. It's a great idea.

MARYAM BROWN: And everybody is together. And it's an opportunity to provide announcements --

CHESTER BRITT: Absolutely.

MARYAM BROWN: -- and what's important in their community. So please, I don't want to skip this step.

CHESTER BRITT: I don't want to skip it either. But I also want to be respectful of people's time. I mean, the meeting was supposed to end at 4:00. I don't know if people have other things going on. So I do want to balance that.

Because we have, I think, about 20 people participating in this meeting. So if we were to hear from everyone, it would probably be at least a half an hour. And I don't think we really have that time. So we'll put it back in the agenda for future meetings.

Go ahead, Roy. Roy?

ROY VAN DE HOEK: Hi. Roy again.

Defend Ballona Wetlands. Robert van de Hoek. I would like to see the gas company in the Los Angeles area and Playa del Rey, where they have a collaborative agreement for access with the State of California's Ecological Reserve for Wildlife, to see a more compatible -- a more transparent intersection of the -- of more inner transparency between the State of California's wildlife officials and the gas company for the public to be in meetings when those wildlife State officials meet with the gas company, because they have access on the roads into the Reserve.

And they are also working as wildlife corridors for animal life that moves. So training and sensitivity of gas company employees for the nature that they are sharing with the State of California at the Reserve.

And I've had two times where I've interacted with a State of California employee from the Department of -- it used to be called the Division of Oil and Gas. What's the new name for them? But anyway, they have a monitor official that meets with the gas company employees. So and then the gas company opens up their well sites, the 17 wells at the Ballona Wetlands on the State Ecological Reserve and in Marina del Rey at -- by Fisherman's Village.

And I got to intersect with that and watch the interview and the dialogue between the State official and the gas company. And it was really interesting to see the State official be very open to me and said, yes, you're welcome to stand here and watch what's going on. But the two gas company employees, lower-level -- not lower-level, but ground, frontline staff. They were kind of -- they didn't like -- they were -- it's like they are not really

-- some of them are not very nice to the public. I'll put it that way. But I have experienced ones that are. So it's just a mix. This kind of a thing. Because the president of the gas company is here. I thought I'd share that, too. Thanks.

CHESTER BRITT: Thank you, Roy.

Jill Buck, I think you have your hand raised. Go ahead.

JILL BUCK: Yes, we're taking a note. I appreciate the feedback. We're taking a note. Thank you so much, Roy.

ROY VAN DE HOEK: Absolutely.

CHESTER BRITT: Jill?

JILL BUCK: Thank you so much. I'm sorry that I couldn't be there in person today. I mentioned to some staff that today's my son's birthday. And I'm throwing a party for him in just a couple of hours. But wanted to thank you, the gas company, for its ongoing support for the work that we're doing with the Compton Unified to reduce methane through their implementation of SB 1383.

The gas company has been very, very helpful in a multi-year way of helping the school district attack this large issue. It's a very difficult law, especially for school districts to comply with. But they are doing a phenomenal job.

And it really would not be possible without the sponsorship and without the partnership of SoCalGas.

So I just wanted to thank you so much and let you know that Compton unified is really becoming a leader within the State in terms of the school districts that are working very hard and very productively to adhere to and comply with SB 1383. So thank you so very much.

CHESTER BRITT: Thank you, Jill.

Does anyone else have anything they want to share before we move on?

ALMA MARQUEZ: We have someone.

Ricardo.

RICARDO MENDOZA: Hello?

CHESTER BRITT: All right.

RICARDO MENDOZA: Well, I first and foremost want to thank the church for hosting us and opening its doors. To make a very brief comment. We'll talk more about this in the future meetings. But we did develop a data index focused in large part in South LA that we would love to share with everyone just to take a look at some of the disparities focused on education, jobs, access to capital for small businesses and affordable housing.

And thank you, Maryam and to your team for just continuing this conversation and allowing the space for us to have this.

CHESTER BRITT: Thank you, Ricardo.

ALMA MARQUEZ: And I did get your link, Ricardo. And we're sharing it in the chat.

RASHAD RUCKER-TRAPP: And I echo your words of thank you to Maryam and your team for having this space and allowing this dialogue to take place and for being mobile. I think this was very important. I was excited to hear that -- I was excited that we were meeting here in Watts in Compton. And I look forward to the next spot even if it is in Downey. I like Downey, too. I think you've got a beautiful facility.

But no, I think that this is important. And like I just really want to echo the appreciation of this and allowing us to be a part of this conversation so that we can work with you in building that partnership with our respective communities. This is not something -- this is something we don't see happen in our communities. So I think that this is a great step going forward. And we are partners to you. And so I ask that you continue to lean on us for support and ways to better engage our community.

I did want to put out, too, that a community event on December 16th, this Saturday, from 9:00 a.m. to 1:00 p.m. We are having a community toy giveaway and community street fair.

We're blocking off the street Vermont between

Olympic and Pico. So it will be a fun celebration with, of course, the support of SoCalGas. And so we thank you for that. For your support and help in this, for making this event possible. I want to invite you all to come out and join the community, the El Salvadorian community in the El Salvador corridor for that event. Again, it will be from 9:00 a.m. to 1:00 p.m., off of Vermont between Olympic and Pico.

CHESTER BRITT: Thank you, Rashad.

All right. I don't see anyone else's hand online raised. So we're going to turn it over to you, Maryam, to give us closing remarks.

MARYAM BROWN: Very much -- thank you very much, Chester. I want to start by thanking all of the members of the CBO for their participation. But I especially want to thank the members of the CBO that are here in person. I think that this has been a really great dialogue.

And I also really appreciate our government stakeholders, Sasha and others that are participating in this CBO discussion.

I want to echo and give a full-throated appreciation to Pastor Fisher as well as Assistant Pastor Olunkwa. Did I get that right? Olunkwa for having us at their house.

While I do not attend this church, I'm definitely very much a person of faith. And I very much pray to the altar of thanking God for those tasks that require our best efforts. And I just really appreciate that we're holding this here.

This is a very important project.

It demands our best efforts. And I think that it has the potential, if we're successful, to make the single biggest change in our -- in the air that we breathe. And provide a lot of additional benefits that are also really important to the community, like jobs, Ricardo, as you have emphasized. It will not happen without your help and without your engagement.

To your point, Rashad, this is something that we have -- that has never been done in infrastructure development. The idea that we would have our community around us on the front end to get your perspective on the front end. And it is so important that we engage with all of the members of our community. But I've got to tell you, I don't think the word "engage" is good enough. Engage for me is a synonym for listen with the intent to collaborate. And that is why it is that we are here. And I hope that that is what your experience is.

But I also would ask for, in the spirit of it's the Holidays, grace. Because we are learning as we do this process of engaging in these different ways and looking to make this process better.

So in addition to giving us your perspective about how to make our thinking on this initiative better and stronger, I would ask for your help to make this type of engagement better and stronger. Because I think we're setting an example for infrastructure efforts, not just in this State but around the country if we can get this right. And that's a very sincere request for your help as we ourselves at SoCalGas learn.

You know, just a few final points to make is that we talk about wanting to engage and to hear from you. It's not that we want your help. We need your help. No one knows these communities better than you. They listen to you.

And we don't want to be in a position where we're guessing what it is that's on the minds of the community. We need your help to understand that.

We want to invest in you. We want to invest in this community. And I think that was very much the points, Enrique and Ricardo, that you were making earlier.

And you know, finally, I think we need your help to identify problems and develop solutions. And that's why Thelmi, I appreciate the focus that you brought on safety because I think putting more emphasis on that is something that we need to do.

I do hope that in-person participation picks up as we move forward. I think it allows for an even stronger dialogue and it gives us -- and give us guidance on how we can make that better. If it's that we need to have these closer in different locations that it makes it easier for in-person participation, please give us that guidance.

And I'll just close by wishing and hoping that everyone here and everyone online has a restful and joyous Holiday. And I look very much forward to seeing you in 2024. Thank you.

MARYAM BROWN: Thank you. And before I turn it over to Emily to talk about Next Steps, I would want to just echo what Maryam said.

You know, we've been doing this now since the beginning of the year. And it's not lost on me that I think initially we said we were going to be doing this quarterly, and then these turned out to be monthly meetings. And it's a big commitment on your part. I know it's a big commitment on our part. But it's a really big commitment on your part. And the fact that you come meeting after meeting, and even if you were participating online, which it would be better if you were here.

But nevertheless, we still have pretty consistent participation.

And you can feel the energy and the synergy of the information now starting to build on each other. And I really am impressed and I'm also encouraged by that going into 2024, because we have a lot of work in front of us still.

Right. As Maryam mentioned, like we are just getting started. We're in Phase I. And we're even really in the middle of Phase I.

So we're about to get to the 16 work studies, which we've all been, you know, waiting for eagerly. And that's going to be a lot of information.

So you know, please do get your rest over the Holidays because we are going to need to come back and, you know, be strong going into next year. Because there is a lot to still cover.

So with that, I'm going to turn it over to Emily.

EMILY GRANT: Thank you. Thank you, Chester. So first I want to apologize. We didn't get to the community roundtable. We were all really excited about this. We put it at the end of the agenda, thinking that it would be a great way to end the meeting and kind of kick off the Holiday spirit. But it turns out we had such a robust conversation that we didn't want to stop, that we ran out of time.

So I sincerely apologize for that.

We'll put it up at the front of the agenda next time around. So please do come with a couple updates to share. We'd love to hear them. So thank you for those of you who provided some info today. And I apologize for the time. We appreciate it.

Jill and Rashad, thank you also for your feedback on our system and our meetings and how everything is doing. And Jill, I'll be sure, too, to share your SB 1383 feedback with that team. That's really helpful. So we just appreciate that.

And for the rest of you, same process as usual. As you know, if you have any other feedback about meeting topics or other things that we could be doing to increase engagement and help facilitate your feedback, just shoot me an E-mail or give me a call. I would love to hear it.

As far as Next Step goes -- oh, also ideas for venues, I'm hearing you. So please let me know if you have other venue ideas. That is my department. You know, we're on the move, people.

So it's good.

Next Steps. Typically, as you know, you get a packet of information before the meeting. You have a couple weeks to review it.

Then we have a meeting about the meeting materials you received. And then you provide your feedback.

And that feedback window closes like Joel talked about.

We did it a little differently this time. We're having our meeting first with some preview materials and some overview. And then we're going to send you the full meeting materials and the full packet of information.

At that point, we'll open that feedback window for you, and we'll let you know what that date is when we send the materials.

Then you'll have probably about four to six weeks to provide feedback. We'll allot for a little more time for the Holidays. And then we'll close that feedback window. So that will be described for you in the note that we send out. And of course, also in the living library, we have that matrix that is consistently updated with the different feedback windows all listed out.

Because I know it gets a little confusing with the studies.

But again, I'm here to help. If you need anything, just shoot me an E-mail. But I think that's it. So we'll announce our next meeting dates once we have that ready and our Next Steps. So just be on the lookout for that with E-mail. And again, thanks for your extra time today and for the robust conversation. We appreciate it.

And we have extra food, so please feel free to take some. That's the other great part about coming in person. You get very well fed. And thanks again for hanging in there since we went a little bit over it.

Have a good happy Holiday.

(Meeting is concluded)

REPORTER'S CERTIFICATION

I, the undersigned, a Hearing Reporter for the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were duly sworn; that a record of the proceedings was made by me using machine shorthand, which was thereafter transcribed under my direction; that the foregoing transcript is a true record of the testimony given.

Further, that if the foregoing pertains to the original transcript of a deposition in a federal case, before completion of the proceedings, review of the transcript [] was [] was not requested.

I further certify I am neither financially interested in the action nor a relative or employee of any attorney or party to this action.

IN WITNESS WHEREOF, I have this date subscribed my name.

Dated: DECEMBER 13, 2023

Shelby Maaske,
Hearing Reporter

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M

R

REGAL COURT REPORTING

In the Matter Of:

So Cal Gas

DECEMBER QUARTERLY MEETING

December 15, 2023

Case No:

A N G E L E S L I N K

Planning Advisory Group (PAG)

December Q4 Quarterly Meeting

Transcript of Proceedings

Friday, December 15, 2023

10:00 a.m. - 2:00 p.m.

Reported by:
Miranda L. Perez, CSR No. 14352
Official Reporter Pro Tempore

A P P E A R A N C E S

Chester Britt - Arellano Associates
Alma Marquez - Lee Andrews Group
Emily Grant - SoCalGas
Jill Tracy - SoCalGas
Darrell Johnson - SoCalGas
Michael Colvin - Environmental Defense Fund
Ernie Shaw - UWUA Local 483
Norman Pedersen - Southern CA Generation Coalition
Charley Wilson - Southern CA Water Coalition
Arthur Fisher - California Public Utilities Commission
Matthew Taul - California Public Utilities Commission
Neil Navin - SoCalGas
Yuri Freedman - SoCalGas
Sal DiCostanzo - International Longshore and Warehouse
Aaron Guthrey - LADWP
Armen Keochekian - Insignia Environmental
Brian Goldstein - Energy Independence Now
Tyson Siegele - Utility Consumers' Action Network
Christopher Arroyo - CA Public Utilities Commission
Hector Carbajal - Local Union 250
Hope Fasching - Green Hydrogen Coalition
Julie Roshala - Insignia Environmental
Katrina Fritz - California Hydrogen Business Council
Lorraine Paskett - Air Products
Maribel Batcher - California Public Utilities Commission
Matt Schrap - Harbor Trucking Association
Pete Budden - Natural Resources Defense Council
Rizaldo Aldas - California Energy Commission
Sam Cao - South Coast Air Quality Management District
Sasha Cole - California Public Utilities Commission
Sara Gersen - Earth Justice
Nate Williams - Local Union 250

Angeles Link PAG Quarterly Meeting
Friday, December 15, 2023
10:00 a.m. - 2:00 p.m.

CHESTER BRITT: This is our quarterly -- fourth quarter meeting for the Planning Advisory Group. My name is Chester Britt. I'm the Executive Vice President with Arellano Associates. And most of you should know by now that I am the PAG lead facilitator.

I have with me Alma Marquez, who is the Vice President of Government Relations with Lee Andrews Group, and she supports the CBOSG with me and leads that effort, and she's here with us today as well.

A couple of quick housekeeping things. Again, you guys should be very familiar with this, but just in case there's anyone new, these meetings are being recorded, both video and audio, and a court reporter will be transcribing the meeting. We didn't do such a great job at our last meeting on Wednesday. We just had our CBOSG meeting on Wednesday, but we need to announce ourselves. If you could announce your name and your organization so the court reporter can record that when you're making a comment, that would be great.

The Zoom microphones are muted by the host, which is to eliminate background noise. You will need to unmute yourself when we call on you to speak, and we can mute and unmute you on our side as well, but you'll have to do it on your side. We encourage you to turn on your camera so we can better engage with you. It's always nice to see your faces. That's how I know what Arthur looks like, because he's good at always turning his camera on when he makes a comment, so when he came up to me today, I immediately knew who he was. And so that just helps, even for the people that are in the room, just to see who's speaking.

If you would like to speak, you will need to raise your hand, that feature at the bottom of the Zoom call, and that should allow you to be seen by us, and then we can call on your name when it's appropriate, and you can make your comment.

Quickly to go through the agenda, again, I mention we have a very full agenda today. We did have our CBOSG meeting on Wednesday, and we had trouble getting through the entire agenda, because there was a lot of information. So we really want to stay on point today. We have different topics to cover.

If you can make sure that your comments, when you're making them, are focused on the items that we're spending some time focusing on, and then we're going to move on and cover some additional items, so you'll get your opportunity to cover everything that you need to cover.

We are going to have a Land Acknowledgment, a safety message, and our normal roll call. We're going to have a welcome and ARCHES update by Neil. We'll also go through the Demand Study Recap Process, and then we'll do a preview of the Demand Study Draft Report. We'll have a member discussion. We'll get into the preliminary findings of greenhouse gas emissions, and then we'll also have another member discussion, then we are going to break.

Our meeting time today was a little later than normal, so we are going to have lunch in the middle. So if you are online, we will provide an opportunity for you to spend some time grabbing something to eat. I think we're going to spend 30 minutes doing that, and then we'll convene back.

We'll do a stakeholder comment update by Jill. We'll preview the preliminary findings for NOx. And then we'll have a final member discussion, and we'll go over some next steps, then we'll adjourn our meeting.

So with that, I'm going to turn it over to Alma, who is going to do the Land Acknowledgment.

ALMA MARQUEZ: Good morning, everyone, and welcome to today's meeting. And just some quick housekeeping rules for our new folks: The restrooms are over to your left outside of the doors. And feel free to serve some refreshments throughout this morning and afternoon. So with that, I'd like everyone to please acknowledge the Land Acknowledgment:

We respectfully acknowledge the indigenous peoples on whose ancestral land we gather of the diverse and vibrant communities of Tongba, Tataviam, Serrano, Kizh, and Chumash people, who, for generations, have cared for these lands and make their home here today.

We honor and pay our deepest respect to their elders and descendants, past, present, and emerging as they continue their enduring stewardship of these lands and waters for generations to come. We acknowledge our collective responsibility and commitment to elevating the stories, culture, and community of the original caretakers of this region and are grateful for the opportunity to live and work on these ancestral lands.

We celebrate the resilience, strength, and unwavering spirit of indigenous peoples and are dedicated to creating collaborative, accountable, and respectful relationships with indigenous nations and local tribal governments.

EMILY GRANT: Thank you, Alma. Yes. Thanks, Alma. So I'd love to offer everybody a brief safety moment (sic) for today. Obviously, it is clearly the holiday season, so we have a couple holiday safety tips for you.

First, if you're traveling, which apparently is more than 60 percent of us with over half of that travel being completed by car, a couple tips to keep in mind: Make sure your car has an emergency kit, especially if you're going through remote areas or to remote areas; get a good night's rest so you can avoid drowsy driving; and, of course, leave early and just plan ahead for heavy traffic. This is the L.A. area.

The next one made me laugh a little bit, but in all seriousness, decorating safety tips: Make sure you're using the proper lights, indoor versus outdoor; replace the light sets that are broken or cracked; and then, of course, when you're decorating, think about glass with pets or little ones who might be around.

And then the last one also made me laugh a little bit, but then I read the statistics and thought it was worth sharing. If you are preparing this turkey this Christmas, it might have missed some of you for Thanksgiving, but apparently frying a turkey is an increasingly popular way to prepare a turkey.

But the statistics: Frying a turkey causes an average of five deaths, 60 injuries, and the destruction of more than 900 homes and more than $15,000,000 in property damage every year.

So a couple of tips from State Farm for frying a turkey safely: Never leave the fryer unattended or use it inside a garage. Keep outdoor fryers a safe distance from structures, off wooden decks, and away from trees. And never attempt to fry a frozen turkey.

And with that, I'll give it back to Chester.

CHESTER BRITT: All right. Thank you. We're going to go ahead and do the roll call. And I've already introduced myself, and so has Emily, and so has Alma.

So we're going to start with Jill on the right, and then we'll go around the room and then go to people online.

JILL TRACY: Good morning, everyone.

Jill Tracy, Senior Director, Angeles Link Regulatory and Policy. Thank you all for joining us this morning.

DARRELL JOHNSON: Good morning.

Darrell Johnson, Manager, Environmental Services specializing in air and greenhouse gas.

MICHAEL COLVIN: Good morning, everyone. Michael Colvin with Environmental Defense Fund. And I can attest to the drowsy tip for driving. I got in about 1:00 in the morning to drive in from the Bay Area, but I'm glad to be here in person.

ERNIE SHAW: Good morning, everybody. Good to see everybody, new faces. Ernie Shaw, President of Local 483, transmission and storage.

And, man, I'm sorry to hear about that. That's a long drive.

NORMAN PEDERSEN: Norman Pedersen, Southern California Generation Coalition.

CHARLEY WILSON: Good morning, Charley Wilson, Southern California Water Coalition. This is the coalition table.

IAIN FISHER: Good morning. Iain Fisher, Public Advocates Office.

MATTHEW TAUL: Matthew Taul, Public Advocates Office.

NEIL NAVIN: Neil Navin, Southern California Gas Company.

YURI FREEDMAN: Good morning. Yuri Freedman, Southern California Gas Company.

CHESTER BRITT: All right. That takes care of people in the room, then we're going to switch over to the people online. I'm going to call your name. If you can unmute yourself and just introduce your name and your organization, that would be great. So the first person that I see is Sal.

Sal, if you can introduce yourself.

SAL DiCOSTANZO: Good morning. Excuse me.

Good morning, everyone. My name is Sal DiCostanzo. I'm a Port Liaison and LRC Representative with the International Longshore and Warehouse Union.

CHESTER BRITT: Good morning.

AARON GUTHREY: Good morning. Aaron Guthrey Los Angeles Department of Water and Power.

CHESTER BRITT: All right. Armen Keochekian?

ARMEN KEOCHEKIAN: Hi. Good morning. Armen Keochekian with Insignia Environmental, Director, supporting SoCalGas with the environmental assessment.

CHESTER BRITT: All right. Welcome.

Brian Goldstein?

BRIAN GOLDSTEIN: Good morning, everyone. It's Brian Goldstein, Executive Director of Energy Independence Now.

CHESTER BRITT: Welcome. Tyson Siegele?

TYSON SIEGELE: Good morning. My name is Tyson Siegele. I'm representing the Utility Action Network.

CHESTER BRITT: Good to hear you, Tyson. I also see Christopher Arroyo.

CHRISTOPHER ARROYO: Good morning. Christopher Arroyo, Hydrogen Analyst at the CPUC.

CHESTER BRITT: Welcome. All right. I see Hector Carbajal.

HECTOR CARBAJAL: Good morning. Hector Carbajal, Local Union 250.

CHESTER BRITT: Welcome. Hope Fasching?

HOPE FASCHING: Hi, everyone. Hope Fasching, Senior Policy Analyst at the Green Hydrogen Coalition. I'm here in place of Nick Connell. Thank you.

CHESTER BRITT: Thank you.

Can I ask whoever is controlling the sound in the room to bump it up a little bit? We're having a little trouble hearing the people online.

Okay. The next person I see is Julie Roshala.

JULIE ROSHALA: Good morning. Julie Roshala with Insignia Environmental.

CHESTER BRITT: Welcome. Katrina Fritz?

KATRINA FRITZ: Good morning. Katrina Fritz, California Hydrogen Business Council.

CHESTER BRITT: Good to hear from you. Lorraine Paskett?

LORRAINE PASKETT: Good morning. Happy Holidays. Sorry to not be there in person. Lorraine Paskett with Air Products

CHESTER BRITT: Good to hear your voice. Maribel Batcher?

MARIBEL BATCHER: Good morning. Good to see you all. And, again, Happy Holidays. Maribel Batcher. I'm with California Strategies and Former President of the California Public Utilities Commission.

CHESTER BRITT: Welcome. I see Miranda Perez. Oh, you're the Court Reporter. I'm sorry.

THE COURT REPORTER: Good morning.

CHESTER BRITT: So many names on my list. Let me see. It looks like Matt Schrap?

MATT SCHRAP: Good afternoon. Matt Schrap, Chief Executive Office of the Harbor Trucking Association.

CHESTER BRITT: Welcome. Pete Budden?

PETE BUDDEN: Good morning. Pete Budden here with the Natural Resources Defense Council.

CHESTER BRITT: Welcome. Rizaldo Aldas?

RIZALDO ALDAS: Yeah. Good morning, everyone. Rizaldo Aldas with the Energy Research and Development Division of California Energy Commission. Glad to be here. Thank you.

CHESTER BRITT: Good morning. Thank you. Sam Cao?

SAM CAO: Hi. Sam Cao, South Coast Air

Quality Management District.

CHESTER BRITT: Sasha Cole?

SASHA COLE: Hi. Good morning. Sasha Cole. I'm the Senior Hydrogen Analyst with the CPUC Energy Deficient.

CHESTER BRITT: Welcome. Sara Gersen?

SARA GERSEN: Good morning. My name is Sara Gersen, attorney with Earth Justice, representing Sierra Club in this process.

CHESTER BRITT: Welcome. I believe that was everyone on my list that I could see, or let me see. Nathan Williams. Nathaniel Williams, actually.

NATE WILLIAMS: Yeah. This is Nate Williams in Union Local 250, welders and steam fitters.

CHESTER BRITT: Welcome.

So if I did not call your name, please raise your hand, and you can introduce yourself. Otherwise, I think I've covered everyone. There's a lot of folks online today, so that's great. I don't see anyone raising their hand, so we're going to go ahead and get started. We can go back to the presentation, Stevie.

What's that? She's getting it. Okay. Just waiting for the presentation to come up, but I can just use your screen, Yuri.

So I'm going to introduce Neil Navin. Neil is the Chief Clean Fuels Officer for SoCalGas. He's going to do our SoCalGas welcome, and also provide an ARCHES update for us this morning.

So go ahead, Neil.

NEIL NAVIN: All right. Thank you. And thank you all for coming, virtually and here in person.

Again, I want to thank you for your participation in this process, and welcome to the quarterly meeting. Your input is really essential to our work, and we value it, and we would like to keep you coming.

I wanted to briefly talk about two things. One is our community-based organizations meeting that just took place, and then a very brief update on ARCHES as well.

So I think, as was mentioned, we had our last community-based organization meeting on Wednesday. The CBO meeting, as many of you know, is focused in on community-based organizations, those that have a specific focus on a specific interest or community they represent.

The meeting focused in on feedback on many of the Phase One deliverables. Some of them you'll see here today. But it also was very specifically focusing in on those areas and those community impacts that the

CBO's are particularly interested in.

So those included affordability workforce development, safety, and health environment impacts. And also looking at the idea of those in the context of individual communities.

I also wanted to mention that in working with our CBO's, they made it clear that they would like to prioritize some very specific areas of the project and interests.

However, they would like a little fewer meetings, candidly, and are reacting to some of the volume of materials they are receiving. So they may get it, may have fewer meetings, access to all materials, but will likely be focusing in on those areas of the project that they take great interest in.

We also, as I mentioned, have a number of things that have taken place, I think, since our last meeting. Certainly, one of those is the ARCHES announcement. A major step forward for the state of California.

Again, just to reiterate one of only seven hubs to receive funding in the nation out of, I believe, 30-plus that were on the short list so that it was $1.2 billion out of the arguably $7 to $8 billion awarded.

ARCHES also has recently announced that they will be headquartered out of Irvine, California. I think that is known by some, but is emerging. So they are formed now, and they are going to base their operations, I'm sure, throughout the state, but also specifically focusing in around Irvine headquarters.

The ARCHES folks are in the midst of their negotiations with DOE. They have publicly stated that they are going to continue those with an expectation and hope that in the first quarter of next year they will finalize those negotiations, but they are candid that that is a sometimes challenging and difficult process to finalize.

And then the other thing I wanted to acknowledge is that the U.S. hydrogen roadmap was also issued, I believe, after our last meeting. A very significant document that starts to frame the federal perspective on hydrogen, along with the governor's office directive supporting the development of hydrogen, and a very recent study, I think, that was just being issued around the last time of our meeting, actually, which was the EDF Stanford study on dispatchable electric generation, which I think is key to a lot of the conversations we're having here today.

So we've mentioned -- we, SoCalGas -- we are part of the ARCHES process. We are bound, as all other partners are, by the NDA, so I'll just be candid: I won't be able to share too many specifics. But as soon as we can share specifics, we will be sharing specifics with this group.

So, again, I want to thank all of you for being here today. We look forward to the conversation. And, as I said, we really appreciate your support, your input, and the feedback that we're getting in the effort. It is making our work product better. So thank you very much.

CHESTER BRITT: Thank you, Neil.

We are now going to go into the Demand Study Recap Process Review. We've come to you a couple times now regarding the Demand Study talking about scoping, the technical approach, as well as some draft preliminary data findings.

And today, we want to just begin the meeting by restating the process and recapping what we're doing with the demand studies so you know where we are. And I'm going to turn it over to Yuri, who is the senior director of business development, and then he will be followed by Jill Tracy, the senior director of regulatory and policy.

YURI FREEDMAN: Thank you, Chester.

As Chester mentions, this is a slide to make sure we all are aware of where we are in the process. And in our previous meetings, as you, of course, recall, we went through study descriptions. Reviewed admittedly in fair amount of technical detail, which may have overloaded some of us with technical approach. And then in the last conversation of the subject, we reviewed our preliminary findings.

The intent of today's conversation, as it relates to demand analysis, is to provide for us an overview of the draft demand analysis results. We are not going to go through the report.

What we are going to do today is to take a look at several key slides, which are going to capture key numbers that are coming out of this analysis. So that is the scope of today's conversation. Let me turn it over to Jill.

JILL TRACY: Thank you, Yuri, for that update. I think we can go to the next slide, please. Okay. So many of you should be familiar with this slide. It is the overarching schedule for all of our Phase One studies and key milestones.

And you will see highlighted language right in the middle of the bar under December and January. And there you will see that we're having our meetings this month to go over some of our Phase One studies, our air and demand studies.

And as Yuri noted, today's session will focus primarily with respect to the demand report's preview of the draft study. And then we will be distributing the Phase One Demand Study in the next couple of weeks, and then you will have a comment period associated with that draft report. That is a big milestone for everybody.

And then we will also be distributing our preliminary findings and data with respect to our air mission studies with respect to GHG and NOx. So I just wanted to give you a heads up. I know everybody is super busy for the holidays. We will be taking some vacation time.

We are also providing some additional time for everybody to provide your feedback over the holidays, because we understand that people will be out and not available. So we want to give everybody extra time. So if anybody has any questions, please feel free to reach out to me directly. Thank you.

CHESTER BRITT: Thank you, Jill.

All right. We're going back to Yuri now to do the overview of the Demand Study Draft Report. Just to reiterate or kind of build on what Jill just mentioned, we are going to be sending the actual report out very soon.

Internally, it's being finalized, embedded before we actually send it out officially. And then there will be an official review period, so you'll have adequate amount of time to actually look at the reporter in detail, and then provide your detailed comments.

Yuri's presentation today is really, I think, going to help you orient yourself to what you're going to see when you get it, right? So this is kind of like a preview of that Draft Report findings so that we can all be on the same page once you get the actual document, and then you'll have your ability to go through it in detail and provide your comments.

So I'm going to turn it over to Yuri, and he's going to provide the overview.

YURI FREEDMAN: Thank you, again, Chester.

The first slide provides you a recap of the main parameters of the study. What we aim to do is to review the potential hydrogen demand for three key sectors.

The sectors are mobility with an emphasis on heavy duty, long-haul transportation, its power generation, and industrial sectors. We analyzed the potential demand for hydrogen these three key sectors over the period of 20 years from 2021 -- excuse me.

2025 to 2045.

And the factors we use to inform our analysis are policy and legislation, technology feasibility, commercial availability, and also business readiness. I know we touched upon these aspects in our previous conversation, so my intent would be to move on to the results unless there are questions or comments.

Hearing none, again, another slide to quickly give us a reminder of the work of the scope of work which we conducted. We started like any modeling exercise by effectively defining the model, by making sure we have a clear set of parameters, objective scope and approach, methodological. How am I going to do that?

We also, importantly, conducted the assessment of existing information. Like any other research, it's not being done in a vacuum, and we made sure that we are fully tapped in to the previous work by academic institutions, by the industry participants. so we have done that the first stage, then I proceed to actually build the model to establish a mathematical relationship between the inputs and outputs, to tabulate those outputs, to develop scenarios. All that work is what is captured here, the model buildout.

Like any other model, it is not perfect being built for the first time. So model refinement, again, as those of you who have been involved in modeling know very well, it is a necessary and important process, which is to say go to the outputs, you see what makes sense, what doesn't. You go back, and you basically do what make the model work. that's what we have conducted as well.

And that, of course, was done in parallel with sharing some of the results with you and getting your input as well. And the box at the bottom is really important because we wanted to be sure that what we are doing makes sense, again, to people who are looking at this market from an academic standpoint, but also from an industry standpoint.

So our interviews with subject matter experts across a broad range of institutions were very important to us in forming where we are coming out with our inputs, assumptions, logic of the model.

That's, again -- I think you've seen all of this before, but the intent is to quickly give you a recap of how we went about this work.

CHESTER BRITT: Michael?

MICHAEL COLVIN: Sorry, Yuri, about the interruption. If you could go back two slides, just remind me. My brain is the memory of a goldfish today.

You had the three sections, industrial power, generation, and mobility. Can you remind us all, for the mobility is it a specific -- what part of mobility are you looking at?

Is it heavy duty? Is it all transportation? Is it aviation? Like, what are you -- just unpack that for me again.

YURI FREEDMAN: Great question. It's on-road heavy duty. Thank you for the question.

CHESTER BRITT: Yeah, thank you. And could you just -- not you in particular, but just make sure you speak directly into the mic so people online can hear us.

MICHAEL COLVIN: And apologies for the court reporter. That was Michael Colvin with Environmental Defense Fund.

CHESTER BRITT: All right.

YURI FREEDMAN: Thank you for the question. Unless there are any other questions or comments, let's go to the next slide, which is the mobility slide.

Mobility, needless to say, is an extremely important element of hydrogen demand because of large amount of mobility in California, including the mobility associated with the ports, large amount of heavy-duty transportation out to the ports.

Also very importantly, as indicated here in the second bullet point, is the policy and regulatory environment for that. The regulatory is the key driver of the entire organization. Advanced Clean Fleets that many of you are familiar with mandates the zero emissions vehicles, and at that point, the choice becomes not between what is on the road today, and the low carbon, zero carbon options, but between various zero carbon options. And then that is where the long-haul heavy-duty transportation really takes a very large role informing the demand for transportation.

And as you can see here that the numbers are between the range of a million, 1.7 million tons per year by 2045. That demand, as you will see on one of the following slides, is going to ramp up over time. We understand that development of that base of fuel cell electric vehicles is going to take time, as will development of the hydrogen infrastructure, but by mid-century we expect this level of numbers.

And the analysis -- again, going back to what we talked about in the previous conversations, but just to recap -- the key parameters that point to fuel cell electric vehicles as the solution of choice for decarbonization of long-haul heavy-duty transport are range requirements, it's the duty cycle, and the heavy load requirements.

And but not the least, it's refueling slash charging time. The combination of those really suggests and this seems to be, I would say to a fair degree of consensus, that heavy duty is the really good sector for applying fuel cell electric vehicles as a solution to the decarbonization sector.

of course, the Air Resources Board, LCFS framework is the major driver of decarbonization transport and accomplished significant success already. The amendments to the LCFS standard, are also going to create incentives not just for production, but also importantly for a fuel infrastructure, which is going to be key.

Like for any other mobility, infrastructure is going to be important, because it's going to provide reliability and certainty of fuel, which is going to turn to drive adoption, and drive demand.

Let's pause here for a second and give an opportunity for questions or comments before I move to the next slide.

CHESTER BRITT: This is a quiet bunch today. All right. Let's keep going.

YURI FREEDMAN: Next slide provides an overview of results of our power generation sector. As

Neil mentioned, we relied very heavily on the work done by external parties beginning from the State's own Air Resources Board, which suggests that there will be a need for up to 9 gigawatts. In fact, a little bit more than nine gigawatts of hydrogen capacity in this state.

In addition to existing thermal capacity and the Environmental Defense Fund and the collaborator's paper, which they established the need for between 25 and 40 gigawatts of clean, firm power.

So putting all of this together and making preliminary assumptions about the capacity factor of this generation, which, as you may recall, range from 10 percent in the conservative case to 30 percent in the ambitious case, which is more or less what the gas power plants are today. That results accordingly in the range between 0.7 and 2.7 million tons per year of hydrogen by 2045.

Again, we believe it aligns quite well with the many documents that we see coming out with the need for reliability and resiliency which is, with thermal generation, is going to be critical as the share of intermittent renewables and the power mix of the state is going to grow.

And I apologize for the word "mobility" at the bottom. It's a typo. It really is meant to indicate this slide is about to be clear. Power generation demand and these numbers, 0.7 to 2.7 are relating to the power generation sector.

Again, let me pause here for questions and comments.

CHESTER BRITT: Yes, Michael?

MICHAEL COLVIN: It's michael Colvin again with Environmental Defense Fund.

So on the power generation side, and as you alluded to, EDF has done a lot of work on integrating clean firm power resources, I'm curious what your modeling is using for -- what power generation technologies are you using, or are you just sort of saying "generic power"? Are you talking about adapting existing turbines? Are you talking about combustion in fuel cells?

The reason why I asked was that the power density is really different depending on the power generation topic, and we wrestled with it in our modeling work, and I'm curious to see if you all came up with a more elegant solution.

YURI FREEDMAN: Absolutely great question, Michael. So I'll preface my answer by saying that as I think you all remember, but I'll remind once again, the scope of Phase One work did not include detailed power market analysis or for that matter, detailed technology analysis. That's what we are going to dig into significantly deeper in the second phase.

In this instance, the assumptions was about conversion of existing thermal plants of hydrogen. That's the broad-based answer. It obviously becomes very specific asset by asset, and we've done some of this analysis, but ultimately, that was the scope that we have limited ourselves to.

MICHAEL COLVIN: Okay. That makes sense.

The next question that I think we are all going to have to wrestle with, and I don't know if it's in the scope of the Phase One study or not, my guess is not, but I'm just sort of putting it on our virtual to-do list.

I think there's a question of the clean firm power resources, by definition power resources, they'll need to be available however long you need it, whenever you need it, but they are not going to be a 24/7 production process.

And so how and when they get the hydrogen to as the fuel input to the generation facility, I think is really an open question? Do we want it to be a certain amount of hydrogen always on site and on standby just to take care of parasitic load? Do we need lots of big spikiness and the ability to move hydrogen around really quickly? Do we want on-site production? Do we want it being more centrally produced and distributed?

I think we need to understand that, because, frankly, when we look at Southern California's power generation right now, we can't move gas around fast enough to the power generators. And I don't want to replicate that problem with a new fuel source, and so thinking through what the role of Angeles Link is to getting the fuel to the power generators, I think is really important for us, because it may determine more pipe, less pipe, more electrolyzers, less electrolyzers. Like, we just need to think that through.

And so that range that you have there, the 0.7 to the 2.7, I think, is maybe just focusing on getting the number of megawatts that you need, but it's not actually accounting for the actual production process and distribution to get the production process to work.

YURI FREEDMAN: Excellent comments, Michael, and I really appreciate you zeroing in on aspects of the analysis, which are going to be critical to us designing the project down the line, because ultimately, deliverability is what is going to matter.

And we know today on the gas side it was going to be equally, if not, more important on the hydrogen side, so the intent in the first phase was to access the total, if you will, market size. How much hydrogen does California need? Does our service territory need? And numbers, suggestive numbers is quite substantial -- that the total is quite substantial.

Without a doubt, we need to analyze the configuration of the asset and the needs for storage and the location of the storage, because it's going to provide our customers the service that they need.

Now it gets complex because we're talking about our customers using this fuel in the future, like any other forecast, going to be forward-looking under conditions of intermittency, which are not yet in place today, so we'll have to extrapolate.

But that is going to be the nature of the analysis, and we are definitely looking forward to doing this and also working very close with our customers, because ultimately, the system has to work for its users.

It is the unique nature of this system is going to be is going to need to work with categories of users which are quite different, because it's reasonable to expect that nature and structure of demand in transportation will be quite different from nature in structural demand power generation. That may offer challenges, that also may offer us some opportunity.

But that is what we're going to dig into absolutely in Phase Two. A great point. Thank you.

CHESTER BRITT: So, Yuri, is it safe to say or fair to say that the demand study was done without really even consideration for how the supply would be generated? It's just looking at what is the demand, right?

The challenges associated with what Michael is raising are still real, and they need to be dealt with. But the demands that he doesn't really consider those things in figuring out what the ultimate demand is, right?

YURI FREEDMAN: I think this is correct because the scope of demand is by nature, by the name --

CHESTER BRITT: Right.

YURI FREEDMAN: -- is to assess how much of hydrogen we need. It starts with what we talked about earlier. As we are going to move into zero-carbon world, we are going to need electrons and molecules. Among those molecules, one choice. Many options is the better choice, but not the only choice hydrogen.

The intent is to quantify that statement and to put numbers on how much hydrogen we need. Productions is a separate study.

CHESTER BRITT: A separate issue, yeah.

MICHAEL COLVIN: Chester, I think that's -- thanks for clarifying that. But just to be really clear on the point I'm trying to make: It's not about the production of the hydrogen. What I'm curious about is, from a demand perspective, how and where are we going to be using it, because if we're going to have to be -- what those end-sources are is going to dictate, I think, a lot more hydrogen demand depending on how we design the actual Angeles Link project.

So it's not about the production of the hydrogen, but it's about the distribution of it and sort of what their needs are actually going to be. If you're doing stuff in fuel cells, they kind of always have to be kind of constantly running.

But, you know, if you're doing stuff to the essential turbines, they might have bigger ramps, but they might have a little bit of parasitic load. Like, there's just questions of what those things are.

I think the -- maybe let me put this another way, and then I'll stop hogging the mic. The range that is provided here, I think, is for a total megawatt use, but I don't think is actually accounting for sort of the big changes that are going to happen on an intraday basis, and therefore, it's not going to account for, well, wait a second, what is the design of Angeles Link going to need to be to accommodate all of that? And we have to kind of think that through.

So I think this is giving us a number, but it's not giving us, you know, enough to be able to, like, really hook on to it. I'm not trying to be critical, Yuri.

CHESTER BRITT: Yeah, yeah.

MICHAEL COLVIN: I'm just trying to think of it.

CHESTER BRITT: Well, I want to clarify what you're saying just to make sure I'm understanding too from Yuri.

Like, what is he saying covered in other studies, because we have 16 different work studies?

YURI FREEDMAN: Let me first say, Michael, I register your point 100 percent. I think we're in violent agreement that that is critical.

MICHAEL COLVIN: Great.

YURI FREEDMAN: We will not be able to design our system without answering the questions that you just raised. Let's just say that. We will not know our needs for compression. We also will not know our storage needs and type of storage without that.

So 100 percent, I think that, again, it's definitely, as you can see, not in scope of the initial demand of for that matter, production analysis, but these questions are going to be critical for us, so thank you for raising them.

And I know that Ernie -- and I apologize. I know that Ernie has been very patiently waiting, and I want --

MICHAEL COLVIN: Here you go, Ernie. Earn yes. You got your own.

YURI FREEDMAN: -- to be respectful of that.

MICHAEL COLVIN: Oh. You got your own.

ERNIE SHAW: No, no. It's just a quick point of clarification, because the other point that Michael raised is associated with whether you make it locally or make it at a distance. And that, of course, has a very big impact on how big the pipe is.

YURI FREEDMAN: Absolutely, yeah.

NEIL NAVIN: If I may? This is Neil. I just wanted to jump in as well.

So it's certainly on the gas system we do not design the system for the average day. The average day is not what we solve for. We solve for -- we solve for those days where the demand is highest.

And so clearly, if you're looking at 0.7 to 2.7 million metric tons and a capacity factor of, you know, 0.1 to 0.3, you've got to reflect that in those instantaneous demands. So we know that, we understand that.

To the extent that we can understand some of that and reflect that in the work that we do to design the system or scope of the system now, we will. But we also recognize that detailed demand and curves, you know, intraday are not part of our work. But they need to be, ultimately, in the end.

CHESTER BRITT: Thank you, Neil.

ERNIE SHAW: Excellent. Cool. I had a couple questions. One of them is kind of easy, so I'll fire it off.

CHESTER BRITT: Sorry, Ernie. Name and organization.

ERNIE SHAW: Oh, sorry about that. Ernie Shaw, President of 483, transmission to storage.

You know, I'm kind of just following along here. What is that TPY?

YURI FREEDMAN: Great question. It's tons per year. And I will go beyond to say that "M" stands for million. So the volume of hydrogen in that first bullet and also at the bottom of the slide is between 0.7 and 2.7 million tons per year.

ERNIE SHAW: That's a lot. That's a lot.

Okay. Easy one, right, like I said.

Also, is there a federal standard for clean energy or hydrogen demand, I guess, that would supersede kind of what's here, like SB 100 and SB 1020?

YURI FREEDMAN: There are goals of federal government. I don't know that there is a legislative document that mandates the Unites States to go to zero emissions. These documents exist at the State level. I will say that there's a very strong alignment between what the Department of Energy is doing at the federal level and what Neil mentioned in his update on ARCHES.

Those billions of dollars, which are going to be put to work with more than a billion dollar targeted for California, are going to be a catalyst of development of hydrogen in the states.

So the federal government is accomplishing its goals through the variety of levels, if you will, but the key State level, California level, legislative documents. And they are captured here in the second bullet.

What's really important is not only that we have the State bill 100, which mandates emissions-free generation by 2045, but what is perhaps less covered -- but I think may be more important -- is that SB 1020, State bill 1020, actually mandates that generation should be 90 percent emissions-free by 2035, which is really, really close, infrastructure terms. And 95 percent by 2040.

So the path to carbon neutrality is by now, I would say, laid out in a very clear fashion with fairly aggressive timelines if you think about how long it takes to develop these assets, which is why we are working on a projet that is going to allow that.

ERNIE SHAW: That was a mouthful, Yuri. Thank you. And then one last thing that kind of caught my attention. So will LADWP supply 100 percent renewable energy, meaning the hydrogen or electricity per SB 100 electrification?

YURI FREEDMAN: Yeah. Their mandate is to provide 100 percent renewable power. They clearly look at hydrogen as the major part of solution for that, which was evidenced by their decision to proceed with Scattergood.

But ultimately, their mandate is to provide power with zero emissions.

YURI FREEDMAN: Thank you for the questions. Thank you again.

CHESTER BRITT: Yeah. Thank you, Ernie.

Jack?

JACK BROUWER: Yeah. This is Jack Brouwer again from UC Irvine.

The numbers you're presenting seem very reasonable compared to the other studies that I've seen, U.S. Hydrogen Roadmap, the recent report from DOE, and other agencies and such. I'm just curious what these all add up to in comparison to the amount of gas that you're delivering today on an energy basis.

I'm wondering how many pipes we're going to need in the end for this?

YURI FREEDMAN: Great question. Thank you, Professor. And on an energy basis, when we add up the total amount the project can deliver, it can reach up to 25 percent energy wise of the energy that SoCalGas supplies today.

So it's always a very large energy volume is going to be distributed in sectors such as transportation, which obviously, today runs by and large on petroleum fuels.

But energy equivalency is the important parameter to assess the scale of the project. So that's their office assessment.

JACK BROUWER: Thank you very much. That's very helpful for the overall perspective of what we are considering here, because, you know, most of the studies done around the world say it's going to be between 15 and 25 percent, and it seems like this study is also consistent with that.

YURI FREEDMAN: Correct. And thank you.

CHESTER BRITT: Thank you, Jack.

Anyone? Yes, Neil.

NEIL NAVIN: May I just clarify?

CHESTER BRITT: Sure.

NEIL NAVIN: Because I think Yuri got it almost 100 percent correct.

But what I would say is the study numbers that we are presenting here is the hydrogen for the Southern California, SoCalGas service territory region.

Now, our original vision for Angeles Link as a project, would actually only fulfill a portion of the numbers that have been identified for the hydrogen.

So if you could imagine that these numbers represent maybe slightly more than 25 percent of the total addressable market, hydrogen market that may be there, Angeles Link would only seek to support a portion thereof.

Does that make sense?

JACK BROUWER: Because the other demand would be met by private pipelines, or --

NEIL NAVIN: Well, I think at the moment we don't know how it will be met.

JACK BROUWER: Okay.

NEIL NAVIN: But at the moment, again, at least in part, you know, we've viewed a portion of the addressable market as something that Angeles Link could provide service for or to. But the total addressable market in the highest cases is above the 1 to 1.5 million metric tons I think we originally envisioned when we laid out Angeles Link.

Again, ultimately, the project will be what the project will be, maybe smaller or larger.

YURI FREEDMAN: Thank you, Neil.2.

CHESTER BRITT: Norm.

NORMAN PEDERSEN: Norm from SCGC.

Neil, are you talking about the total market in Southern California, or are you talking about the power sector?

NEIL NAVIN: Yeah, maybe we'll skip to -- no, maybe we won't skip. There are slides, Norm, that'll help with this, but if we look at the three cases that we've laid out, the most ambitious case where we have a much higher adoption of hydrogen in the market would suggest that there's upwards of 6 million metric tons of hydrogen that could fulfill some transportation manufacturer, high heat manufacturing, or power sectoring heat, again, 6 million metric tons per annum by that 2045 date.

Again, the original design, original sort of thesis around Angeles Link was not to necessarily build a pipeline that serviced 6 million metric tons of hydrogen. It was something less than that.

So I wanted to make sure as we're answering that question about the total amount of natural gas that is delivered today and energy equivalency, Angeles Link would seek to displace about 25 percent as it was originally envisioned.

If you look at the total numbers, 6 million metric tons of hydrogen per year is more than 25 percent of the total energy.

NORMAN PEDERSEN: I'm getting confused here, and I see that Jack just left. But I thought Jack was talking about the --

CHESTER BRITT: He's getting food. He didn't leave.

NEIL NAVIN: No. Well --

NORMAN PEDERSEN: Jack is back.

So what are you talking about, Jack?

NEIL NAVIN: I think Jack's original question is: Is this, the hydrogen that we're speaking of, what percentage in energy equivalence of the total natural gas that SoCalGas delivers today, what percentage would this hydrogen represent?

My clarity is that these numbers -- well, we'll show you all the numbers -- a portion thereof is what Angeles Link would seek to address, and that, in fact, is about 25 percent of the energy.

NORMAN PEDERSEN: So when you talk about the 0.7 million to 2.7 million that you have on the slide, what percentage of current gas deliverability to power plants in Southern California are we talking about?

NEIL NAVIN: Yeah. Respectfully, can we get through all the rest of the slides, and I'll answer the question right at the end? Is that okay?

NORMAN PEDERSEN: You want to leave the power sector, then?

NEIL NAVIN: No. We'll come back to it in a minute, because we have a summation of that at the end.

CHESTER BRITT: All right. Before we keep going, we did have -- Lorraine had your hand raised. I think you might have put your hand down, but if you still would like to make a comment, we want to give you an opportunity.

LORRAINE PASKETT: Oh, thank you. You know, I think I will just wait until the end.

CHESTER BRITT: Okay.

LORRAINE PASKETT: But thanks for asking.

CHESTER BRITT: Yeah, no worries. All right.

So, Yuri. go ahead and keep -- let's keep going.

YURI FREEDMAN: Thank you, Chester.

The next slide, it's the last of the three slides which are the sector-specific. And this is, as you recall, this third segment for market demand for hydrogen industrial.

Industrial, obviously, is a very broad characterization, and the second bullet point gives you the least of selective sectors, which are, again, as diverse as metals, food and beverages, stone, glass, and cement, aerospace and so on and so forth.

Importantly, it includes cogeneration, which are the industrial, the power generation facilities inside industrial plants. It mentions refineries here.

As you will see on the next slide, we only include demand for hydrogen from refineries in our ambitious case. The moderate and conservative cases do not include any assumption for demand for green hydrogen coming from refineries.

And what's important, of course, is the production capabilities inside California to the extent that will be growth in these sectors of the industry that could drive the demand further. We did not make those assumptions. That's a level of conservatism here.

With that, we are going to the slide that Neil referred. I know that Professor Brouwer has a question, please.

JACK BROUWER: Yeah. Just one quick thing. Do we make aviation fuels here in Southern California? We, I think we do, right?

YURI FREEDMAN: We are making aviation fuels here in refineries?

JACK BROUWER: Yeah.

YURI FREEDMAN: When I say "we," I mean the refineries --

JACK BROUWER: Yes.

YURI FREEDMAN: -- are the producers of fuel increasingly looking to switch to sustainable aviation fuel.

JACK BROUWER: And you only consider that in your ambitious case?

YURI FREEDMAN: We -- our case, overall, is focusing very heavily -- no pun intended -- on heavy-duty on-road long-haul transportation. That's where the vast majority of the volumetric demand is going to come from.

But there's no question that demand for hydrogen will come from sustainable aviation fuels as the sector is going to get scaled over time because that pathway seems to be quite promising.

Let me go to the slide, unless there are questions and comments, Chester. We can go over -- yeah, there. Yeah, the summary slide that Neil mentioned is bringing this altogether. And that range, when you add all the three sets of numbers we reviewed with you before, the mobility, the power generation, industrial, that adds up to 1.9 million tons per year in the conservative case, going up to 3.2 in the moderate case, and almost reaching 6 million tons per year by 2045 in the ambitious case.

And you can see that those series, overlaying each other, you can appreciate visually that the majority of demand comes from mobility and power generation.

You can also see that that light blue segment, the power generation -- maybe, Norm, this partial answers your question -- you can see that middle section, light blue of the hydrogen demand, the reason it change so much, this is where the range from 0.7 to 2.7 comes in. So if you look at this chart, that's basically what those numbers are, but it's only an element of total demand.

The rest is coming from transportation, which is the lower -- the dark blue section at the bottom.

And then the industrial, which is darker blue section at the top of those columns. I know this is going to generate a fair amount of questions because this is -- yeah, where are we going to?

CHESTER BRITT: Norm, please.

NORMAN PEDERSEN: SCGC.

CHESTER BRITT: It's on. Yeah.

NORMAN PEDERSEN: So looking at the light blue on your graph, that take us from 0.7 to 2.7, I found what Jack was talking about to be very helpful.

In terms of gas equivalency -- what gas equivalency is 0.7, and what gas equivalency is 2.7?

YURI FREEDMAN: I don't know if we have those numbers for you, at least off the top of my head. I definitely know that we can come back to you with this information, but I don't have it immediately with me today.

NORMAN PEDERSEN: Do you have it for industrial that ranges from 0.2 to 1.5 million tons per year?

YURI FREEDMAN: Yeah. We have not looked at the data this way, which is why my answer would be still the same. We'd be happy to come back to you and to the advisory group with those numbers. We simply don't have them in front of us right now.

NORMAN PEDERSEN: Just to conceptualize. It would be helpful, at least for me, to be able to think about it. If we're used to thinking in terms of gas, we're moving into a new world.

So in terms of gas, what's that new world? Jack might have something.

CHESTER BRITT: Jack, do you have something to offer on that?

YURI FREEDMAN: The only comment I'll make: Until we get to the data, which we will, is that the amount of installed capacity, which we assume is going to switch to hydrogen, is between 10 and 13 gigawatts. That may give you some sense of scale, even though, obviously, the capacity factor is changing from 10 to 30 percent.

But that number, which I know is in our backup materials, that's at least some initial sense of how much we think of the existing gas fleet is going to convert to hydrogen, which, if you think about this, is directly aligned with CARB assumption of 9 gigawatts.

Even though a CARB in their materials puts this as a separate hydrogen power generation in addition to gas, we assume that some plants are going to get converted. But fundamentally, numbers are in the same, I would say order of magnitude. Maybe even closer in the order of magnitude, if that makes sense.

CHESTER BRITT: Jack?

JACK BROUWER: Yeah. To me it makes perfect sense and Neil's clarification was helpful. I also want to say that the study that we included in ARCHES is consistent with this too, I think, because we're talking about in the same year, 2045, 17 million tons per year, and you're serving a little bit, like 40 percent of that in this high estimate, okay. High estimate.

So kind of conservative, maybe, because what percentage of territory do you have here in gas in the state?

YURI FREEDMAN: Well, remember, this is the forecast for our service territory.

JACK BROUWER: Yeah, I know. That's why I'm asking. What's the percentage that you currently serve? Is it, like, 50 percent of Californians? SoCalGas? I think it's more than 50 percent, right?

YURI FREEDMAN: Maybe. It's about half.

JACK BROUWER: About half.

YURI FREEDMAN: I don't have the exact number.

JACK BROUWER: That's what I thought, it's about half. And you're less than half here. So it's, again, consistent with the ARCHES study.

YURI FREEDMAN: I would say that, yeah. This is -- I like to use the word the "Order of Magnitude." This is way closer in order of magnitude. Those numbers are directionally similar.

JACK BROUWER: Right. Yeah. Thank you.

NEIL NAVIN: The only thing I might add, Jack, is that I think it is directionally very similar. Arguably, you have to look at people, you have to look at industry mix, and end-use mix, and so arguably, Southern California has a different use profile and energy need profile than Northern California.

So we are directionally very similar to the ARCHES overall number, if you were to double it and then add a bit. So we are in a few areas.

And by the way, it's detailed in our report. We are probably conservative in some areas where there may be opportunities for additional hydrogen.

JACK BROUWER: Well, and I was going to say that's you ambitious case, is consistent with this, and so you're talking about on average more like the 3.2, which would be serving an even smaller fraction of the market?

CHESTER BRITT: Anyone else have any thoughts?

I was going to ask Yuri if you could elaborate a little bit more on the conservative, moderate, and ambitious scenarios in terms of how they play into the other 16 work studies?

YURI FREEDMAN: Thank you for the question, Chester.

I would say, again, taking a step back in this initial phase of the analysis, the initial question should be asked is we talk a lot about hydrogen as potentially contributing to solving the decarbonization challenge of California, how much could we use in this state?

If we just put it all together, that is effectively the question we were trying to answer. Answering this question as appears here with a large volumetric number, which, again, recall that we talked about the hydrogen the Angeles Link pipeline is going to serve, only a fraction of that.

But basically establishing that we have a large amount of hydrogen demand allows us then to say, okay, there seems to be demand for this commodity large enough to warrant infrastructure.

In fact, we could turn it around and say with that amount of demand, you need to have delivery infrastructure at scale, which is the pipelines; otherwise, it's going to be, A, maybe less reliable, B, significantly more expensive.

And that's where it links into the production study and to other studies, which then proceed to say, okay, so where are we going to produce this hydrogen? Because ultimately, the pipeline's role, of course, is to connect supply and demand. And others studies key of that as well, and cost effectiveness and the options and alternatives are then developing the concept of the asset further.

CHESTER BRITT: All right. Makes sense to me.

Tyson, I see your hand raised. We're going to go to you next. If you could unmute yourself, we should be able to hear you.

TYSON SIEGELE: Hi, Tyson Siegele with Utility Consumers' Action Network. I have a few questions, just baseline questions to begin with, and then specifics on the individual sectors.

So the first one: Did I miss the slides being released before the meeting?

CHESTER BRITT: Tyson, can I interrupt you for a second? Can I still ask someone to turn up the volume in the room? We're having a little trouble hearing Tyson. Go ahead, Tyson. I'm sorry.

TYSON SIEGELE: No problem. No problem at all. Were the slides released before the meeting? I don't think I saw those.

CHESTER BRITT: Well, the PowerPoint slide was not released before the meeting. We did make reference to the fact that we are going to be releasing the draft environmental -- I mean, not environmental -- the draft demand study after this meeting. Not immediately, but soon thereafter.

And then there will be a period of comment that will be established that will go and allow people to review the demand setting in detail. So today's meeting is really just an overview or preview of what that demand setting is going to show when we send it to you.

TYSON SIEGELE: Got it, got it.

YURI FREEDMAN: Let me add this, Chester. Our previous session, as you recall, has the review of initial and now outputs of the analysis. So the data in that review that I know you participated in was presented, this data closely mirrors that.

So while perhaps the exact language of some of the slides is different, but you have seen these numbers before.

TYSON SIEGELE: Thank you. In terms of just making it easier for us to provide right comments and provide the most useful comments, it would be helpful for us to have slides prior to these meetings.

I know that sometimes working right up to the deadline that's not possible, but if it is possible, whenever it is, it would be great to have them.

The next question I have is -- again, I made this request shortly before the meeting earlier this week.

Are any of the consultants for the demand study that SoCalGas has hired, are they available today for answering any questions?

YURI FREEDMAN: Our intent is to have this conversation between SoCalGas. That is the party that coordinated this analysis and the stakeholders.

TYSON SIEGELE: Okay. The next question, it looks like -- as you just said, Yuri, it looks like the outputs that you are presenting here today are nearly identical to the outputs that were presented in August.

And with that, one of the things that you said early on when you were talking about mobility is that the mobility is on-road transportation. Previously, you had presented information that also included a marine and aviation.

Has marine and aviation been taken out of the mobility modeling?

YURI FREEDMAN: Yeah. This sector is numerical, a pictaba (phonetic) mobility analysis. And maybe I was imprecise in explaining that by and large, the line share of demand, mobility comes from long-haul heavy-duty transportation. But there are other sectors that have perhaps not as large, but contribution as well.

And again, you're absolutely correct that the analysis would present in greater granularity during our methodology discussions, the previous conversations.

TYSON SIEGELE: So in terms of what is being presented today and what was presented this summer, are there any changes in the outputs?

YURI FREEDMAN: I'll have to go back to assess this number, number to number. I think you are correct, and that changes, if they are there, they're very small. And that is the result of the conversation, the feedback that we have received. From what I recall, the feedback on numbers was, I'll just say, quite limited.

TYSON SIEGELE: In terms of the sourcing material in the studies that you cited for forming the basis for your inputs to the modeling, have any of those sources changed?

Or, for instance, in the mobility modeling, one of the main pieces that you used was the beam model, which I believe has now been renamed the TechScape model. Is that the main one that you're using for the mobility sector?

YURI FREEDMAN: Yeah. I'll have to come back to you with an exact specification of analytical tools we are using.

I will say that since then, obviously, time elapsed from August until now is substantial. We have been incorporating the new work that has been coming out of a range of institutions.

On the power side, it includes, as we -- as Neil and I have mentioned -- the EDF paper, analysis of the needs for clean firm power. On the mobility side, again, as I'm sure you know, the University of California Davis is developing their view on the role of fuel cell electric vehicles.

And as their views evolve, we are aligning up with that as well, so we are making sure that our analysis capture is the latest thinking among the industry experts' academic institution as this thing evolves.

TYSON SIEGELE: In terms of the mobility sector, because the outputs have not changed much, and I really appreciate the continued updates of the modeling, continuing to use the latest research.

The TechScape model, when I took a look at that, it showed that the total cost of ownership for battery electric vehicles is better than fuel cell electric vehicles all the way through 2045.

With that being the case, are you assuming that the demand within the mobility sector is going to come from industries that purchase trucks that the total cost of ownership for their vehicles just isn't a consideration for them?

YURI FREEDMAN: That is not at all what we're assuming, Tyson. The way we're approaching that is, first of all, there's going to separate cost-effectiveness study, which this one is not. This is a study assessed in total demand.

Within the study, we are looking at characteristics, which, in addition to the cost, make various technologies a better or worse fit for various applications.

And I know I mentioned this before, so I will be brief, but the combination of the duty cycle of the range requirements of the payload and the fueling time seems to point to fuel cell electric vehicles as the solution of choice for long-haul heavy-duty transportation. That is something which we observed seems to be concluded for quite convincingly by the University of California Davis and a range or parties.

So I think I will just say it's important to look at transportation in a granular fashion. Various solutions are going to be a very different fit for various, if you will, applications, various needs.

And, again, we are going to go into it significantly deeper in our cost-effectiveness analysis.

TYSON SIEGELE: That would be great too, to hear about that in more detail, because when I've gone through and taken a look at the various studies, they do not reach the same conclusion as SoCalGas has reached.

They find that the total cost of ownership does not point to hydrogen fuel cells being used in vehicles, including heavy-duty trucking. It also points to the continued advances in, you know, just battery electric vehicles just like it is assumed for other technologies. And what you see is that it's just not cost-effective to have fuel cell electric vehicles. And it's particularly -- it's particularly stark in terms of the cost effectiveness for the first decade, decade and a half from now where we are taking a look at what is the most likely for that time frame, the cost effectiveness of cell fuel vehicles. It is just not close to battery-electric vehicles.

The 2035 and after, you know, it's really hard to predict those costs, both for battery-electric vehicles as well as fuel-celled vehicles. So it's -- I guess I just don't understand how the conclusions for the mobility sector are supported at all through any of the sources that I've seen provided by SoCalGas, through the sources that I have taken a look at separately from the ones that SoCalGas has been reviewing for this demand study. So that's within the mobility sector. Within the power sector --

CHESTER BRITT: Before we move on to that, can we just get a comment from Yuri on that if he has one, and then I think Jack might. And also Michael also had their little placards raised, yeah, as well.

So I don't want to leave this topic that Tyson brought up before other have a chance to weigh in.

YURI FREEDMAN: I'll just say that we have provided, and we'll make sure to provide the third-party analysis that we are referring to that seems to arrive to conclusions that I've just reviewed.

We'll make sure to be very transparent with regards to where the analysis that we are quoting and citing comes from. But with that, let me stop and perhaps turn it over to Professor.

CHESTER BRITT: Yeah, Jack.

JACK BROUWER: Yes. Jack Brouwer from UC Irvine. I just want to point out to all the studies from all the transit agencies that have been submitted to the California Air Resources Board for the clean bus rule, the clean bus fleet rule. I don't know if that's exactly the name of it. I can't remember.

But in every single one of those, they show that there is a mixture of battery electric and fuel cell electric that are used to minimize the total cost of ownership. So there are studies there that suggest there are going to be some hydrogen use in heavy-duty bus fleets for sure.

And I think similar analyses could be considered in this study. Let me just say that the earlier studies, based the cost analysis only on the input fuel and the bus itself, which, Tyson, I think you correctly state that if you look only at electricity costs and batteries, they are cheaper than hydrogen plus fuel cell. battery kell.

The latest studies from these transit agencies, though, also asked the question: If I want my entire fleet to be battery electric, what is my utility upgrade cost?

Okay, so the infrastructure was included in the latest studies, and that's what flipped it a bit and made some cases, the fuel cell plus hydrogen cheaper than the battery plus electric vehicle charging.

Okay. So it's the infrastructure that has to be included in this total cost of ownership analysis. I think that's when you see, especially in heavy-duty sector, a hydrogen being adopted.

CHESTER BRITT: Michael, did you want to --

MICHAEL COLVIN: I have a new point, but I also want to recognize Sara's had her hand up longer than I have, so why don't we go to Sara first and then come back to me.

CHESTER BRITT: All right, Sara?

SARA GERSEN: Hey. So my question is about, you know, given that the price to deliver the hydrogen is going to be such an important factor in determining how much hydrogen different sectors are going to demand how your modeling takes into account the expiration of the 45V tax credits, which is obviously going to dramatically -- have a dramatic impact on that price for low-carbon hydrogen. Thanks.

YURI FREEDMAN: Thank you for the question, Sara. I will say that the detailed answer to that question is going to be contained within the cost effectiveness analysis, which is a separate study from this one. So scope wise, we have not addressed that topic. That's a very important topic, though.

I will also say that if you look at the structure of hydrogen price today, transportation distribution actually is the largest cost component. And from that, it immediately follows the delivering.

Cost-effective hydrogen to consumers is going to necessitate building large infrastructures that is going to allow that delivery at scale at low cost, which, of course, cost to deliver hydrogen by pipeline are a fraction. And they're relatively small fractions sometimes of those costs if you were to deliver it by truck.

So I think -- and the last point I will make, which I think is well known to everybody here, the intent of the federal government putting public capital behind kickstarting hydrogen production is for it to gain scale, and scale is what we in California have observed that getting production to scale, drive the cost of clean electrons by pretty much order of magnitude in the space of a decade. There is no reason to believe the same could not happen with clean molecules on the production side.

We are focusing on the second part of this equation, which is delivery cost to have to come down to, but together that seems to be what the federal government is looking at with their goals that seems to underpin a lot of the State's assumptions with regards to hydrogen's potential to be a major contributor to decarbonizing the state.

CHESTER BRITT: All right. Michael?

MICHAEL COLVIN: Thanks. Michael Colvin with Environmental Defense Fund. I think I'm building off of Sara's question but in a slightly different way.

So you've referenced EDF's clean firm power study a couple of times, and we looked at a variety of different technologies there. And quite frankly, we did this before the IRA and IAJ (phonetic) were passed, so we had to do a generic clean field cost when we did hydrogen, but we didn't quite have a -- we did a pretax cut.

And as a result, hydrogen was priced at the highest, and it got picked up the least in various different options that were out there. We never had the chance to go back and rerun that model with, you know, today's pricing or today's forecasted pricing with 45V being put into place and that's still influx.

But I do think it points to a larger question here of you're sort of assuming a high point, a couple of these -- I think you're assuming a high point, but I don't know what the underlying fuel costs are, so a lot of customers are going to be looking at fuel switching and saying, well, hydrogen might make an option for me if the price is low enough, or it might not be the option for me, and I might be going towards these other options if depending on how some of these things sort of shake out.

And so I think the question that I am ultimately asking is I would love to see whether it's in the demand study or in some future work group or whatever else, what the sensitivity analysis is on the price forecast that you're using, because I think it's going to dictate whether or not we're actually on the conservative, moderate, or high case, just in terms of what customers acceptance are, and then we have to figure out if there's the actual business case for it or not.

YURI FREEDMAN: Thank you, Michael. I completely agree, and I think that the Phase Two analysis is going to need to overlay the cost on that, because that's really what you're looking at right now, is that total, if you will, addressable market.

We need to understand clearly, like any other market is going to be sensitive to price and the choices of market participants will change as their result of the price. No doubt about that.

I think the unique feature of that, though, I will say, is that a lot of drivers of this market are policy and regulatory, rather than economic.

For example, advanced clean fleet for transportation suggests that if you want to be in the business of hauling containers from the port, you are going to be zero emissions. And that changes the calculus from what's cheaper diesel, and maybe diesel is cheaper today, admittedly, to what decarbonization options I have.

And then that's why we go to UC Davis, which suggest that the long haul, the market share of the fuel cell electric vehicles may be as high as 80 percent. But it compares this to battery, because basically we have to look at the decarbonization options. The same analysis, but in a separate way will have to be done by the power generators, owners of the facilities.

What is their path to carbon neutrality? Is it hydrogen? Is it carbon capture and sequestration? Or all these other options?

So it starts from regular push, but within that, within the scope of what's possible within the regulatory arm, they're obviously going to go through this economic optimization, and we need to analyze that.

CHESTER BRITT: Go ahead, Michael.

MICHAEL COLVIN: Yuri, I think that makes a ton of sense. I think the -- I think it would be -- well, let me ask a more simple question.

Between your three scenarios that you have up on the screen right now, is price held constant, and you're just assuming a greater regulatory push? Or is there a price fluctuation that is helping to tip the changes between one and the other?

YURI FREEDMAN: Yeah. It's the former, Michael, as the price has not been a factor in developing those scenarios. And again, the simplest way to think about that is look at the power generation, which I know all of the people here are experts in. The biggest driver of that difference in this light blue is the capacity factor generation.

The capacity itself changes somewhat too, but the biggest driver is the 10, 20, 30, which again, goes back to the range of how much generation is going to have to run.

So cost is going to be overlaying this in the future work for sure.

CHESTER BRITT: All right. Norm?

And then we're going to go back to you, Tyson, to finish your thoughts.

I'm sorry, Norm, if you could use the microphone and state your name.

NORMAN PEDERSEN: I'm Norman Pedersen, SCGC. Yeah, I would like to get back to what you were just talking about, Yuri. But first, Tyson sort of sent us down the trail of light-duty vehicles and buses. But in looking at the mobility slide, going back to the mobility slide where you project 1.0 to 1.1 (sic) million tons per year for the mobility section.

CHESTER BRITT: 1.7.

NORMAN PEDERSEN: You didn't have -- yes?

CHESTER BRITT: 1 to 1.7.

NORMAN PEDERSEN: Pardon?

CHESTER BRITT: For mobility it's 1 to 1.7 million tons per year.

NORMAN PEDERSEN: Oh, yeah. You have two -- there are two numbers there, two numbers here, and I was reading from the top number. The bottom number is 1 to 1.7 million. Thank you, Chester.

CHESTER BRITT: Yeah, no worries.

NORMAN PEDERSEN: Okay. In difference to my colleagues who are from the ports, you don't have anything in your slide about the mobility section about the ports. We have, in previous sessions, focused on the ports, and they are not like light-duty vehicles. The ports have a demand that is driven by factors different than light-duty vehicles.

So what percentage of your 1.0 to 1.7 are represented by ports, which are definitely heavy duty?

YURI FREEDMAN: Yeah. I don't have the exact number for you, but I will just say that the mobility demand is very heavily dominated by long-haul heavy-duty sector, without a doubt.

CHESTER BRITT: Which includes the ports.

YURI FREEDMAN: Which is driven to a very large degree by the traffic associated with the ports.

CHESTER BRITT: Yes.

YURI FREEDMAN: Which, obviously, results from the fact that between the Los Angeles and Long Beach ports, we are by far the largest port in the nation, and the tens of thousands of trucks that haul this is the major element of demand. It's the drayage by far.

NORMAN PEDERSEN: Okay. So you're looking at both the demand of the drayage to and from the ports, and you're looking at the ships that are going to be coming into the port and may be fueled by hydrogen.

YURI FREEDMAN: Actually, the intercontinental movement, we did not include into this analysis. This is not a way to think about the fact that is there more hydrogen that could be used in the future as the marine operators are going to change their ships to either ammonia or methanol, or perhaps liquid hydrogen expert that is outside the scope of this analysis. That's additional potential demand, which we did not factor into these numbers.

NORMAN PEDERSEN: So you're focused on the drayage. You didn't focus on the marine transportation.

YURI FREEDMAN: Which is not a way to say we were quite conservative in approaching the market.

NORMAN PEDERSEN: Okay. And then next, moving back to your slides that show total expected clean renewable hydrogen demand.

In your caption below the last chart showing the ambitious scenario, you talk about higher capacity utilization and power, you are talking about capacity factor, then?

YURI FREEDMAN: You are correct. Remember the difference in the power generation sector between conservative, moderate, and ambitious scenario is the assumption of a coordinate. 10 percent capacity factor and conservative case, 20 percent in moderate case, and 30 percent in ambitious case.

NORMAN PEDERSEN: Okay. And I noticed in the conservative and moderate slides, you have the percentages broken down among mobility, power, and industrial, but you didn't include the percentages in the last slide, the ambitious.

Do you have the percentages for the power sector in ambitious?

YURI FREEDMAN: We do. I apologize for not having these numbers on the slide, but we will share them with you and the group. It's simply an oversight.

CHESTER BRITT: Thank you, Norm.

Tyson, we're going to go back to you, and then hopefully you can cover -- I think you wanted to go over the power generation sector and the industrial sector. And then we need to move on on our agenda, because we do, as I mentioned, have a full agenda.

And, again, if we don't have enough time to get through all of the thoughts and questions, we are going to be giving you the actual study report, and then we will allow you to have time to provide substantive comments to that if you would so desire.

So with that, Tyson, I'm going to go back to you. Tyson, you're on mute if you're talking.

TYSON SIEGELE: Thanks. So I have a couple of other questions that came up when other folks raised some issues.

Jack, if you could just drop a couple of those studies that you have mentioned about the buses, the hydrogen fuel cell buses into the chat, that would be really helpful so that we can take a look at those.

I haven't seen those studies. The studies I've seen on buses don't align with that, but I definitely want to see all of the research that's available. The next piece is -- Norm, when I was talking, Norman, if I said "light-duty vehicles," I misspoke.

What I was referring to when I say that through the timeline, 2045, that fuel cell vehicles will not be cost-effective, that is for the long-haul heavy-duty trucking. And that is also the sector for SoCalGas in the demand study here, says will be the majority of the hydrogen use within the mobility sector.

So, you know, the information I'm thinking to look at does not agree with the information that's being presented.

In terms of the power sector, the power sector, also -- this is the departure from what I'm seeing on other studies. For instance, the California Energy Commission and the California Public Utilities Commission have gone through and done a study to take a look at what is required, legislatively required by 2045 in the power sector.

How do we get there? How do we get there at lowest costs? And how do we get to the -- and I dropped this into the chat, the statutory requirement of retail sales by 2045 being 100 percent clean.

And so that is what the CEC and the CPUC took a look at. What they found is zero hydrogen in the power sector. And so when I'm taking a look at this study that says there's going to be gigawatts worth of capacity, as well gigawatt hours worth of production, I don't understand where that's coming from.

And so, Yuri, can you talk a little bit about why your conclusion here in the power sector departs so drastically, dramatically from the conclusions reached by the Utilities Commission?

YURI FREEDMAN: I may repeat myself, and I apologize if I do. I'm sure you're familiar with the CARB scoping plan. The normative document of the State of California that lays out the vision for the power generation among other factors. We are happy to refer it to the plants materials, which suggests 9 gigawatts of hydrogen power generation in the state by 2045.

Are you familiar with this document?

TYSON SIEGELE: I am, yes.

YURI FREEDMAN: So I don't think it would be fair to say that the view of the State of California includes zero power generation with the face of the fact that California Air Resources Board has more than 90 gigawatts of this generation in their plan document. That will be half part of the answer.

I will also refer it to the -- I know the source, which we discussed repeatedly today, the analysis done by the EDF, Princeton, Stanford, and other bodies, which, as I'm sure you know, came up with a significantly greater number, admittedly, for not just hydrogen, but clean firm power. That number, as I'm sure you're familiar with, is between 20 and 40 gigawatts.

Are you familiar with that study?

TYSON SIEGELE: I am, yes.

YURI FREEDMAN: Excellent. So I think it's fair to say that there is a significant body of analysis, which points to the need for clean firm power. And within that, there seems to be an Air Resource Board document that clearly points to a need of large amounts of hydrogen generation.

Let me stop here. I would be happy to provide you with more information. And like I said, there's definitely Phase Two where this analysis needs to be conducted in greater detail.

But between this and between decisions of Los Angeles Department of Water and Power, to completely change intermountain plant to hydrogen, which is, as you know, in place in construction today, and is going to come into operation. In fact, two weeks from now we will say it will be next year, as you know the in-service date of intermountain is 2025. That is not far away. That's really around the corner.

And between Scattergood, which I believe has in-service date of 2029, I don't think there's any question of hydrogen is expected to play a large role in power supply of California. I'll stop here.

TYSON SIEGELE: So those are all interesting points you raised. That piece that I'm taking a look at, when I'm taking a look at, what CPUC has done, what the California Public Energy Commission has done -- sorry. What the California Energy Commission has done, is I'm taking a look at the SB 100 study.

The SB 100 study is meeting the statutory requirement. If you go beyond the statutory requirement, then you're doing what LADWP is doing. You are moving to a cleaner energy system than what is statutorily required, and that is excellent. That is great. I would love to see that. That is not what the power generators across the state of California are required to do.

If we move to that, and I hope we do, then I think that the study that you're taking a look at here, the demand study that you're providing results for are more in line with voluntary changeover.

Voluntary changeover happens when there is cost effectiveness of a product, and right now the cost of hydrogen is much higher than the cost of natural gas. So I don't see more generators switching over to hydrogen voluntarily.

The other piece the you reference on a regular basis is the number of gigawatts. The number of gigawatts is definitely of importance, that's the capacity number. The amount of hydrogen used is based on the capacity plus the capacity factor. The capacity factor that has been assumed within this demand study, as you point out, 10 percent, 20 percent, 30 percent for the different scenarios. That is an extreme departure from even what LADWP is suggesting that they will do with Scattergood.

With Scattergood, they say they're going to do approximately 1 percent capacity factor. That's 1/10th of the conservative scenario. It's 1/30th of the ambitious scenario.

And the intermountain power plant, which they do intend to run at a higher capacity factor, that's not in California. That is in Nevada. And so that's not going to be something that's served by the Angeles Link and really has no bearing on what we're taking a look at here on the demand study for the Angeles Link for the L.A. basin.

So, again, the assumptions that are being used of 10 percent, 20 percent, 30 percent, they don't align with what the best available information is if they don't align with the source data that you are saying that you're using for this study.

The source data, the documentation from LADWP that you have provided as one of the sources for the capacity factor, it lists 1 percent. It doesn't list 10 percent, 20 percent, or 30 percent, and that is just one generation facility.

In the demand study here, you list gigawatts of generation facilities, and there's no basis for any of those being switching over to hydrogen based on anything that I've been able to find.

YURI FREEDMAN: Thank you. Perhaps, I realize as we are going to need to move on, I will, for the record, correct that in the intermountain power plant is not in Nevada, Tyson, it's in Utah.

TYSON SIEGELE: I'm sorry. Yes, you're right. Utah, yes.

YURI FREEDMAN: You are correct. It is outside the boarders of the state of California.

I will also say that, again, what I mentioned about CARB having more than 9 gigawatts of generation in their plan is a fact that I don't think anyone can deny because you can go to the CARB site and see that.

There is no question that we need to assess the capacity factor in greater granularity as we are going to conduct (inaudible) market analysis. What I can also commit you to is that we are going to be in close dialogue with our customers with parties, which are going to use hydrogen, first and foremost, to Los Angeles Department of Water and Power. And as their views and assumptions of capacity factor are going to evolve, we are going to be sure to be very, very close to this analysis, and we'll factor this in our assumptions and inputs.

CHESTER BRITT: All right. For the sake of controlling our agenda, I'm going to go to Lorraine who has got her hand up, and then we are going to wrap up this section. We're going to take a 15-minute break so we can grab some food, and you can grab some food online.

This is a very robust discussion. It's not surprising. We knew the demand study was a very important study. As I mentioned, while we might not be able to get through every single item or comment in this schedule that we have that's in the agenda that's filled with other things that we have to cover, we are going to give you the opportunity to have the demand study in detail and provide detailed comments. So that's part of the process.

So I'm going to now switch to Lorraine. If you have your ability to unmute yourself, we should be able to hear you.

LORRAINE PASKETT: Hi there. Thank you.

So, Yuri, as part of the demand study, are you looking at the volumetric potential and economic viability in the power sector for conversion? Just picking up a little bit on what Tyson said.

YURI FREEDMAN: Great question, Lorraine. And I will say that we will analyze alternatives. In the separate study, which is accordingly titled "Analysis of Options and Alternatives," this study is focused on a session, the demand for hydrogen, per se.

LORRAINE PASKETT: Okay. All right. Then I'll wait for that. Thank you, Yuri.

CHESTER BRITT: Thank you, Lorraine. Okay. A really, really robust conversation. Again, not surprisingly, we knew this topic was very important to everyone. We are going to now break for a quick ability to use the restroom, get some food, something to drink. Same thing online, if you would like to take the opportunity to do that, we will reconvene, let's say, at 12, and get back started with our agenda. All right.

Thank you so much.

(Lunch recess; reconvene at 12:00 p.m.)
(15 minutes)

CHESTER BRITT: Okay. Our next speaker is Darrell Johnson. He is the SoCalGas manager for Environmental Services, and he's going to be making two presentations today, but the first one is going to be focused on greenhouse gas emissions, and I'm going to turn it over to Darrell, and he's going to make his presentation. And then we'll have a discussion about the preliminary findings.

DARRELL JOHNSON: Thank you very much, Chester. So I like to start off basically by doing kind of a revisit, a high-level overview of methodology we use to perform our calculations. And then I'd like to kind of present a high-level preliminary results for greenhouse gas, and we'll follow that by going through a little bit of the breakdown.

So to recap in methodology, we use the scenarios low, medium, and high that Yuri just discussed in detail, and we took those and focused basically on the three sectors, mobility, power generation, and hard to electrify industry and evaluated for the mobility sector, the replacement of diesel and gasoline with hydrogen fuel cells.

`And for the power generation and hard to electrify sector, we looked at replacing natural gas with the hydrogen fuel for combustion, right? And for the infrastructure, we looked at electrolysis and renewable natural gas, steam methane reformation for production, and, of course, reciprocating engines and turbines for compression and transmission. Next slide. You're ahead of me.

All right. So the overall preliminary results for greenhouse gas were favorable. I mean, obviously -- well, I don't want to say "obviously." But there's no Co2 and no CH4 in the combustion of hydrogen. So we see a 36 million metric ton removal of hydrogen per year in 2045 at the high-demand level.

Mobility, the fuel cell substitution provides 100 percent greenhouse gas reduction. And in that 36 million metric tons, our power generation represents 29 percent, and in the industrial sector represents approximately 12 percent of the overall reductions respectively. Next slide, please.

So as we look at the mobility sector, again, we assume that hydrogen fuel cells, which are zero greenhouse gas emissions will replace gasoline and diesel, and that was based on our high-level demand study. The key findings that we show there is that the mobility sector represents the largest sector of our overall greenhouse reductions accounting for 59 percent of the overall reductions.

And of that 59 percent, the lion's share of the reductions come from heavy-duty vehicles, followed by medium vehicle duties -- medium-duty vehicles.

And I think if you look at the slide, you can kind of see that in the orange sections for medium and heavy duty, and then the tertiary reductions or the next category would be buses. Next slide.

So now we move to high-level preliminary results for the generation sector. And that was, again, founded on the demand study and is based on gradually replacing natural gas with hydrogen, and so the substitution results in a 99.6 percent overall reduction, because we're talking, again, about the combustion of fuel, no methane, no Co2.

But there is a little N2O, you know, which is a very small portion, but it has a very high global warming potential, so it represents the 4 percent on the combustion side.

So in the power sector, that accounts for 29 percent of our overall reductions. And we have an equivalent in 2045 to replacing nearly 3 million homes in a year based on the EPA calculated with that amount of emissions. Next slide, please.

All right. Our Hard to Electrify sector, very similar results, and, you know, from the combustion standpoint, we're still looking at an overall reduction of about 99.6 percent of the combustion emissions associated with transplanting natural gas for hydrogen. And this particular category represents 12.2 percent of the overall reductions for greenhouse gas in the three major sections, which is equivalent to about 6,000 homes in one year using the EPA calculator, the emissions that it would equate to. Next slide, please.

There was, you know, one small area where, obviously, the new infrastructure -- the equipment and new infrastructure, there's a very small increase in the greenhouse gas piece. It represents about 0.2 percent of our overall 36 million metric ton reduction. From production we have zero emissions from either electrolysis and/or biomass gasification. But our renewable natural gas, steam methane reforming does have a very small contribution to the greenhouse gas portion.

On our storage and transmission considerations in new infrastructure, we consider, of course, the electric-driven compressors and renewable electricity --

or electric-driven compressors from new renewable electricity, and there's no greenhouse gas emissions associated with that.

However, you know, the combustion of our reciprocating repressors and turbines would contribute a small element of greenhouse gas again from the combustion standpoint associated with N2O.

I will say that when we did these calculations and back to one of Michael's questions previously, we used the GWP100. However, when the report comes out, we are going to have a discussion on the scientific evaluation from our research for GWP. I think there are about five different numbers out there from various research, and we don't want to pick a winner, so we're going to discuss the range and potential impact.

That is actually my presentation of Preliminary Results on greenhouse gas using the demand study.

CHESTER BRITT: Well, are you a popular guy because Jack has already raised his card.

JACK BROUWER: Yeah, so this is Jack Brouwer from UC Irvine. I think it's a reasonable thing to use the EPA calculator, but I think it's outdated and in particular with regard to consideration of leakage.

There should be some consideration of the fact that some hydrogen will leak, and it has these indirect greenhouse gas impacts. Those haven't been included in your analysis, and I urge you to include those.

DARRELL JOHNSON: I will say that this is just combustion, right, so we're really not speaking to the leakage piece in this particular situation. However --

JACK BROUWER: Is there a separate study for the leakage?

DARRELL JOHNSON: Yes. We have a NOx, a leakage, and our greenhouse gas study.

JACK BROUWER: So that's usually in a separate study, that's why it's not appearing here?

DARRELL JOHNSON: That's correct.

JACK BROUWER: Because the 99.6 percent reduction is -- well, overall, is not going to happen from my perspective.

DARRELL JOHNSON: Well, we're talking -- well, let me be clear, because I know numbers can sometimes like be misrepresented.

The replacement of fuel, either with, you know, fuel cell technology or natural gas replacement, diesel and gasoline, we're saying for that replacement on the combustion side for greenhouse gas, this is where we're seeing a reduction.

JACK BROUWER: Okay. But it's -- well, okay, but it's kind of strange to me that you call this "the greenhouse gas emissions evaluation," when it should just be end-use impacts or something like that.

Is that the name of the study?

DARRELL JOHNSON: No. That's a fair, you know, statement, and maybe a consideration we can have to better represent what we're trying to purport.

But this particular study from the greenhouse gas side is relating to the combustion sectors --

JACK BROUWER: Got it. Yeah, combustion and conversion.

DARRELL JOHNSON: Conversation, yeah.

JACK BROUWER: Thank you.

CHESTER BRITT: Thank you.

Michael?

MICHAEL COLVIN: I'd have to put check on the payroll because he was going to ask a lot of the questions I was going to ask.

CHESTER BRITT: If you could just name yourself, I'm sorry.

MICHAEL COLVIN: My apologies. Michael Colvin with Environmental Defense Fund.

I appreciate, first of all, the caveat that you're making about GWP100 versus GWP, and I get what you're trying to do. I understand the range of different numbers --

CHESTER BRITT: If you could speak into the microphone a little bit better.

MICHAEL COLVIN: I apologize, folks. I have never been accused of being quiet in my entire life.

I appreciate the range of what you're trying to do. I think, you know, you're putting an assumption out there where we can all, you know, shoot the darts that we need to shoot at it, but I appreciate that rigor of it.

I think when you do that caveat, the reason why you want to make it very clear is because hydrogen, when it is released into the atmosphere, is going to function as an indirect greenhouse gas, as Jack just mentioned. But on a GWP100 basis, it's going to be meaningless. On a shorter time frame it's going to be far more potent.

And the reason why that matters, even if we're not talking about the leakage during the transport on the pipeline, if we're just talking about the combustion, there is no such thing as 100 percent field conversion from that point of connect from, you know, at that combustion site itself. You're going to lose some gas just in the transfer from the pipe to the end-use product.

But if we're building permanent infrastructure without the right fittings and without the right things that are sort of there, we're going to end up undoing a lot of the environmental benefit that we're going to claim on paper, and so we need to be able to capture that and sort of account for it.

So even if you're not including in this, if you're just looking at the role of the end use for the combustion, as you put it, I think it is academically incorrect to say that you're going to have 100 percent reduction of anything. You're going to have to assume some sort of fuel loss, some sort of something that's going to happen.

DARRELL JOHNSON: No. It makes total sense, Michael. And I think as all three come together, it will paint a more comprehensive --

MICHAEL COLVIN: Sure.

DARRELL JOHNSON: You know, our painting, f you will, or -- and I think that it's an interesting area to say the least, especially if, you know, I don't want to get into leakage too much, but, talking about GWP because it's temporal, right, in a sense that we're on an assessment number six for, you know, GWP's and the research on hydrogen GWP's, I would say is probably going to change. If not as much, probably more in the time to come between when we have this feasibility study when we actually go to ground, if it comes to fruition.

MICHAEL COLVIN: Of course, and I understand that you're going to be trying to integrate a couple things together to get a bigger picture.

My last two observations, because I see other hands in the room. One, I don't think SoCalGas wants to be put in a position on any of its documents saying that there's going to be 100 percent GHG or emissions reductions. I think that is just going to open yourselves up to a credibility question, even if you have the purest of intent behind it. And I don't -- I'm not questioning your motivations here, but I just think it's not going to pass the laugh test. It doesn't pass mine.

So build in more of the assumptions, build in more of what you're saying, and why, to get us to get there, but let's be careful on that.

DARRELL JOHNSON: Absolutely. Thank you for the suggestion.

and just to be clear to the audience, when that concept of 100 percent in the presentation was in relationship to, like, replacing, you know, gas and diesel with fuel cell.

MICHAEL COLVIN: Sure, sure, sure.

DARRELL JOHNSON: Yeah.

MICHAEL COLVIN: But I think that, again, just to kind of push on the door just for 10 more seconds here. It very well could be that hydrogen is the right solution for a lot of customers, especially in the areas that you've identified that are Hard to Electrify, and all the sectors that you're identifying, it could be very well the most positive thing that we could do.

I think the misnomer of saying that there is zero attached to it, is just going to be giving customers false expectations, and we don't want to be doing that. We want to be going into it eyes wide open and say, look, even with these caveats we think that there's a business case, and we think there's an environmental case to be made.

DARRELL JOHNSON: Appreciate it.

CHESTER BRITT: Thank you, Michael. We also have a few online that have their hands raised. I'm going to go to Pete Budden first with NRDC. If you could unmute your microphone we could hear you.

PETE BUDDEN: Hi there. Just wanted to support what Michael and the previous comment he said about the hydrogen leakage issue. I think that's really important to be included, and I'm glad to hear this, like a separate study that will be working on that.

But I want to echo the call to integrate these things together. I think it's really important to get the full picture. I also just want to just draw attention to the assumption that the production pathways are going to be zero or near zero emissions. There's a lot of assumptions baked in to that. I have concerns that all the production fees into this pipeline may not be able to achieve, particularly around electrolysis and the procurement of renewable energy that's truly additional and hourly matched and deliverable.

So I, again, just want to make sure that the assumptions being made are clear from when you present those really ambitious greenhouse gas production numbers. Thank you.

CHESTER BRITT: Thank you so much, Pete.

Did you have anything to offer?

DARRELL JOHNSON: No. I was just going to thank Pete as well, and I think, you know, our studies are about 140, 150 pages each, so when the full on study comes in, you know, the research and considerations that have gone into it, you'll be able to comment on as well, so thank you, Pete.

CHESTER BRITT: All right. We're going to go to Tyson Siegele.

Tyson, if you can go ahead and unmute

yourself.

TYSON SIEGELE: Hi. Tyson Siegele with Utility Consumers' Action Network. I am interested in hearing a little bit about the options that you have taken a look at in terms of further reducing the emissions.

One of the issues I asked about previously in a previous meeting was around combustion, and the opportunity to limit the supply of hydrogen to customers who will only use it for non-combustion purposes.

Have you taken a look at a study of this nature, the greenhouse gas emissions, that take a look at non-combustion, and then compares that to what you presented here?

DARRELL JOHNSON: So I will say that in our consideration for the range of potential emissions, because, obviously, when you're looking at storage and transmission combustion, you have the opportunity to have a, you know, full on electrification, as well as the replacement of fuel with hydrogen.

So, you know, really these reductions could go from, you know, the consideration of full on electrification and replacement. This evaluation specifically is the replacement of fuel, but in our study we also look at the potential of electrification as an option as well.

So, you know, I try to preface what these reductions were founded upon, but electrification, obviously, is an option for, you know, storage and transmission or combustion of some of these engines.

So that is kind of baked into it, Tyson, any consideration that we have.

TYSON SIEGELE: Got it. Thank you.

DARRELL JOHNSON: Yeah.

TYSON SIEGELE: Sorry. Go ahead.

DARRELL JOHNSON: No. I was going to say we're not in Phase Two where we know exactly what we have and how it's going to be formed, but that is one of the options that will be in consideration based on the availability of electrification and location of equipment, so we don't have that level of detail now, but I'm sure as we move forward into future phases, it will, you know, be more obvious and in a topic of discussion that we can speak to in more detail.

MICHAEL COLVIN: Thank you. The other piece that I would ask for is -- it probably came through that I was a little disappointed with the demand study that was presented today.

In terms of the demand and how much greenhouse gas emissions you're going to have, those two are very much linked, and because there are planning advisory group members, like myself and others, who believe that the demand study is high by at least a factor by 10, that it would make sense for some of these other studies to take a look at this, and then say, however, PAG members think that our demand study is far, far too high. We are also taking into consideration that greenhouse gas emissions could be one-tenth or even less of what we're presented because the demand could be off by that factor.

DARRELL JOHNSON: Oh. Yeah. I think, Tyson, that is an excellent consideration. And I do want to, again, preface that these numbers that were shared today were based on the high demand. There's a range based on the levels of demand. And so as we speak to demand, the emissions are going to change based on what scenario we evaluate, right.

So, you know, you're looking at each demand section being about a third, approximately of, you know, low being the one-third, high being three-thirds. So as you evaluate potential reductions, if you compare them to the scenario, they are going to change as well, right, so you're not going to get as much emission reduction if you consider the lower demand.

So I think in our studies that will be more transparent. This is just an opportunity to share at the high demand what the emission reduction potential is.

CHESTER BRITT: Yuri is going to follow-up on that. Go ahead.

YURI FREEDMAN: Thank you, Chester. And just to add to this, I think I just want to reiterate while all of us here are entitled to our own opinions, but I think we clearly are going to have to agree on objective facts.

It is an objective fact that the State of California led by ARCHES and being in the process of securing more than a billion dollars of federal funding has a hydrogen demand forecast to a tune of 17 million metric tons per year for the State by 2045.

It is also a fact, as Professor Brouwer referred to that there are academic studies that point to demand in the same order of magnitude. But I just want to be sure that as we are talking about this, we all are agreeing that the State of California itself, sees the forecast along with the number that I just mentioned to you, 17 million tons per year for the State. And while you may believe that that number is higher than the estimates you have in your possession, but let's make sure that we all keep that number in mind. Thank you.

CHESTER BRITT: All right. Thank you.

Jack has his hand raised again.

JACK BROUWER: Yes. I just want to make a suggestion that's following on Michael Colvin's comments on EDF and what I said earlier.

I think that you need to have an additional assessment in your category of end-use conversion that includes not just N2O as a greenhouse gas, but also the secondary affects of how much leak you actually expect at the end use, because there's going to be some, right? There's going to be a little bit of hydrogen that comes out some way or another, leakage going from the tank to the engine or whatever.

So, please. Please look at a little bit of an assessment of that. And then reporting on both 20 and 100 years will be great. Yeah.

DARRELL JOHNSON: And I appreciate that and thank you. I think one of the difficulties -- considerations we have to have is that, you know, we're not in our leakage assessment. We're not saying tons of leakage, right. We're saying maybe percentage of leakage or a leakage rate.

So, you know, those things can be considered you, but it's not like we have a number to associate, per se, with the combustion in the same way.

JACK BROUWER: Yeah. But okay. I think that there's a way that you can assess it, though. And what you'll find is that just all of those, you know, instead of 99.6 and 100 percent reduction, it will be lower than that. It will be a 95 or 98. I don't know what you're going to find, but you're going to find something like that. Thank you.

DARRELL JOHNSON: All right. Thank you, Jack.

CHESTER BRITT: All right. I think -- I don't see anyone else with their hand raised in the room and online, so we're going to go ahead and keep going on our agenda. Let me just get to our next speaker.

Jill Tracy is the Angeles Link Senior Director of Regulatory and Policy, and she's going to be talking about stakeholder comments and incorporated changes to our technical approach.

And with that, I'm going to go ahead and advance the slide and get her started.

JILL TRACY: All right. Thank you, Chester. And thank you to all of our PAG members here in the room and online for coming and taking time out of your busy schedules to be here today. Thanks a lot.

Before we get started, I'm giving an update on our stakeholder process, and I just would like to start with a raise of hands in the room and online as to how many of you have provided stakeholder comments to our many feasibility-studied milestones. I see a couple hands up in the room. Got one, two.

Norm, I believe you've provided comments, haven't you, to any of our feasibility studies or -- really? I'm surprised. Okay. You have provided. Not in writing, but you've been provided many verbal comments, so I would consider. And, Ernie, we all know where you fall. That's right. And, Tyson, I see you've got your hand up too, so thank you.

So I think -- take a look around, you all are in very good company, and most of your colleagues have provided comments to this process. That's why we're here, and so thank you. Part of the process that we've been doing is taking those comments and tracking them and incorporating them, and that's part of my discussion right now.

And then also, I wanted to mention elevators. You might ask why I'm talking about elevators. Well, elevators came up in our CBOSG meeting on Wednesday, and one of the CBOSG members asked why we couldn't make a complete conversion to clean renewable hydrogen within five years. And Miriam Brown, who was in attendance, mentioned, well, there's no straight elevator to the top. There's a lot of work that needs to be done. There's a lot of feasibility studies, citing, permitting, and a stakeholder outreach. And that's the preliminary Phase One that we're in right now.

Also with respect to our feasibility studies, there's no express elevator to the top to complete these feasibility studies. We have to take stops on certain floors, and those floors are our milestones. We stop at certain milestones, we issue those milestones to our stakeholder group. We ask of you a comment period. We have a workshop or a quarterly meeting where you have individuals in subject matter experts, such as Darrell Johnson or Yuri to present on certain topics.

We then have a comment period after that to allow you guys to provide us more comments, and then we evaluate that feedback and determine whether or not it's appropriate to incorporate that feedback into the particular milestone of each of these studies.

And so on this slide you'll see different colors represented within each milestone. Our first milestone, which we've already passed, is our scope of work. And we've already issued our redlines for the scopes of work for our Phase One feasibility studies.

Milestone 2, many of our feasibility studies are within our technical approach where you've provided us comments, and we are incorporating those comments and we will be issuing a redline to those technical approaches next month in January of 2024.

And then for Milestone 3, we are in a preliminary findings stage in many of our feasibility studies as well. And Darrell Johnson presented today for our GHG and NOx emissions, a preview of those preliminary findings.

As Chester and I noted, we will be issuing those draft preliminary findings and data in compliance with the final decision in the next couple of weeks, and then you will have an opportunity to provide comments as well.

And then the draft report is our final Milestone 4 for our feasibility studies. The demand study as we've noted previously is farther ahead than many of our other feasibility studies. The draft report for the demand study will be issued in the next couple of weeks. You will have an opportunity to provide comments, and I'm sure many of you will, and we welcome those. And so, let's see. Go to the next slide, please.

So this slide represents a graphical representation of the different types of comments that we have seen to date. The light blue is where a comment is directed to the specific milestone, and it is incorporated into the applicable Phase One study. The gray area is -- comment addresses an issue that is already a part of a different study.

Like a great example is today, Jack made a comment about leakage, and Darrell was clear that that's another study, and we will be presenting on that and issuing preliminary data and findings.

And I actually think it's a great idea that Jack had, today -- is to have something that come comprehensively looks at the emissions in the totality, rather than them having three separate independent studies that don't talk to each other.

So I think that is a really good example, and even though that comment falls into the gray, it can actually fall into the blue. I don't mean to confuse anybody, but it can also fall into the blue that says we can incorporate that by making it more comprehensive, so -- and then some comments are in the dark blue quadrant, and that is it's a great comment, but maybe it should be in a different phase, such as Phase Two. Probably not Phase 3, probably will be a Phase Two question.

And then some comments are beyond the scope of Angeles Link Phase One or outside of the particular milestone. You might be providing us a question or a comment on a technical approach, when, in fact, it's really a comment that should have been made when we were in Milestone 1 on scope. And so those are just a general overview of the different types of comments that we're seeing.

And then the next slide for Slide 3, we just wanted to give you a couple of examples of the types of comments that we have incorporated into our ongoing technical approaches. One was our greenhouse gas emissions evaluation.

Darrell, you've already addressed this pretty thoroughly that we've received comments from a number of parties that the GWP100 and GWP200 should -- 20. I keep saying 200. I don't know why -- that 20 and GWP100 should be incorporated into our GHG emissions evaluation, and we have done that.

And then another example is the environmental justice and environmental and social justice analysis. And one of the comments in particular from UCAN, CBE, and Physicians for Social Responsibility L.A. asked that we take a particular study, the equitable principles for hydrogen, environmental justice position on green hydrogen in California, which was issued in October of 2023.

This report was actually issued after we initiated the study. But our team, our subject matter experts went, received the comment and thought this is a really good idea. We want to incorporate these principles into our environmental and social justice analysis. And for those folks who haven't had a chance to review that report, some examples of these principles include a commitment to green hydrogen produced via electrolysis, and the use of surplus water and additional renewable energy.

Hydrogen Production Project Center, tribal consultation and consent and community consent and engagement. Safety and leak detection technology and regulation for the transport and storage of hydrogen, as well as managing leaks throughout the life cycle of design implementation and maintenance of hydrogen infrastructure.

The consideration of community impacts when citing hydrogen transportation and storage infrastructure. And also costs of hydrogen infrastructure to be clear and transparent to our repair and consumers.

And so a lot of these issues are being addressed, as you know, in a lot of our other feasibility studies. And this also goes to show you about the interdependency of many of our feasibility studies are also taking into consideration some of the findings of our other studies.

So this was a really good opportunity, we felt, to also use those principles that are in the report to be integrated into our environmental and social justice analysis.

So some of the key takeaways that we would like you to think about as part of our comment approach is we want to, you know, focus on transparency. You know, we conduct these meetings in compliance with the final decision, but we also are committed to transparency throughout this process, and part of that process is when you provide us comments, we're going to tell you what we've said, how we've addressed them, and we're going to provide that information to you. And we anticipate doing that in the next month.

We also want to reiterate the importance of the feedback that you are providing us, and then also reiterate the many opportunities through these very important milestones for our feedback on an ongoing basis.

So that concludes my presentation, and I'll pause there for any questions.

CHESTER BRITT: Any questions? All right. Jill did a great job. Thank you for that overview.

All right. We're going to go now to our next discussion, which is on NOx, and we'll go back to Darrell, and he will give another presentation, and we'll follow that up with another discussion.

DARRELL JOHNSON: Thank you, Chester. I just want to say before we get started on NOx that the presentation on NOx is on the exact same format that it was for greenhouse gas, so you will see similar kind of numbers and structures. And some of the questions that you asked on greenhouse gas may be somewhat applicable to the NOx portion.

But this is -- we have the same recap, high-level methodology of how we went about using the various demands scenarios to produce our emissions are the same. The difference for NOx is, obviously, for all of the equipment we had to evaluate all the rules and regulations for NOx, right.

There are existing emission factors for natural gas in association with NOx, and there are no specific equivalent factors for hydrogen, but there have been some studies on the relationship between natural gas and hydrogen blending and the subsequent emissions.

We used this 1993, I believe it's Jonkey (phonetic), study -- please forgive me if I butchered that name in any way -- to develop a correction factor so that we could actually compare the combustion of NOx from natural gas to hydrogen from 100 percent natural gas, all the way up to 100 percent hydrogen. So that's how we actually came up with our NOx numbers, just to give you a little bit of background. Next slide, please.

So as we look at that, we look at the potential up to a 20,000-ton reduction. And the reason the study shows a potential for reduction is primarily based on the fact that there's a mandate to reduce NOx in Southern California, South Coast Air Quality Management, and other air agencies.

So the foundational consideration here is that equipment technology and emissions associated with permitted equipment is not going to be allowed to increase, so at a minimum, we anticipate that emissions will stay the same or with a potentially small decrease.

One of the things when we're speaking to combustion and trying to make a correlation factor or correction factor from natural gas to hydrogen is the fact that equipment today and emission factors today and information today is based purely on equipment designed to burn natural gas, right.

So there are a lot of engineering and design elements that we've discovered in research, and we anticipate even more or so in future that are going to actually reduce the potential of NOx emissions in the combustion of hydrogen similar to what has taken place in the NOx arena over the last 20 years, right.

So the same considerations that apply to reducing NOx from a natural gas standpoint apply to hydrogen, in that the design of equipment will consider it fuel mixture, you know, temperature, all of the elements and the potential controls, like selective or non-selective catalytic reduction and selective catalytic reduction. As we move forward in the future, we anticipate some growth in the area of equipment design specifically for hydrogen combustion.

Okay. So having said all of that -- well, if you look at our overall graph today that is based on the high-demand scenario, we show that the greatest reduction in NOx, again, counts from the mobility sector and that substitution of gasoline and diesel for fuel cell technology.

And again, for the power sector and hard to electrify sectors, we show the potential for a very small decrease, and if not, at minimum, the same amount of emissions. But the emissions associated with the mobility sector, when compared to South Coast 2037 forecasts is about 20 percent of that forecast. So it's beneficial to say the least. Next slide, please.

CHESTER BRITT: Darrell, before we leave this slide, I have a question. When I look at the graph and it shows the reduction over time, it's very linear, and it's based on the high-demand scenario, which has more of a slope to the graph when you look over time of how the demand changes over time.

Can you explain that or help me understand how the reduction over time is, like, flat or it's very paste?

DARRELL JOHNSON: I will say to you that we originally did our analysis based on a five-year increment, you know, 2030, 2035, 2040, et cetera. And some of that information in this graph may be an interpolation of those main points, right, because this is a high-level representation, and we're really trying to show you where we think the trend is, and I think that may play into it, somewhat.

CHESTER BRITT: All right. And I think Yuri has something to offer.

YURI FREEDMAN: And I'll just comment that if you recall the case is comprised of three sectors of demand: Mobility, power generation, and industrial.

If you look at this legend here, you almost cannot see any other sector other than mobility, which is another way of saying that really lion's share of NOx reductions come from transportation sector, so it's dynamic of adoption of fuel cell electric vehicles that drive that reduction more than anything else.

CHESTER BRITT: Yuri, you are amazing. Like, you can really see those little small lines if you really look for them.

MICHAEL COLVIN: Those are exponentially increasing.

CHESTER BRITT: They're almost not there.

DARRELL JOHNSON: I put red for a purpose. Try to see the red.

CHESTER BRITT: All right. Well, there's your answer -- there's my answer. I guess I asked the question. All right, keep going. Darrell.

DARRELL JOHNSON: All right. So in our next --

CHESTER BRITT: I'm sorry, Jack. You had your hand up.

JACK BROUWER: Well, yeah. Jack Brouwer from UC Irvine. The assumptions that underlie this, I think, are very good. As a matter of fact, I think that in combustion systems for power generation, I would expect NOx emissions to go down even. That's what all of the research is saying at this point.

The one thing that kind of, I think, is perhaps an optimistic assumption is that all of the mobility hydrogen goes into fuel cells. Okay. If it does all go into fuel cells, your assumptions are perfect. But some were might go into hydrogen combustion, okay. If it goes into hydrogen combustion, you're still going to have some NOx. It's going to be lower than it was before, but still, it's going to be some NOx.

So I don't know if you should consider that. My preference would be California makes a rule that we're only going to support fuel cell trucks and not combustion of hydrogen. I hope that's a rule eventually, but it might not be, and many people are developing hydrogen combustion engines.

So South Coast may make a rule like that. Communities may make a rule like that. Okay. So we'll have to see. I just don't know if that's a good assumption yet, 100 percent fuel cells.

DARRELL JOHNSON: No, and that's fair. And a lot of, again, foundationally comes from the demand study, so this is just an emissions associated with, you know, proportionate to the demand study.

CHESTER BRITT: All right. Thank you, Darrell. Michael, I know you -- oh. We can go to Norm since, Michael, you're grabbing food. Okay. No, worries. We'll come back to you.

NORMAN PEDERSEN: Norman Peterson, SCGC.

Darrell, you were talking during your presentation about how the equipment could change for combusting hydrogen in the power sector, namely, we could move from traditional gas fired sorts of equipment to strictly hydrogen-oriented equipment, hydrogen-suited equipment as is being done at intermountain power project.

And you also said that we could reduce NOx, and I thought you were talking about the power sector, by doing various things that we do adjusting the temperatures, adjusting the mix in the combustion chamber.

Were you talking about the power sector? And if you were talking about the power sector, about how there is a possibility of improvements, what would we see, if any, reduction in NOx? Or did I misunderstand you? And you were talking about power.

DARRELL JOHNSON: I was really speaking in general to the possibility.

What I was saying is that currently when folks look at emissions or potential emissions increases from natural gas to the blend of hydrogen, you know, and they show an increase in NOx associated with it, my point was is that that type of equipment was designed 100 percent to combust natural gas.

And as we move forward in future, the engineering and design considerations for burners and different control technologies are going to be designed more specifically with hydrogen in mind, because that wasn't part of the equation when the engineers designed the original combustion equipment available today.

That was really my point: As we move forward, there are going to be -- listen, most of these rules are technology forcing, right. And the technology increases based on the reduction demands, and as the reduction demands also include a consideration for hydrogen, we would anticipate new design in, you know, burner technology and combustion equipment that consider hydrogen to reduce NOx. That's my point, and the same thing on the control side.

CHESTER BRITT: Michael, back to you.

MICHAEL COLVIN: So I --

CHESTER BRITT: Name and organization. I'm sorry. Our court reporter is online.

MICHAEL COLVIN: It will take me like 20 more times. I'll get it right. Michael Colvin with Environmental Defense Fund.

I appreciate the story that you're trying to tell here of doing the fuel switch to hydrogen will lead to a better impact on greenhouse gas emissions, but there is not as appreciable of a difference when you're combusting hydrogen on the NOx side of things.

And so if we're trying to optimize for both, we have to wrestle with that trade off, and I think that's an important point to be making.

It occurs to me, and I probably should have said this in the greenhouse gas, but I'm saying it for both. In the power generation side where you're not seeing a whole lot of NOx benefits because you are having combustions, and you are seeing the combustion here, our gas generators have variants within them. They are not all a one-to-one. Some are super efficient, some are super inefficient. And you see that unfortunately, more on the NOx side of things than you do on the GHG, but you do see it in both places.

But to do the fuel switch, to go from natural gas to hydrogen is going to require some investment into that equipment anyways. And so I don't know if you can take as constant the current heat rates or the current fuel efficiency or capacity factors, whatever phrasing you want to use there. I don't know if you can take that as a given, because I think whenever you make a reinvestment and repower a facility, there's going to be other improvements that you're going to make at the same time.

And so I don't know, but I would suspect that this snapshot and the power generation NOx is probably an under count, because I'm assuming you're just doing a one-to-one of what's happening today is what's happening tomorrow, that you're combusting your combusting.

But I don't actually know if that's the case, and I'm curious to hear your thoughts on what you did in the power sector on the combustion assumptions of what the efficiency changes would be, both on the greenhouse gas side and on the NOx side as we made that repowering?

DARRELL JOHNSON: So thank you for the question. I would say that it would be a little speculative of me to try to say that I know what the percentage improvements are going to be, right, because that technology is not here to make those assumptions on.

What I would say to you, you know, as a reference, if you look at the reduction in NOx over the last 20 years -- I'm using that in an analogous way to say that we've gone from 150 parts per million V down to 2, right. And so I would anticipate between now and 2035 to 2045, if we focus on technology and the combustion of hydrogen in a similar fashion, that we would see some reductions that is not necessarily represented in these figures today, which I think is aligned with what you're trying to say.

MICHAEL COLVIN: Again, Michael with EDF. I appreciate that.

One other question, which I think is probably more on the demand side, the demand study, and you're just taking the information that's there.

But since it's also interconnected, have you considered from an emissions perspective a sensitivity analysis of the power sector of what happens if we did that same level of capacity that we're talking about, but not converting over the existing generators, but doing it with a non-combustion technology, such as fuel cells?

the reason I ask that is look at the numbers that we're seeing in the mobility side, it's because we're not combusting. When you look at the (inaudible) principles that Jill mentioned during her stakeholder update, there is a very strong column there for non-combustion technologies.

And so I'm wondering if we're at least even running the sensitivity for -- well, what would happen if we tried to scale up power generation to the level that we think the demand is requiring, but not using the existing fleet, using some new investment that's non-combustion in nature?

DARRELL JOHNSON: So I mean, at a very high level in the study, we kind of have a high and low scenario that says well, what happens if electrification if this equipment comes in?

So that is a consideration, right? But --

MICHAEL COLVIN: All right. Isn't the electrification -- Michael Colvin with EDF here.

Isn't the electrification if we had more end uses being electrified? I'm talking about, like what happens if we had those 30 gigawatts coming from fuel cells? Like, I don't necessarily think we're going to get that level of penetration, but I'm just trying to figure out what the map and this graph would look like if we were saying, no, this is something that we really want to go after?

DARRELL JOHNSON: Right. We do not have that in our analysis today, but I could tell you that if it were a third fuel cells, we would see that proportional reduction in the overall NOx emissions.

MICHAEL COLVIN: That might be worth at least noting in one of your sidebars in the study to say, look, we are -- so if non-combustion power generation technologies were adopted, we would see more appreciable. Instead of the little red slivers, we would see greater proportion. It might be worth it. Even if you don't quantify it, I think it would be worth at least noting it.

DARRELL JOHNSON: I think it's an excellent scientific caveat and bears noting, and thank you for it.

CHESTER BRITT: Jack?

JACK BROUWER: Yeah. I just want to note that current emissions from the power sector of nitrogen oxides is about 2 percent of the total nitrogen oxide emissions. And so most of the NOx emissions are in mobility, so it would increase that a bit, but it wouldn't be, I think, really big.

But I still want you to note it, though, because we should, especially for local communities, be considering this reduction that's associated with getting Energy Research and Development Division of California Energy Commission of that combustion power plant and putting a fuel cell there instead. I think it's a really nice thing to put in the report. I just don't think it's going to be a big sliver.

DARRELL JOHNSON: Right. I agree with both, and thank you for the suggestions.

MICHAEL COLVIN: Thank you.

CHESTER BRITT: All right. We have a couple online that have raised their hands.

Sara Gersen, if you can unmute yourself.

SARA GERSEN: Hi. Thank you. So one of the reasons that the information that's been presented so far is insufficient for understanding the potential impacts on the NOx from industrial and power sources, is that you note that these are permitted sources that have regulatory limits on their NOx emissions, but what you don't note is that all sources are not currently emitting all of the NOx emissions that they could legally emit under those permits. So there's a delta between current emissions and maximum permitting emissions.

And so the transition to hydrogen rates room, assuming the permit limits stay the same to increase within that delta.

And so I'm curious if you have plans to investigate the difference between current emissions and permitted emissions to get a better understanding for that legal room for NOx increases, assuming permit limits stay the same.

DARRELL JOHNSON: We have not at this point, but I think it's an excellent consideration for the study for inclusion in the study.

When we talk about permit limits, I would very humbly propose that if we entered in -- if we bring in a new fuel source into the permit process, that the permit consideration and the limits associated with the permits would have to have some alter, you know, consideration for all, you know, change.

But as far as comparing the two emissions between 100 percent of what is actual and what is allowable in the permits, I do see the difference there. Actual emissions are less in many cases than permitted allowable emissions, and so that's not something we've estimated at this point, but it's an excellent consideration.

CHESTER BRITT: Thank you, Sara.

Tyson, you have your hand raised. We'll go to you next.

TYSON SIEGELE: Hello. Tyson Siegele with Utility Consumers' Action Network.

Could we move back to the previous slide? Yeah. On this one, when I'm taking a look at the key, it says "power sector" in yellow, "Hard to Electrify" in red.

Is the Hard to Electrify there the industrial sector within the demand study?

DARRELL JOHNSON: That's correct, yes.

TYSON SIEGELE: And when you're doing the breakdown -- going back to the power sector for a second.

When you're doing the breakdown here on some NOx emissions reductions within the power sector, it would indicate -- what this graph indicates to me is that on a per plant basis, there is fewer NOx emissions within that level also, or are you assuming that there will be fewer power plants? And because there are fewer power plants, there will be fewer NOx emissions?

DARRELL JOHNSON: So no. This is purely a fuel-based calculation compared to, you know, a throughput and an emission factor and a result in an emission. So it doesn't try to estimate the number of potential facilities.

So we're looking at the demand study from a potential fuel demand. If we switch that fuel times the appropriate emission factor, what emission reduction do we see?

So those considerations are not in the study at this place in point.

TYSON SIEGELE: I see. And when you are taking a look at the emissions then on a per plant basis, you would see more NOx emissions on a, I guess, per kilowatt hour that is produced?

DARRELL JOHNSON: Tyson, I don't know if I'm fathoming that question. You say on a per plant basis would we see more? I would answer the question and say --

TYSON SIEGELE: I'm sorry. No, no. Let me clarify.

Within just the average that you're taking a look at for combustion of hydrogen within gas-fired power plants, when you're taking a look at that, is the assumption you're making that the NOx emissions on a per kilowatt hour of electricity produced, you're going to have more NOx emissions than a natural gas, gas-fired power plant for that same kilowatt hour?

DARRELL JOHNSON: So we did not take -- we did not evaluate the kilowatt analysis. This is purely a kind of demand fuel piece, and the only other consideration that we have from a low side potential is if, you know -- well, I would just say that the demand study, this is a fuel swap basically.

And if you have the fuel swap, what's the representative emissions that would be reduced from that is the simplistic way or approach that was taken to evaluate emission reductions.

So what we do is in the study we look at all the different categories of equipment, right. And there's a lot of different categories depending on whether you're in the power sector or hard to electrify sector, and they all have emission requirements or specific rules that govern the NOx emissions that they can emit.

We take those factors with the fuel, we create an emission, and we do a convergence to hydrogen to see what the analogous emissions would be for hydrogen, and that's the reduction that we're purporting in this information.

It doesn't speak to a comparison to kilowatt hours in any way. It's a fuel swap and an emission factor based on throughput.

TYSON SIEGELE: So --

CHESTER BRITT: All right. Oh. Go ahead, Tyson.

TYSON SIEGELE: When I am taking a look at the hydrogen-fired turbines and, for instance, GE's turbines, and GE says, our turbines, when you compare a hydrogen turbine to an equal output, in terms of kilowatt hours, natural gas turbine, the hydrogen turbine is going to emit more NOx emissions.

I guess the only -- and maybe this is what you're saying. The only way I see a reduction in NOx is if you see a reduction in the amount of kilowatt hours that are produced through gas-fired facilities.

So you're reducing the amount of natural gas generation, in terms of the total kilowatt hours produced each year when you are moving over to hydrogen.

So you are actually getting less power out of the hydrogen in order to -- and by doing that, you reduce the NOx emissions.

Is that what you're saying?

DARRELL JOHNSON: I understand what you're saying. I wasn't saying that. I better understand in the power generation what you're trying to get to.

Did we evaluate the change in the kilowatt hour output for power generation with the fuel switch, because of the energy within the fuel?

Is that the question, Tyson? Because we did not evaluate the kilowatt hour production of the power sector in this analysis, right? This is purely a fuel swap.

However, having heard what you are saying, I think I envision what you are asking in a way that we could incorporate something like that to provide detail in our report. But this was purely a fuel swap throughput times an emission factor and a subsequent emission and what the delta between the two emissions were. So we didn't consider the relationship to how many of the power output or need or production in the electric sector.

So that wasn't an equation or a factor is a very straightforward equation. You know, throughput times an emission factor is an emission. However, we can align those two if that is an area of information that would be valuable and make that -- include that in the report, but it's not currently included in the report.

CHESTER BRITT: Darrell, I'm not sure you even got through all of your slides.

DARRELL JOHNSON: I didn't, but it's okay because everybody seems to have questions.

CHESTER BRITT: Well, it is okay. We want to, obviously, have those. But I would like for you to go through the rest of your slides, and we can continue the conversation if we need to.

DARRELL JOHNSON: Absolutely. So, you know -- and I'll just say that the slides are very similar to the slides before; they just break down the reduction of NOx from each sector, right. So if we go to the next slide, we're talking about the mobility sector. If you go to the next slide, it will represent the reduction or the NOx from the high demand in the power sector.

And, again, you know -- and this goes back to your question, Tyson -- the assumption is to incorporate the consumption of fuel data from the demand study, and basically, we're equating the NOx associated with that fuel switch, right.

So, again, in the power sector, it represents -- our findings show that it represents a very small portion of the overall reduction, less than 1 percent, you know, at this time. Next slide, please.

And this is the hard to electrify sector where we looked at, you know, the metal section, the glass and stone sections, you know, papers and chemicals. It also represents the little tiny slivers in the overall, about 0.3 percent of the overall reduction.

And, again, it is noted, simply a fuel consumption data from the demand study and calculated emissions associated with that. Next slide. And we'll get through all of them, and then we can answer any questions.

So the infrastructure piece on NOx, we do see an increase on NOx of about 4.7 percent, and that represents about -- I had my numbers. Here were go -- about 2.6 percent from production, about 1 percent from storage, and a little over 1 percent from transmission for new infrastructure. And that's generally associated with what we perceive NOx from the renewable natural gas steam methane reformers. We're not calculating an increase in NOx from the electrolyzers or the biomass gasification.

And we also see, obviously, an increase in the transmission to storage area where we are looking at reciprocating compressor engines and turbines. And I have one more slide, and then I'll go to questions, okay?

Also in our presentation or our evaluation, we looked at a very high-level impact of the fuel swap on VOC's and diesel particulate matter, and, you know, taking the diesel fuel and the gasoline out of the equation, we see some very large benefits in the forecasted PM2.5. The diesel was very heavy in the PM2.5. And we also see a projected reduction that's equivalent to about 28 percent of South Coast Air Quality Management District 2037 forecast for VOC's.

So, you know, taking the diesel and the gasoline out of the equation is highly beneficial to VOC, which is a contributing factor to ozone in a number of criteria pollutants and also to the particulate matter PM2.5.

So I'll take any questions you have now, because that's the end of my presentation.

CHESTER BRITT: All right. Norm? State your name.

NORMAN PEDERSEN: SCGC. I'd just like to, for a moment, go back to Tyson's question in relation to your slide that you just covered about the preliminary results for power generation sector. If we could just go back to that slide? That slide. You say, "NOx permitted emissions from power generation are expected to stay the same or decrease."

Are you saying NOx permitted emissions from power generation are expected to stay the same or decrease per kilowatt hour produced?

DARRELL JOHNSON: I guess I would say the answer to that question -- yes, because the combustion associated with the need to produce electricity is going to have some analogous relationship to the kilowatt hours produced.

What I was saying to Tyson is that we didn't evaluate that relationship in our analysis, but purely speaking, I would say that there is a relationship, and there would be a reduction, an analogous reduction. If you relate it to kilowatt hours produced, there's a relationship.

What I'm really saying is there is a relationship to kilowatt hours produced and fuel combusted, right. So I don't know the proportionality between the two. But if you see a reduction in the overall emissions based on the amount of fuel that you're burning, then you would also see a reduction related to kilowatt hours produced.

The exact relationship between the two, we have not evaluated. So if that's information you're interested in, we can. I hope that helps, Norm.

NORMAN PEDERSEN: No, it doesn't.

DARRELL JOHNSON: Okay.

NORMAN PEDERSEN: I'm afraid it doesn't, because the heat content of hydrogen isn't equivalent to the heat content of natural gas.

DARRELL JOHNSON: Understood.

NORMAN PEDERSEN: So you get more kilowatt hours produced if you burn natural gas, and if you burn the same volume of hydrogen. So volume shouldn't be -- it doesn't seem, to me, the point of comparison.

You should compare NOx produced per kilowatt hour of generation. We're interested in getting kilowatt hours out of a generator. We might have to adjust the amount, the volume of the fuel that goes in, if we're burning a different gas, namely hydrogen versus natural gas.

So it would be very helpful if you can

incorporate into your study the analysis of NOx per kilowatt hour produced.

DARRELL JOHNSON: Thank you, Norm. I understood that, and we haven't. And I think that that is something that has been identified as being an interest to the group, and so I appreciate the question, and we'll take that back and try to bring that analysis in the study.

CHESTER BRITT: Jack?

JACK BROUWER: Yeah. Jack Brouwer from UC Irvine. First of all, I just want to suggest that we are arguing over a really, really small portion of the NOx reductions. Okay. So this is just a sliver. Remember, it's the sliver.

But secondly, these are very interesting topics, and scientifically interesting to me. So I'll still comment on them, and that is that when it comes -- I want to first go back to Tyson's comment about the GE study that does show its current gas turbine technology when blending hydrogen in with natural gas shows NOx emissions going up without modification -- without modification. Okay.

Nonetheless, if they want to do that in any gas turbine here is the basin, -- in other words, I'm agreeing with you, Tyson. That's what they say. Yes.

But if they want to do it anywhere in the basin, they are going to have to have a selective catalytic reduction device downstream from that that still takes it to below the regulatory standards.

Okay. So from my perspective, it's kind of inconsequential that GE's goes up a little bit when you blend. In addition, their GE is doing work right now, along with every other turbine manufacturer to actually handle blends with lower NOx with some modifications.

Okay. So all of these factors considered, I anticipate NOx emissions from power generation to go down. There's the third reason they go down -- and you mentioned this earlier in your talk. It's because SCAQMD requires it, okay. And they are ratcheting down on everyone to lower NOx's, okay, because they need every pound, every kilogram of NOx reduction possible for us to meet our sip. okay.

So I think your assumptions are good here, I'm saying.

DARRELL JOHNSON: I appreciate that. I mean, and it --

NORMAN PEDERSEN: And it's a very interesting scientific discussion, though.

DARRELL JOHNSON: It's a very interesting in science, because even depending on what kind of equipment you combust the fuel in, lean burn, rich burn, how you -- what fuel mixture you have, what the ratio is, you're going to get a different emission, right.

NORMAN PEDERSEN: Yeah.

DARRELL JOHNSON: So those evaluations are going to take place, but specifically with hydrogen or hydrogen natural-gas blends in mind, right?

NORMAN PEDERSEN: Yeah. Thank you.

CHESTER BRITT: Thank you. Michael?

MICHAEL COLVIN: Michael Colvin with Environmental Defense Fund. I'm going to change topics a little bit, but stay on this slide, because I think it'll lead us in. I think this is for both the NOx study, the GHG study, and then frankly, for Yuri, per the demand study as well. And I'd like to just focus on cogeneration for a moment.

CoGen is interesting when it comes to hydrogen for two reasons. A CoGen unit has generally been supported by federal policy because there's a high-quality heat need, and then there's extra waste heat, so therefore, let's make some power out of it.

So we've had, as a state, for the last 15-plus years as we've been wrestling with how do we attribute the GHG emissions and everything else of, well, this power, this is industrial, where are we coming from? Where? How? And we've kind of cobbled something together.

I don't know what's going to happen to the future of the CoGen fleet as we make the move away from natural gas and into hydrogen. Presumably, a lot of that underlying useful thermal is going to still need to be used, and we're going to have to convert that over. But not all facilities are going to do that, and so we have to have a pretty honest conversation from a demand study perspective.

What do we think is going to still be a CoGen unit, and what's going to be converted into just a straight boiler, and say, look, it's not worth making power? It's not worth making this additional investment. The market's not there for the power side. or whatever it might be, and just, overall, expense is not there.

But that flows into this conversation on the GHG side. What Norm mentioned a moment ago is that the thermal output of gas versus the thermal output of hydrogen is just a different quality of heat.

And I don't know -- I genuinely don't know if we're going to be able, even if the facility wanted to convert over and to stay in the cogeneration space, I don't know if the useful thermal output is going to yield enough of the useful thermal heat after the end of the industrial process to make it worth going into a cogeneration process. And so it's a very open question.

I think it would be worth figuring that out for both the GHG attribution and for the NOx attribution, but really for the power, for our demand study to just go through and say -- there's something like 4,000 Dish megawatts still of CoGen in the state. and, you know, about -- there's a lot of that in your service territory, more than half, if I remember my numbers right. So I think just nailing that down a little bit, and at least saying, look, there's some open questions here, I think are important.

You know, as Yuri articulated a couple of hours ago, that policy case really drives a lot of the movement here. The State has made no mention yet of how it's going to update short run of what it costs, if at all, to doing a fuel switch.

I have no idea how you would take a new price of natural gas to hydrogen or not like if the economics are going to work or not. Like, there's so many weird questions there.

But from a demand study case, like I don't think we can assume a one-to-one swap for CoGen, and I think it flows down into some of the work that you're showing. So apologies that I didn't raise it in the morning as part of our conversation, but as I was seeing sort of the yellow squares here, it reminded me of, oh, wait. I had that other point to make.

YURI FREEDMAN: Maybe I'll say that first, Michael, I think I agree with you on literally all counts beginning from the fact that CoGen space -- go ahead.

MICHAEL COLVIN: I was just going to say we can start singing Kumbaya next. That sounds great.

YURI FREEDMAN: Exactly. We are a half an hour away from that, yeah. Let's get into the spirit of the holiday season.

So I think CoGen is a really interesting and complex sector. You listed several factors that are going to be a factor, and we'll need to take into account. One is the heat content. The second one is the speed. and jack, I'm sure can comment on the fact that even though hydrogen is lighter and has less energy content, can flow faster, so you need to do the math on that.

I would also say another element that you did not mention is going to be that, you know, we assumed for simplistic purposes that all the power generation is going to be running between 10 and 30 percent.

I think we all know that the capacity factor of the CoGen, if the facility is the host is going to run, then the CoGen is not ran 30 percent. It's capacity factor is going way, way up.

On the other hand, if the facility cannot comply, then the viability of the facility, the host becomes a question. To actually need to do this, I hate to say it, on a project by project, asset-by-asset level, because CoGens are all idiosyncratic. And I think you'll need to go through the biggest, at least, of them, and basically do this analysis, and basically, which absolutely, we need to do. No doubt.

CHESTER BRITT: Michael?

MICHAEL COLVIN: Yeah. Again, I think we're in a ton of agreement here. The reason why I think it's worth at minimum doing a sidebar, doing a call out in the demand study on CoGen is because I think if SoCalGas is going to be making the case to say, look, one of our future potential customers are going to be the power generation sector, and a portion of the power generation sector is made up of combined heat and power units, and we don't know what the future of the combined heat and power units are, it's at least a signal back to the regulatory to say, look, we are preparing and doing some scenarios here as if we are going to maintain that, because I don't think the State is in position of losing thousands of megawatts right now.

But at the same time, I don't think they have geared up for that conversation either. And so I think there is some signal value for SoCalGas to say we have an obligation to serve these customers. We're trying to figure out how to transition our customers into a new world, are we bringing these customers with us or not? Like, that is a very important high-level question we need to ask.

And, you know, the NOx study is not the place to do it, but it's the slide that prompted the thought, so apologies.

YURI FREEDMAN: Yeah. No, I think it makes total sense to put it with a sidebar, in fact, to list several key parameters that differentiate the sector so that people know we're thinking about that. We may not have gotten there in Phase One, but this is what the sectors we're going to look into, and that's how we're going to look at it.

MICHAEL COLVIN: Yeah. And it may be worth -- and when you had your colored blue stack charts, maybe just breaking out how are generation, non-CoGen power generation with code, another shade or a hash mark or something, just to really visualize this, because I don't think the State is recognizing the long-term implication here.

YURI FREEDMAN: Yeah. Good point. Will do. Yeah. Thank you.

CHESTER BRITT: All right. No worries.

JACK BROUWER: And this is Jack again from UCI. One of those customers is our very campus, so I'm thanking Michael for talking about this.

CHESTER BRITT: There's a reason you're sitting next to each other, right?

Ernie, you're being quiet. Are you okay? I understand.

All right. Well, I don't see anyone else with their hand raised, so we are nearing the end of our agenda. We have a couple more things to do. I'm going to turn it over to Emily, who is going to go over next steps.

EMILY GRANT: Thank you, Chester.

So as we stated today, earlier, this is a little bit of a different process and a different meeting than we normally have. Typically, we give you pre-meeting materials, the feedback window opens when we provide you those materials, then we have a meeting to go over them, you have a couple more weeks after that, and then we close the feedback window. We have not opened the feedback window yet, because we haven't provided you materials.

So when we get you those materials, that is when that window will open, and you will have plenty of time to provide your written comments.

As usual, if you need additional support reviewing the material, just shoot me an e-mail, and I will connect you with the correct subject matter expert, and we will get you the additional information that you need.

As usual, today's presentation and the recording will be available on the Living Library in the coming weeks. Hopefully we can do that before we all kind of start relaxing for the holidays. And additionally, again, if you have any questions or concerns, just get in touch with me, and I'll make sure I get you to the right person.

We don't know our next meeting date yet. Again, that will be determined upon when we have -- I know. I'll get it to you, Michael. I promise, I promise.

I know some of you are traveling a really long way, so we'll do our best. As soon as we have a little bit of a forecast on our next meeting dates, we'll get those dates and times out to you. I heard today that the 10:00 to 2:00 window was prime time, so I've noted that. And if we like that time, we'll do our best to accommodate it in the future, and I think that's it. So we'll let you know the next meeting dates when we have them. Yeah, Norm?

NORMAN PEDERSEN: Norman Pedersen, SCGC.

Are you planning to have two workshops after this Pipeline Advisory Group meeting, as you have in the past, or are you going to skip past the workshops?

EMILY GRANT: At this point, I think we're anticipating a workshop would likely be needed to go over the preliminary findings. That's our plan. And then we'd would probably move into a quarterly meeting after that.

So I would anticipate that we would have one workshop, and then a quarterly meeting.

NORMAN PEDERSEN: Do you have any idea about when you would have that one workshop in relation to the holidays?

EMILY GRANT: It would be after the holidays. Normally, it'll probably be sometime late January, and whether or not we consolidate all of the preliminary data and findings, or do we have two workshops? One late January or some time in February.

And then we anticipate having our next

quarterly meeting some time in March.

Go ahead, Ernie.

ERNIE SHAW: Thank you. I just wanted to make general comments if we're, like, ending and wrapping it up, which I think that's where we're going.

Ernie Shaw, President of 483, Transmissions and Storage. Just a couple of comments I wanted to make, you know.

First, I wanted to say, like, you see that little comment tracking little chart thing with the colors and all that? That's a pretty good idea as far as just being able to maintain, like, where everything is at, and where everything is going. Pretty unique, especially adding like a color-coding system to it. I love it. I was like, wow. You guys are on top of it. So, yeah. Oh, man.

EMILY GRANT: We appreciate that. We're trying. We really -- you know, the comments are so helpful, and the written comments are really helpful too. We're tracking everything, and, you know -- to give you an idea, when we start tracking the verbal ones, we're in the 500 range, and each comment gets tracked, and then we put it back to the subject matter expert, and so it does take us a little bit of time to do that.

But in the quarterly reports, you will be seeing where those comments go. And that's really important to us that you provide us feedback. We're able to show you exactly how we're tracking it, and what we're doing it with. We think that's a really important part of this process. Thank you.

ERNIE SHAW: Yeah. Freaking-A, man. That's awesome. Love it. So there's that.

And then going back to -- I mean, I think I kind of caught the tail end of it, the greenhouse gas emissions part about leakage and all that. But, you know, if I understood it correctly, you know, if there ever was a concern for leakage, and what if and this and that, I mean, there's leaks, we're going to find it, we're going to fix it. And that's just what we do every day. So, you know, there's nothing to be worried about, because we do it pretty dang well. Or at least my members of 483, I should say. You know, I can't speak for everybody else, but -- and we also have a good -- great cathodic protection system that eliminate that prospect of having leakage. You know, we've got guys out there that monitor that on their work orders, you know, monthly, quarterly, semi-annually. I mean, they're on top of it. And if they find any little indication of left or right, they troubleshoot, you know, seek to remedy it. So like I said, if there's any concern for that, don't let it. We find it. We fix it. Move on.

EMILY GRANT: Ernie, on behalf of all the cities I used to work with, "Find it, fix it, pave it, then you move on."

ERNIE SHAW: You know, we like to spread the love around with paving, you know, so I can't do everything. Exactly. We'll do the majority of it. Most of it, but we'll spread the love around.

And then last but not least, and maybe I'm far off on this, I don't know but I'm just going to say it anyways, because that's the way I understood it, to kind of talking about Tyson's comment. Yeah, I know you're there hearing me, Tyson, so open your ears.

We talked about the potential for not having a need for fuel cells for the heavy -- or not the heavy, but -- I forgot what it was. But anyways -- maybe that's what it was, yeah.

You know, if we're going to limit ourselves to just battery-powered, you know, automotive and stuff like that, then I think that will kind of create an opportunity to isolate the market, and just say, like, well, we're only using battery for everything, as far as automotives and all that.

So, you know, we're having production problems at the mine or however we, you know, make these batteries or the materials for it, so, hey, you have to pay thousands of dollars more for this if you really want it, and that's just the way it's going to be.

So having an alternative, you know, method for delivery, you know, for this. It is what it is, you know. You can't be able to kind of, you know, isolate the market that way so it's good to kind of, I guess spread the love around, right?

We may fix everything ourselves, but we don't complete everything. We would like to spread that out like I was mentioning, just a general comment. Like I said, if I'm off, I'm off. But that's just the way I interpreted it, and I wanted to kind of put that just the way I interpreted it, and I wanted to kind of put that out there. Thank you.

CHESTER BRITT: All right. I think we did it.

So I want to just -- as a facilitator, you know, we've been meeting like once a month. I'm not sure we anticipated that when we first started, what was it, eight or nine -- ten months ago.

But you guys have been amazing. I mean, I've gotten to know a lot of you. I saw you at the H2 Catalyst conference. You know, it's beginning to feel like a family, and I really think as this group moves forward into next year, you know, we really have a lot of work still in front of us, and there's a lot of reports that are going to be coming out with some of their findings.

Today's conversation was terrific. I mean, this is exactly why we convened the PAG, was to have robust conversations about serious technical information that the SME's are here to answer and have dialogue about and to get your feedback so that we can incorporate it where it's appropriate into those documents.

So it's really helpful to hear what you have to say. I appreciate, Arthur, you guys coming and being here in person. I would encourage you -- we had a lot of people online today, which is great. We're not complaining about that.

But the more that you can show up every once in a while, the better it is. It really does help to have conversations in person and to break bread and have food and SoCalGas does a tremendous job in feeding us all during these meetings. So and there are holiday cookies in the back. We want to encourage you guys to get some and take some with you and take food with you because we don't want to waste it. And I do want to, you know, just tell you guys to have a happy holiday. Spend time with your families. Get your rest. I know all you guys are tremendously busy. You guys work really hard, and it's an important time of the year to kind of, you know, exhale a little bit and get ready for the next year because there's lots of work to be done. so we thank you very, very much for your participation, and we welcome you to 2024, the next time we'll see you.

(Meeting adjourned at 2:00 p.m.)

CERTIFICATE

OF

CERTIFIED SHORTHAND REPORTER

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I, Miranda L. Perez, CSR No. 14352, Official Reporter Pro Tempore of the Superior Court of the State of California for the County of Los Angeles, do hereby certify that the foregoing pages, 3 through 143, inclusive, comprise a full, true and correct transcript of the proceedings held on Friday, December 15, 2023.

Dated: January 9, 2024

Miranda Perez

MIRANDA L. PEREZ, CSR No. 14352

OFFICIAL REPORTER PRO TEMPORE

LOS ANGELES SUPERIOR COURT

REGAL COURT REPORTING

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In the Matter Of:

PLANNING ADVISORY GROUP ANGELES LINK

TRANSCRIPT OF PROCEEDINGS

October 18, 2023

Case No:

PLANNING ADVISORY GROUP

ANGELES LINK

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REPORTER'S TRANSCRIPT OF PROCEEDINGS

October 18, 2023

Taken before Nicole A. Hatler

CSR No. 13730

P R O C E E D I N G S

Wednesday, October 18, 2023 - 9:02 a.m.

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MR. BRITT: Good morning. We're going to go ahead and get started.

It's good to see people in person again. It looks like you all got your coffee and bagels. For those of you online, you're missing out on the free food. It's always good. It's good to see everyone again. We're in this monthly groove where I think we're having meetings on a monthly basis going over various topics. Today is a planning advisory group meeting. It's our October workshop. And we'll go ahead and jump right into the agenda and our slides because we have a lot to go over today, and we have a lot of speakers and a lot of information to share with you. So it should be a really good meeting, and I'm looking forward to it.

I guess I have the clicker. There we go. All right. A couple of housekeeping slides. You guys should be familiar with this. Most of you have been in meetings before with us. But this meeting is being recorded, both video and audio. As you heard a second ago, there is a court reporter who will be transcribing the meeting. Please announce yourself before you speak. The Zoom microphones are muted so that we eliminate any background noise. You will need to unmute yourself once you are called on to speak.

Both in person and online participants, please speak clearly and directly into your microphone. We have the microphone over there. So you can share that. But please speak directly into the microphone, announce yourself before you speak. If we could encourage you also, especially people online, to turn on your cameras, that way we can better engage with you. It really helps us in person here to see your face. We have a big screen behind us where we can see that. So that helps us connect with you.

Please feel free to use the Zoom chat to provide any input and ask questions throughout the meeting. Again, we're recording the whole thing. So if you want to speak in person verbally, great. And if you'd rather just chat something, we will be able to capture that, as well, and make sure that we take a look at that and read it off and get answers to that chats and document all that information.

If you would like to speak, please use the raise your hand button at the bottom of your Zoom screen, and then wireless microphones will be passed, as I mentioned, to those speakers.

Again, my name is Chester Britt. I'm the executive vice president of Arellano Associates, facilitator of the PAG. I have with me today Alma Marquez, who is the vice president of government relations with Lee Andrews Group. She also helps me lead the CBOSG, which is a community-based organization stakeholder group, and she's with us today, as well.

As I mentioned, we have a full agenda. We're going through our welcomes. Alma will do a land acknowledgement in just a moment, and we'll do our normal roll call as we go around and introduce ourselves. We'll have some welcoming remarks from Frank, which will be really good in light of what we found out from Arches on Friday.

Also, the production planning and assessment technical approach will be presented today, and we'll have a member discussion about that. We'll also get into pipeline routing and technical approach. We'll have a break and then we'll talk about a software platform called Pivvot that we're going to be particularly interested in discussing with you. We'll get into pipeline sizing and design technical approach. And that will conclude our meeting and we'll wrap up with some next steps and talk about our upcoming meeting in December, and then we'll have lunch. So again, those of you who are here in person will have a good lunch to end our meeting.

So with that, I'm going to pass it over to Alma who is going to do the land acknowledgement.

MS. MARQUEZ: Thank you, Chester.

And good morning, everyone. We respectfully acknowledge the Indigenous Peoples on whose ancestral land we gather of the diverse and vibrant communities of Tongva, Tataviam, Serrano, Keyas [phonetic], and Samish [phonetic] people who, for generations, have cared for these lands and make their home here today. We honor and pay our deepest respect to their elders and descendents, past, present, and emerging, as they continue their enduring stewardship of these lands and waters for generations to come.

We acknowledge our collective responsibility and commitment to elevating the stories, culture, and communicate of the original caretakers of this region and are grateful for the opportunity to live and work on these ancestral lands. We celebrate the resilience, strength, and unwavering spirit of Indigenous Peoples and are dedicated to creating collaborative, accountable, and respectful relationships with Indigenous Nations and local tribes. Thank you.

MR. BRITT: Thank you, Alma, for that.

All right. We're going to do our roll call.

We'll do self introductions. And we'll just pass the microphone around in person first, and then we'll go to the online participants and ask you to introduce yourself.

Again, when you do that, if you could please state your name and the organization you're affiliated with.

MS. GRANT: Good morning. Emily Grant, senior public affairs manager with Angeles Link.

MS. REGAN: Good morning. Katrina Regan, engineering and technology development manager for Angeles Link.

MS. KITSON: Good morning. Amy Kitson, director of Angeles Link engineering and technology.

MR. DOWNS: Robin Downs UWUA Local 43..

MR. SHAW: Good morning. Good morning, everybody. I know I look different. Don't get used to it. I had to do my fit test last week. I feel so empty without it. Ernie Shaw, president of Local 43. Good to see everybody.

MR. DICONSTANZO: Always a tough act to follow. Sal DiConstanzo, Port liaison with ILW Local 13. Good morning.

MR. PEDERSEN: Good morning. Norman Pedersen, Southern California Generation Coalition. And after two nights of watching Ken Burns' documentary about the buffalo and the Native Americans, your introduction, Alma, really fit in very well.

MR. LOPEZ: Good morning, everyone. Frank Lopez, director of public affairs for SoCal Gas.

MS. TRACY: Good morning, everyone. Jill Tracy, senior director Angeles Link regulatory and policy. Good morning.

MR. FREEDMAN: Good morning, everybody. Yuri Freedman, senior director of business development managing innovations.

MR. BRITT: All right. So we're going to switch now to people online, and I'll just start at the top. Once I announce you, if you could unmute yourself and then announce yourself, that would be great.

The first one I see is Aaron Guthrey.

MR. GUTHREY: Good morning. Aaron Guthrey, LADWP.

MR. BRITT: Welcome.

Aaron Stockwell.

Aaron Stockwell, are you there?

MR. STOCKWELL: Yes. Good morning. Aaron Stockwell with California State Fire Trades Council.

MR. BRITT: Welcome.

I also have somebody with a phone number which is 949, and it ends in 1305. Is -- if that's you, if you could unmute yourself.

MR. CONNELL: Yes. Hey, Chester. Nicholas Connell, interim executive director at the Green Hydrogen Collision. I'll jump on camera soon. I'm just traveling today. Thank you.

MR. BRITT: Thank you.

Adam Jorge?

MR. JORGE: Hey, everyone. Adam Jorge, SoCal Gas state and legislative affairs.

MR. BRITT: Welcome. Armen, it looks like, Keochekian.

MR. KEOCHEKIAN: Yeah. Hi. Good morning. Armen Keochekian, director at Insignia Environmental.

MR. BRITT: Thank you, Armen.

Adam? Actually, I already did Adam.

Let's see. Arthur Fisher?

MR. FISHER: Hi there. Good morning. Arthur Fisher with the office -- Public Advocate's Office. It's CPUC. Thank you.

MR. BRITT: Welcome.

Jack Brouwer?

MR. BROUWER: Yes. Hello. Jack Brouwer from the University of California Irvine.

MR. BRITT: Good to see you, Jack.

MR. BROUWER: Nice to see you.

MR. BRITT: I also have someone listed as H Moreno. That's Hector. Okay. He's with SoCal Gas.

I also see Joon Hun Seong.

MR. SEONG: Joon Seong with Environment Defense Fund.

MR. BRITT: Good to see you.

Julie Roshala?

MS. ROSHALA: Good morning. Julie Roshala with Insignia Environmental.

MR. BRITT: Welcome.

Katrina Fritz?

MS. FRITZ: Hi. Good morning. Katrinia Fritz, the executive director of the California Hydrogen Business Council.

MR. BRITT: Welcome.

Maddie Munson?

MS. MUNSON: Good morning. Maddie Munson on behalf of the Agricultural Energy Consumers Association.

MR. BRITT: Welcome.

Matthew Tahl?

MR. TAHL: Hi there. Engineer with Public Advocates Office at the CPUC.

MR. BRITT: Maryam?

MS. HAJBABAEI: Good morning. Maryam Hajbabaei,

program supervisor --
(Reporter clarification.)
MR. BRITT: Maryam, could you reintroduce yourself for the court reporter?
MS. HAJBABAEI: Sure. Maryam Hajbabaei, program supervisor South Coast Air Quality Management District.
MR. BRITT: Great.
Tyson Siegele?
MR. SIEGELE: Hello. Tyson Siegele. Today I am representing the Utility Consumers Action Network.
MR. BRITT: Good to see you, Tyson.
Miles Heller?
MR. HELLER: Yep. Miles Heller with Air Products.
MR. BRITT: Rizaldo Aldas.
MR. ALDAS: Hi. Good morning, all. Rizaldo, that's with the research development division of California Energy Commission.
MR. BRITT: Welcome.
Sara, looks like, Fitzsimon.
MS. FITZSIMON: Almost. Hi. Sara Fitzsimon, and I'm the policy director at the Independent Energy Producers Association.
MR. BRITT: Welcome.
Sophia Dumbridge [phonetic].

MS. DUBROVICH: Yeah. Good morning. It's Sophia Dubrovich. I'm from Local 13 with the IOWU.

MR. BRITT: Welcome.

Nermina?

MS. ONEIL: Yes. Good morning. Nermina Goodwich O'Neil, manager of resource planning and assist with union CFTWP.

MR. BRITT: Welcome.

Nicole Hatler.

THE REPORTER: Hello. It's the court reporter.

MR. BRITT: Okay. If it looks like those are the only people that I see. If I did not call your name, please rise your hand so we can allow you to unmute yourself and introduce yourself.

Did I miss anyone online?

All right. It looks like we got everyone. So that's good. Okay. So welcome again to the meeting. Again, thank you so much for participation. We always have a good group. Looks like we have a really strong group today, and we have a lot of information to cover.

So without any further ado, I am going to try to advance the slide. Nancy, I'm having -- there we go. I'm going to introduce Frank Lopez. He's the director regional planning -- regional public affairs, and he is going to give us a welcome and opening remark.

MR. LOPEZ: Thank you, Chester. Good morning everyone. Frank Lopez, director of public affairs. It's good to see everyone. It's been a while since I've been to a PAG meeting in person. I was just thinking about this yesterday. I think the last one I came to was at Ulta C. So it's been a while. I watch all of them online, though, so I haven't missed any of the input. So I really appreciate that.

But I've been watching and reading all of the feedback. I just want to say I appreciate folks continuing to engage and provide us with feedback. I know it's been a lot of meetings. It's been a lot of information. It's been a lot of process and studies, but we value your input, and I just want to acknowledge and say that the work that you're doing is really making a difference in our work.

But before I turn it back over to the team, I also want to just take a moment to acknowledge that last week was a pivotal moment for the hydrogen economy in the United States, and especially here in California. As many of you know, last Friday we learned the exciting news that the U.S. Department of Energy awarded California via Arches $1.2 billion for a clean hydrogen hub. California was one of seven hubs that were selected to receive $7 billion to accelerate the domestic market for low cost clean hydrogen. I know some of our PAG members are part of Arches, and I wanted to congratulate all of you and the State for receiving the award. Some of you may recall that the CPUC directed us to join Arches and its Angeles Link memo account final decision. So we, too, were part of the State's application. I know it took tremendous amount of leadership from the state to assemble the broad coalition of organizations that make up Arch. I think it's over 400 organizations, and to get them to work together to develop one application is no easy feet. So just congratulations to everyone who was part of that effort.

I'm here to, obviously, representing SoCal Gas today, but as a Californian, I'm also just very proud that the state received one of the largest awards. As I'm sure Sal from ILWU can attest to, California often doesn't get its fair share of funding when it comes to federal infrastructure programs. So on a personal level, I'm just happy to see that California was one of the awardees and got a substantial amount of money.

You know, for SoCal Gas, we believe that last week's announcement was really a watershed moment for the -- California's clean hydrogen economy. We believe that DOE's investment in Arches demonstrates the essential role that clean hydrogen will play in accelerating California's energy goals, growing California's clean energy workforce and improving the lives of billions of Californians.

The award also adds even greater urgency to our work on Angeles Link because we always envision Angeles Link as a critical transportation system that would connect regions with clean renewable hydrogen to hard-to-electrify sectors.

In terms of next steps, I'm sure there are a lot of questions about what comes next. Arches is in the beginning stages of working out details on its implementation plan for the projects and its applications. And I think as Arches realizes that plan and we have more information to share with all of you, we're going to come back to that PAG and share the information. I think in the meantime for those of you who were not part of Arches but you're interested in learning more about the award and getting involved, I encourage you to please visit their website which has information about next steps, and I think they also have some upcoming opportunities for public engagement.

So with that, I know you have an ambitious agenda, as you always do, so I'm going to turn it back over to the project team. But if any of you have questions about Arches and what I just shared, I'm going to stick around for most of the day today. So if you want to come talk to me -- for those of you who are in person want to come talk to me during the break, I'm happy to make myself available. And for those of you online, if you want to reach out to Emily Grant, she can provide you with my contact information and I'm happy to have a conversation.

So with that, thanks for be being here. I'll turn it back over to the project team.

MR. BRITT: Thank you, Frank. And you mentioned that Arches has its own website, and we'll put that link in the chat feature so that people have access to it. It is a separate process, just to be clear, from what we're doing here with Angeles Link. They have their own outreach, their own meetings will be set up. And as Frank mentioned, there will be further discussion about Arches and future meetings, potentially, as we learn more. Again, this just happened on Friday.

So while there's a lot of excitement, there's a lot of uncertainty still as to what that means and what the next steps will be, and all of that will be forthcoming as we go through.

I think someone raised their hand. Tyson, you might have a quick comment or question to Frank before we move onto the agenda? We're not going to really cover a lot of discussion about Arches because, again, it is brand new, and there's really not a lot to say. This process we're going through is not Arches. It's very focused on the 16 work studies and the Phase 1 feasibility analysis that we're doing, which has been what we've been meeting on since January and what today's meeting will continue. But I do want to at least allow one person to ask something to clarify if there's anything to clarify so that Frank can weigh in before we move on.

So Tyson, go ahead and unmute yourself and introduce yourself. That would be great.

MR. SIEGELE: Hi. My name is Tyson Siegele. I am representing the Utility Consumers Action Network today. Frank, thanks for the update there. In terms of taking a look at the award, I wasn't able to find anything on the application, how it might relate to the Angeles Link, what is actually concrete, what is not really decided yet.

The information is -- is really -- as far as I could tell, nothing is public yet. Is that -- is that right?

MR. LOPEZ: That is correct. I think it -- Arches is probably still waiting to finalize the agreement with DOE before he releases that information.

They have more projects proposed than they could fund. So I think there's still going to be some ongoing negotiations and they haven't disclosed information about what projects ultimately made it into Arches, although they do have a facts sheet that came out that talks about some of the potential benefits that could come from the projects that are included and a map -- kind of, a high level map of where the various projects are distributed throughout the state.

MR. BRITT: And as I mentioned, Tyson, there is a separate link. We'll post on the chat. There is a separate outreach process that is not being handled by SoCal Gas which you can participate in and get probably more of that information.

And again, if there is something to say from SoCal Gas' perspective, those will come in future meetings, and we'll notify you of those things, as well.

So we're going to go ahead and move on now into our agenda and talk about some of the details. The first presentation is Yuri Freedman. You guys should be familiar with Yuri. He's the senior director business development, and he's going to make a presentation on production planning and assessment and the technical approach that we're taking to do those things, and then we'll follow that up with a member discussion.

So I'll turn it over to Yuri.

MR. FREEDMAN: Thank you, Chester.

Again, good morning. Let me see if I can operate the clicker.

I'm going, as Chester managed, to talk about the technical approach to assessing of planning -- well, production planning for hydrogen. I'll just say the good news, I think -- I don't think it's news to any of you here is that California has tremendous resource of renewable power, as well as other pathways of production. But renewable power is one that really shines.

So again, what I think this analysis is showing and the way technical approach structured is that clearly there's multiple ways of producing renewable power. There are going to be very promising pathways to producing renewable hydrogen using this power.

As you can see the first slide, from a very high level, illustrates three pathways, of which we will focus on the first. First one is -- again, it's pretty simple. Technically, you take power, you take water, and then you apply that electric power to water by splitting water into hydrogen and oxygen. That's what we call electrolysis. And this is going to be, quite likely and by many assessments, by far the largest pathway of producing hydrogen, which is, of course, why hydrogen --

clean hydrogen got so much attention.

The second pathway which may gradually become relevant to the state, even though it's not at scale yet, is taking biomass and putting it through the process called desiccation. Think about this as biomass, organic matter, contains a lot of carbon, a lot of hydrogen. Heating this biomass, in the absence of oxygen, is going to eventually split this into carbon and hydrogen. What we mean is hydrogen, the attractive part of that is that carbon stays in solid form. So we avoid making carbon dioxide, which is a gas. We keep carbon in solid form, we can either sequester it or use it for something because many materials which we use in our lives are carbon containing.

And the third pathway is the same process of the hydrogens being produced today, it's called steam method reformation. The reason I list it here is that if you use bio gas, biomethane, you start from chemical called methane. But since you avoid emitting this into the atmosphere, it's actually a carbon negative way of making hydrogen where you do emit soot during the process, but it is a fraction of greenhouse gases effect that you were to have if you were to allow the biomethane to leak into the atmosphere.

So these three pathways are the way you can make, in a very simplistic high level, hydrogen. Again, we're going to focus on the first one as by far the most scaleable and technical mature.

And the next slide is going to drill it one level down and effectively ask a question, Okay, if you want to produce renewable power, and that's your chart on the left here, how many ways are there to produce.

Or said differently, how many resources can you tap into to produce renewable power? Some of them we know really well, of course. In fact, we know many of them quite well. It's -- so it will take, it's hydroelectric, wind on and offshore, biomass, and geothermal. Just to illustrate the -- our approach, we providing here the table on the right which is based on the data from National Renewable Energy Laboratory that captures the important technical characteristics of the pathways which run the gamut from useful life of the assets which, as you can see is extensive, but it's bigger -- longer in some times than in others; construction years, which is also important; and the cost, of course -- cost to construct and cost to operate.

So these are the pathways of making renewable power. Again, we expect, based on what we see in California today, and based on the direction of the development efforts, is that solar photovoltaic is by far the most scaleable of these six pathways for a number of reasons. Again, California has a range of resources, but solar PV is what is being in the most active development today. It is quite likely what is going to be continued developed, which is going to serve as a feedstock or power supply for clean hydrogen.

And the next slide is giving you a high level of review of how we're going to compare those ways of making renewable power. If you look on your left, those rows are, again, fairly comon-sensical parameters where we look at how mature technology is, how technical feasibility is. We look at the scalability and the -- if you will, the opportunity for it to really deliver this clean energy at scale. Because as California ambitions are, as this project we are working on is, the scale is large, accordingly -- accordingly it calls for large-scale deployment or build-out of renewable resources. Location siting is a very important parameter, and of course how much land is required is quite important, too.

And so, going from left to right -- or maybe going horizontally, you can appreciate it. Almost all these technologies are mature, technically. The exception is offshore wind. And this really isn't a subject because there's plenty of excitement in

California about offshore wind. I'm sure that, Norm, you and others know it full well. Globally, there is a lot of offshore wind that has been installed. California is going to have a degree complexity associated with that because of the shape of the ocean floor. Quite simply, if you build those offshore wind platforms in the shallow water, you build stationary platforms, we call it a fixed-slab platform, and then you install equipment on them. We may not be able to do it in California because the depth of the ocean floor gets very significant very rapidly, which is to say we will need to build floating production facilities, which is significantly more complicated technically, as you can imagine.

There's tremendous experience Worldwide in the industry. Frankly, this experience is in offshore rigs, and these are space-age technologies deployed to put those very large facilities in the water and keep them finely balanced. But applying this to wind is going to be challenging, which is why we put this technology here as developing. Again, that's just intend to illustrate you our approach that on the other side, maybe, of the spectrum, if we look at scale, I know I said it before, it's fair to say that both solar photovoltaic and wind can be potential large for us. Geothermal resources and maybe hydro can be more limited.

And then as we, I think, all know, location and siting really, really matters. And I think it's fair to say that siting the hydro facilities, as well as geothermal, is going to be somewhat complicated. I would say solar photovoltaic is probably the easiest which, again, helps. And wind offshore not always complex technically, but obviously it has a lot of interactions with the ocean environment with marine life, therefore, there's a degree of complexity associated with that.

So again, this is not trying to hit every square, if you will, in this table, but just giving you a sense of how we are going to go about comparing these technology of producing renewable power.

Let me move over to the power storage, which is obviously very important element of producing power. As I think all of you know, many of the power resources, especially solar, of course, and wind intermittent and have relatively low capacity factor. And the question becomes, would it make sense to combine them with storage technologies to effectively increase the capacity factor. And again, it's the same -- the same format that you've seen before. We will -- except that we are listing on the left four probably most commonly discussed ways to store power. The first of them is most common, I would say.

I think the vast majority of what's been installed in California today is the utility scale lithium ion batteries for our batteries. Pump storage is very well-known, and we'll talk about it in the next slide. Flow battery is promising. They can -- they have the potential to store energy for longer than four hours. I don't think we're going to stretch it for days or weeks, but it may be eight hours storage or maybe more. And again, compressed air energy storage is another area where there's a -- work of developers who are trying to use and repurpose, sometimes, the existing underground facilities for compressed air.

You can see on the right-hand side, again, the same source, the same framework of putting the key parameters that will go into the analysis. I would draw attention to an important Footnote 3 here, because when we talk about the time to build, that time does not include time for permitting and interconnection requirements. As many of you know, these days in California may take a long time to interconnect power generation facilities. That -- the -- the line that you see here, the construction year, it does not capture that. That's simply the construction timeframe.

And going over to the next slide, again, this table looks remarkably like the table two slides ago, but believe me, it's different. And again, same approach, more or less, in terms of the parameters except that we also include here the storage duration, which is really, really important parameter, of course. Everything else is quite similar. You can see that this lithium ion obviously is the one that is most proven in reality to execute. The one -- I wouldn't even call it a drawback, it's just a feature of technology, it's short duration storage. And so, while it can help in combination with solar to increase capacity factor of the project, what lithium ion, of course, cannot do is store large amounts of energy for long periods of time, which is where chemical storage and hydrogen comes in.

So again, that goes back to complimentary phase methods of storage where hydrogen doesn't compete with lithium ion or other forms of short-term storage, they're able to compliment each other.

Pump storage is very proven, which is why I put mature way of storing energy. Again, there's nothing technological challenge about this. I think what's challenging, of course, is the site. And just between the scarcity of the sites where it can deploy this technology and the environmental complexity of permitting them, we are putting this as difficult.

And now going to utility scale flow, flow is promising and there's a lot of excitement in the venture capital community around that, it is still a developing technology. So we rank it, as you can see in yellow, because it is not yet at commercial maturity. Not difficult to site, not much land, but generally speaking, it's something which has not yet proved itself in the market at scale.

And compressed air energy storage, last but not the least, the logical developers is clear. If you have existing facility which has underground cavern, it would be attractive to use it for storing energy in boundless forms, of course, to pump compressed air and then to take this energy back when we need that. It is relatively difficult technically for a number of reasons. It's also has the site challenges, and there's just not that many sites where it can be deployed.

So this, effectively, is the, if you will, high level screen which we are going to apply to these technologies. Again, thinking back and maybe taking a step back, this is production plan assessment. So the end result of this would be to conduct analysis of how much renewable resource is there to produce clean hydrogen. We're very optimistic about the fact that, again, California has the world class resource, as we all know, of solar and other types of resources. Therefore, we believe it will be an an impressive outcome as we look at the ability of this analysis to clean hydrogen.

And with that, let me stop here and answer questions -- take questions.

MR. BRITT: Thank you, Yuri. I think we had someone who just joined us. If you could just put your little name plaque up so I can see you and then introduce yourself for the court reporter, that would be great. Other other way. Thank you.

MS. PASKETT: I'm --

(Reporter clarification.)

MS. PASKETT: Good morning. This is Lorraine Paskett with Air Products.

MR. BRITT: All right. And if there's anyone else who joined us online, go ahead and raise your hand, and we'll introduce you.

But is there any thoughts -- your presentation focused on various production pathways, renewable energy, biomass, and biogas. I would say, however, most of the focus is on renewable energy sources to use in the electrolysis process.

I wonder, does the PAG agree with this focus and are there other sources of renewable energy that you think should be considered? Just as a thought to get us started, I would love to get your input on that.

And I see, Arthur, you've raised your hand, so we'll go to you first while people in the room are thinking about it. So go ahead and unmute yourself, Arthur. We should be able to hear you.

MR. FISHER: Hi. This is Arthur Fisher with Public Advocate's Office. This is not so much a comment about what you just said, unfortunately. It's a somewhat different comment, but since I have the floor, I'll hold it.

One of the issues I see with what you presented, Yuri, is -- I have a concern about generation profile, daily generation and daily production, and I don't see that reflected -- I think that needs to be reflected as a line item across all your generation and storage elements that you're studying. Because that's going to be hugely, hugely important as far as energy costs are concerned to both the producers and the public. If we get the profile generation wrong, then we could deepen the dark curve, and I don't want to do that. I'd rather have a profile that actually benefits everybody and actually uses all that intermittency, for example.

So can you -- can you speak to the considerations that you may be giving to the actual profile of the -- of the daily and see the generational of these storage -- these different generation and storage elements you're looking at?

And then -- so yeah. Just leave it at that. Thanks. I'd like to speak to that, if that's possible.

MR. FREEDMAN: Absolutely. Thank you for asking that. So as you correctly mentioned, of course, the capacity factor and the intermittency is a very important attributes parameter of many renewable production methods, especially, of course, solar and wind. We are going to capture that. Ultimately, the objective is to find the lowest cost configuration to make sure that we are producing hydrogen -- or when I say we, it will be third parties. As you know, SoCal Gas will not be producing hydrogen, but we are going to take an informed view on the potential to produce with a light to the optimal costs. And so, capacity factor absolutely is going to be the factor in this analysis, of course.

MR. FISHER: But this goes beyond just the capacity factor, per se. I mean, this is going to be time of use, effectively. That is my concern. You know, if -- the greatest benefit, from a renewable perspective, would be to use -- one scenario, greatest benefit would be use solar -- the spare solar capacity in the middle of the day. That gives you a six- to eight-hour period of time where you have, potentially, very cheap solar available for production.

My question to the actual developers is, is an eight-hour window, an eight-hour slot enough for them to get a return on that -- on that generation on that production profile?

Because otherwise, you're going to be kicking into -- you know, just with the profile of generation in California, you're going to be kicking into -- into the actual existing gas generation and things like that as you go through the length of the day. So I think it's a wider question about what profiles are feasible for actual production and whether we have -- because maybe -- there may be other necessary build-outs of other -- of other -- are there other renewables or will you be dipping into things that are nonrenewable.

MR. FREEDMAN: No. I think that's a fair question. We definitely will have the analysis. As you will recall, we will have the cost effectiveness analysis which is where this is going to be drilled in deeper. But -- and we also important like going to interface with market participants to get their sense -- or to get their intent on whether or not -- quite simply have a number of choices. You can add storage which adds costs, and by that, we can mitigate what you described, right. You can basically capture that excess power that you are producing during the peak hours and then use that power once you, obviously, go to the shelter hours. That adds cost. So we have to analyze. And developer is analyzing that because that's their projects, whether that makes sense or whether you are settling for lower capacity factor. Basically, what -- what are the results in all lower cost, right. So we are going to go through this analysis, but we're also going to validate this with the market participants to make sure that we understand what they're thinking.

Does this answer the question or am I still maybe missing the mark?

MR. FISHER: I don't think you're missing the mark, Yuri. My concern is it's -- focussing on capacity factor averages everything, and that really concerns me. The devil is going to be in the detail because you're going to have tripping thresholds, effectively. If a developer has got to decide to develop and then they're going to have -- to have increased actual transmission requirements and they're going to transmission cues, you know, and things like that, then it's going to start becoming a real issue and there's going to be knock-out effects. And I want to -- I would like to understand what the knock-out effects are for the wider system. Not just what they're going to need to do, but what is it going to do to the actual electrical system, as well.

Because if we get the time of use wrong it -- and you start adding on -- and you start generating at 5:00 p.m. and we don't understand how that works, you're going to have real problems.

MR. FREEDMAN: Yeah.

MR. FISHER: That's -- that's just what I'm trying to get at. I think there's a level of detail here we really need to get into to understand the potential -- potential risks.

MR. FREEDMAN: 100 percent I think, again, the question is extremely valid. I think it does come down to what you mentioned as the level of detail, as I know we've noticed this Phase 1 analysis does not involve the detailed modeling of the power market, which I think is what will be required to answer a question this close to satisfaction. I, personally, think it's absolutely essential part of work because we have to model this within the confines of real power grid of California. That's what we intend to do down the line. But our market modeling was, as you know, not within the scope of Phase 1. But that's not to say that's unimportant. That's extremely important.

MR. FISHER: Okay. Thank you, Yuri. Let's set up that power modeling correctly then.

MR. BRITT: All right. Thank you, Arthur.

Really good input.

I also see Jack Brouwer, your hand is raised. Go ahead and unmute yourself and ask your question.

MR. BROUWER: Thank you very much.

You asked about the -- whether we agree that the study is identifying approaches for making the hydrogen that are reasonable. I would say that from the many papers I have read and written, it seems very, very reasonable. The likelihood of the most cost effective means, the possibilities associated with California and offshore wind, together with the availability of solar that we have in this region and everything seemed very reasonable and most likely for the production of hydrogen into the future.

One of the things that I think it might need a little bit more, from my perspective, is on the biogenic pathways, and in particular those that might have synergistic benefits associated with removal of waste streams. And a particular one that I think we should be talking about is the removal of forest waste which would have the secondary benefit of limiting wildfires into the future. Now I know this is, kind of, controversial because some people think that, you know, removing it is not a natural thing to do and everything.

But anyways, some of this kind of discussion would be helpful. And some of those very pathways which would have the co-benefit of handling a waste stream and producing a lot of hydrogen continually and not having the grid impact that Arthur is worried about might be some of the most cost effective means in early years.

So just a little more discussion on that would be nice.

MR. FREEDMAN: Great point. Thank you very much, professor. And we agree that biomass identification would be beneficial pathway in model one way. Obviously terms, if you will, liability into an asset. It's very important. I know there's a lot of interest in the state on that. We are going to try to compile data points on that. As you know better than us, technological maturity of this is quite, quite different from such technology as, for example, PV solar. Solar PV is super well understood. Gigawatts have been installed, and biomass is not there. But we will try to find what we can and present this data, for sure.

MR. BROUWER: Great. That's great. I agree, on the other hand, that that won't be the primary means by which we very eventually produce all the hydrogen we will use in society. The methods that you've identified are those that will be the most prominent. We're going to get most of it by -- by renewable electricity through electrolysis.

Secondly, I agree with Arthur that the dynamics of the system are super important to resolve.

And so, I commend you for your question, Arthur, and comments on that topic.

And I want to suggest that the flexibility that could be introduced with hydrogen because you can -- because you can have the pressure and pipelines, for example, go up and down every day. Okay. It allows us to actually dispatch them exactly like you're suggesting so that it captures the otherwise curtailed energy or the widely available energy in the middle of the day. So you know, we should always concerned for that and make sure that we actually do things like that.

I want to suggest that in the current rate structure environment, however, I think most of the hydrogen production will be completely behind the meter. So it would have literally zero impact on the grid, zero. That's what's happening today. The cheapest way to actually make hydrogen from sun energy today is behind the meter. I think that's unfortunate because the -- the electrilizers could actually do something beneficial on the grid if they were connected to the grid and dispatched the way you're suggesting. In any case, a lot of it's behind the meter, mainly because of rate structures and what -- what electrilizers would otherwise have to pay for the electricity to have it transmitted and delivered to the electrilizers.

Anyways, just a comment there.

MR. BRITT: Any other comments, Yuri, on that or we're good?

MR. FREEDMAN: I think all points exceptionally well taken, and I think I could not agree more that, in the longer run, hydrogen can and perhaps will become an important power market resource and perhaps we will be be entitled to some of the benefits, whether it's resource adequacy or others, that other power market source are entitled to, which will then, of course, allow it to be grid connected.

But I completely agree that, as it stands today, I think the description of where we are is autonomous, I think.

MR. BRITT: All right. Tyson, I see your hand raised. We'll go to you next, if you could unmute yourself and ask your question.

MR. SIEGELE: Hi. My name is Tyson Siegele. I'm with the Utility Consumers Action Network.

The first question I have on this is, with the production planning approach that you are -- you're reviewing right now, is this impacted by the demand study?

MR. FREEDMAN: I would say that we are eventually going to combine. As, of course, logic suggests, supply and demand and cross-comparativeness allows alternatives to come up with this unified view. I would say that the -- the -- the approach we're taking is to analyze the potential to produce clean hydrogen within the confines of our service territory. So in that, they are -- the approach is similar to demand. But methologically, as we look at renewable resources, as we analyze the places where it can be produced, it obviously is a different approach in nature.

MR. SIEGELE: Okay. The -- the next question I have is related to what -- what Jack was talking about at the end there, is a connection a grid versus connection behind the meter.

And so, with the electrolysis, do you anticipate any of the -- the production in, for instance, the first decade to be anything other than renewable energy -- and in terms of the electrolysis itself, just that production pathway, do you anticipate any of that being grid connected electricity, so pulling electricity off the grid, or do you anticipate all of it to be production that is directly connected to the electrilizer that does not go to the grid?

MR. FREEDMAN: Yeah. I think it's a fair question. I think we may be prepared to address this later when we are going to present the initial results of our analysis. As you recall, this discussion about technical approach and methodology, maybe it's another way of saying that I don't know that we have that conclusion as created, but we would like to be able to communicate it, but now it's the -- just the different stage of our analysis.

MR. SIEGELE: Got it.

Then the last question that I have is related to the other pathways, the -- the non-electrolysis pathways. I'm going to go ahead and drop a link into the chat there that is an attachment that the Communities for a Better Environment attached to their October 13th comments for SoCal Gas. And in that, they talk about how electrolysis is the pathway that they support. They don't support other pathways.

Do you anticipate changing the approach for production based on this feedback or do you anticipate moving forward in opposition to the Environmental Justice Community.

MR. FREEDMAN: I have not had the opportunity to review what you just posted in the -- in the chat. And so, we definitely will review this and come back to the

community with our view on this.
MR. SIEGELE: Okay. Those are my questions. Thank you very much.
MR. BRITT: Thank you, Tyson.
All right. Next is Nicholas Connell, if you could unmute yourself and ask your question.
MR. CONNELL: Perfect. Can you hear me okay, Chester?
MR. BRITT: Yes, we can.
MR. CONNELL: Thank you. And it's never fun to go after Dr. Brouwer because he always steals the thunder with all of his comments. So I would second Dr. Brouwer on the approaches. Looking at the production pathways, the Green Hydrogen Coalition people support of looking at renewable pathways, either biomass or through electrolysis. We think that we need to stay technology agnostic and take a portfolio approach. So we're very happy to see SoCal Gass looking in this way. This is the how our team is setting up. They're looking at biogenic pathways as well as electrolytic. So I'm happy to see that you're aligned, especially what the State is planning, that's very critical, as well as what the federal government is looking at.
I think it's, you know, important to think about, you know, how are the PTCs being structured,

especially looking at a carbon intensity to allow this pathway to identify within the PTC structure. So it's important to not narrowly focus just on electrolytic. Again, the GHC is fully in support of electrolytic pathways, but there are other pathways that produce hydrogen. So I just wanted to voice our support. So thanks for that, Yuri.

MR. FREEDMAN: Thank you.

MR. BRITT: All right. Thank you Nicholas. I also see Sara Gerson..

MS. GERSON: Hi. Good morning. I'm Sara Gerson. I'm representing Sierra Club in this process. And I want to respond to the call for input about which types of pathways you should be looking at. As we've said in the -- the Angeles Link memo kind of proceeding, the way you align hydrogen production with California's Huddle Health policies is by only using zero emission hydrogen production. Our public health regulators have told us that we'd need a wholesale transition to zero emission technologies in innovations or else we will not have air to breathe that meets federal health air quality standards. So it's very disappointing to hear talking about looking at biomass, biomethane production methods that were not mentioned in that application; that are not zero emission when we have zero emission technologies that are available today and ready to scale and renewably power electrolysis.

And I just want to emphasize that if -- if you don't have accurate information about the California air pollution from hydrogen production whether from electrolysis or these biogenic pathways including in the air quality modeling, then the air quality modeling will be completely unreliable. So I just wanted to make sure that what you're doing on the production side is going to feed into the air quality model, as well.

MR. FREEDMAN: Thank you, Sara. I wholeheartedly agree with your position that robust data and robust data support analysis is key to sound public policy. I think that applies to the topics of resiliency of what we need to make sure that our energy transition is not just, you know, quick, but also resilient, affordability, as well as the topics that I know are front of mind for many of us, which relates to the input of hydrogen in the environment and the -- all the topics related to transportation.

So we are going to put our utmost effort to make sure that the data we bring to bear are fact based, well supported and researched, and we expect no less from all the participants in this conversation. So thank you.

MR. BRITT: So a lot of the input that we've gotten so far is really focused on the first half of Yuri's presentation, which is on the, you know, renewable energy sources, but he also mentioned a lot about the storage technologies, which is also an important topic that he raised, and I think the summary table on slide 12, if I could go back to it, really kind of showed that lithium ion batteries was -- had at least the most green squares. I was just curious to know what the PAG members think about the storage technologies and the summary results that are shown on this table, if there's any thoughts about this, in particular.

Yes, please. In person, sal,

MR. DICONSTANZO: Good morning, everyone. Sal DiConstanzo with ILW Local 13.

As we reported in the past, we are conducting numerous demonstration projects in the port around all matter of technologies, whether it be hydrogen, retrofits, with Toyota 2 show, whether it be at Phoenix Marine, YTI, we have battery electric models, as well.

And that -- you know, when you have the one read typical storage duration short, yeah, that's right -- that's right on the money. The batteries just do not hold up to the heavy-duty cycle that we need in order to do our work. Our operations are very efficient. During the middle of Covid, we processed 20 million TEUs, which is a record for this complex in LA and Long Beach. And there's no better way than to get products to market than by ocean carriage.

So when you have equipment that's on the land side that fails to perform, it puts workers in harm's way, it chokes the supply chain, and it ultimately brings about, you know, economic unintended consequence, right, that ripple all throughout the process.

I -- I would say that, from my perspective, there's still a lot of debate and confusion around, you know, what is green hydrogen, right. You talk to four people. You get four different -- four well-respected people, you get four different answers. Oh, well, this is -- this doesn't count and that doesn't count. I'm not a scientist. I'm not at the level of expertise of many of the folks on the call here. But I would say that as a practical user of this technology, we need way more power than anybody is really -- really willing to admit. The grid cannot produce it all. We're going to need products like hydrogen. I would like to see as broad a definition as possible. The one power source that's not up there that I think probably should be considered is nuclear power, as well. It's utilized in a lot of ways. And as far as I can tell, while it has a reputation, let's just put it that way, I think there's actually less deaths and injury from nuclear power than possibly from manufacturing wind turbine blades. That's a quote from somebody that I recently was talking to.

But in terms of the air emissions, I think we oftentimes let the perfect get in the way of the good. And the topic around zero emissions, you know, that everything has to be zero emissions, I hope we get there. We're doing our best to try to get there. But rarely to we get something for nothing in life. There's no free lunches. You can go through all the different metaphors. You know, can we get to very, very low emissions and still have the economic vitality that our modern civilization needs. You know, what are we willing to sacrifice to squeeze out that last little bit of emissions to get it to zero? What is that going to cost us?

This is a conversation that we're having, you know, from regulatory bodies in legislature down to the OEMs that are trying to make the equipment. So I know I, kind of, deviated a little bit from the -- from the -- the storage question, but all these -- all these topics are all interconnected. So let's -- let's keep our focus on solving the big problem and not getting lost in the weeds. Thank you.

MR. BRITT: Thank you for that, Sal.

I don't see anyone else's hand raised. We've been on this topic for a little while now. I think it's probably time to move on, unless anyone else has anything to offer. And we'll go to our next presentation.

With that, let me introduce both Amy Kitson, the Angeles Link director engineering and technology, as well as Katrina Regan, the engineering and technology development manager. They're going to make a presentation on pipeline sizing and design. And I will the microphone over to them.

MS. REGAN: Thank you, Chester.

All right. Awesome. Okay. Good morning, everyone. So today we're going to discuss two pivotal studies that really lay the foundation for our pipeline project. And I just want to provide some delineation between the two of them upfront because I think it's pretty easy to conflate them sometimes.

On one hand, we have our pipeline routing study.

Oh, yeah. Sure. Can folks on line hear me all right?

All right. So on one hand, we have our pipeline routing study, and this takes a real high-level view. It concentrates on the system as a whole and starts looking at those preferred pipeline routing corridors. One of its primary objectives is to identify and recommend several preferred routes for pipeline and ensure that we capitalize on potential while understanding things like terrain and environmental requirements.

While, on the other hand, our pipeline sizing and design study, which we will talk about later today, that really starts calculating how our pipeline could function. So in essence, while our routing study answers the question of, Where will our pipeline go, the sizing study answers, What does this pipeline look like and how does it operate.

So we'll go ahead and we'll delve in a little bit deeper into that routing side of things.

MS. REGAN: So understanding the progression of our pipeline routing study is really crucial. So we're currently in Phase 1, and the goal here is to start mapping out these potential pipeline corridors based on production capabilities, storage, and the evolving demand. So our routing is informed by information about existing energy corridors, rights-of-way, environmental, social, and engineering challenges. But ultimately, its purpose is to connect these areas of demand, storage, and production together.

In Phase 1, we're really applying forecasting, we're gathering data, system and route evaluation is occurring at a high-level long-term state to evaluate operability, technical considerations, major crossing elevation, terrain types, and other engineering and environmental and social challenges. So here, we're creating a baseline and a foundation for the Angeles Link system.

At the end of Phase 1, there will be maps that we can share that will provide and illustrate those pipeline corridors and system structure. And these will still be re preliminary in nature, and there's an opportunity there for us to continue the conversation and continue discussing these different potential options. In subsequent phases, like Phase 2, things become a little bit more tactile. So these desktop findings of Phase 1 serve as the foundation, but in subsequent phases, we'll be applying more detail, and that allows us to expand outreach and look to complete further refinement of the system, its components, and those routes that we identify.

So we expect it to be a really dynamic process, which is why it's so crucial that we're getting everyone involved right now at this phase. The goal remains consistent throughout the process. We aim to chart a pipeline route that's efficient, sustainable, and harmonious with its environments and communities. So let's go ahead and let's walk through the process.

All right. So we have four steps here. Mapping the future of this pipeline project requires a really systematic approach. If you think about it like a puzzle, each piece here represents a potential pathway that's defined by its potential in terms of production and demand dynamics. Our immediate task is, therefore, to identify these system pathways and start to assess those which present the most promise in short term and long term.

But potential really isn't going to be enough, light. We need to consider a whole lot of other things. So as we're conceptually assessing what is needed today, we also need to think about what is potentially needed in the future. We need to evaluate how these lines connect because that gives us the ability to lay a foundation for a really cohesive and efficient system from a long-term standpoint. And so, it's here that we start visualizing our preferred route options. We'll then be looking at, you know, what is within these potential pipeline corridors, what is the terrain like, are there critical habitats nearby, how will local communities be impacted.

So at this Phase 1 level, we're really cataloging these features, and we're building an understanding of the landscape and how it supports and interacts with this energy network. So the forethought is crucial because it begins really building a proactive baseline, right. And most importantly, what we're starting to do here is have these conversations, right, have a platform on which we can have discussions about this network. And this back-and-forth dialogue, you know, between us, I think -- we really believe will help shape and refine this project.

So the Los Angeles -- the Angeles Link system, it needs to be resilient and reliable. That's where we need to be based in. So while it presents an opportunity for deep decarbonization of various industry sectors, its role as a clean source of firm power cannot be undervalued. Our proposed pipeline system is, therefore, functionally diverse. Each area, each pathway has a distinct role to play, yet they all come together to support a cohesive, efficient long-term operation. Let's start with the connection zone. Pathways in this zone represent opportunities for connection to other hydrogen networks in state and out of state, which creates an opportunity to benefit from additional storage and production potential. Pathways here ensure that we're not an isolated entity but are seamlessly integrated with other networks. Interconnectivity like this is pivotal for resilience because it furthers our ability to whether challenge unexpected events and main stain steady supply.

Next, let's talk about the collection zone. Pathways in this zone, in this area of the system, this is where we start building flexibility. If hydrogen is being produced in one area and needs to be rerouted, this zone allows us to do that. Pathways here allow us to start consolidating our supply and creating more extensive dynamic capabilities for the system overall.

And then lastly, we have our central zone, LA Basin, and this is where we start to see more potential for direct distribution to various off-take. The amazing part of this approach is that while each of these different zones has a primary function, they're not limited by it. The system is is versatile, and with segments often serving dual or even multiple roles based on demand necessity. The adaptability like this ensures that we're not just efficient today in the short term, but we're ready for the long-term challenges and the opportunities that still stand to be gained here.

Let's take a look at an illustration here of what a preferred route could look like. So the full vision of Angeles Link is something that needs to align with production and demand growth over time. So when we start looking at these final preferred routes that we will be identifying in Phase 1, we need to highlight their all-encompassing nature. Rather than being compartmentalized, each route is a piece of a larger system, and this allows for both short-term and long-term continuity to be considered and harmonized across all functional areas.

The way we're thinking of preferred routes is that they not only connect points of potential production to potential demand, but they help plan for long-term operational challenges and reliability. Each preferred route has different segments. So it bridges us to external networks through the connection zone, it efficiently consolidates gas within the collection zone, and finally ensures that its gas that this gas reaches endusers with dedicated distribution pathways. So by having an integrated approach like this, it means that every route isn't just a pathway, but it's part of a complete picture and a complete system. Thank you.

MR. BRITT: Thank you, Katrina. All right. I want to go back to a slide that she covered early, I think. There we go. So in Katrina's presentation, she highlighted their technical approach to pipeline routing, including discussion of system evaluations, localized hubs, and preferred routes. They also itemized what will be the focus of Phase 1 versus Phase 2 activities. And I'm wondering, what thoughts does the PAG have on this technical approach, and specifically in Phase 1 activities, is there anything that you think is missing or that you would want to comment on.

MR. BRITT: All right. Ernie, I like it.

MR. SHAW: Ernie Shaw, president of 43. So yeah. A couple things that last slide there, that connection, collection zones X, Y, Z. I mean, so that one and the one before that, like, just -- I'm just, kind of, like, lost. Is that supposed -- the line -- that little blue line around supposed to be, like, how it's supposed to be ran?

Like, I mean, I just -- I'm, kind of, lost with all this routing and stuff.

MS. REGAN: Yeah. Let's talk about that. So this is definitely -- it can get really complicated really quickly. So at this point, really, we're setting the stage, we're setting a foundation for what system design looks like long term. And so, these different areas really present opportunities to us. So we don't envision the entire thing being filled with, you know, pipes that are on top of one another, but just that when we think about a pipeline in that area, what kind of function does it serve for us, right. A pipeline in the desert does something different than a pipeline in LA Basin.

And so, we're trying to make sure that that conversation is really at the basis of our design process. Does that -- does that help?

MR. BRITT: Katrina, could you walk through again -- because I think as a layperson, I kind of understood what you said, but the connection zone, versus the collection zone, versus the central zone, can you just delineate what is the focus of those zones?

MS. REGAN: Yeah, yeah. Well, when we -- when we look at, you know, the connection zone, pipelines in that area give us the ability to connect with other networks. A pipeline in LA Basin doesn't give us the ability to connect with another networking state maybe up north or out of state. So the different zones help support that, and connection is where we make those connections.

MR. BRITT: So can I interrupt and just ask a question about that? So is a connection zone, essentially, connecting to the source, right?

Is that, like, where the hydrogen is coming from?

MS. REGAN: I think that, as we work through the production study, we're going to start to identify those production locations a little bit more. But you know, predominantly speaking, when we think of renewables and when we think of those large scale solar farms, we're thinking of areas where there's space, right, and those spaces typically are not going to be maybe the central zone, within LA Basin. Not to say there isn't production available there, but just typically speaking. So when we think about the connection zone and we think about the collection zone, I think collection is probably, you know, a little bit more central but closer to LA Basin, and that's an area where we definitely could see production. But I think, as I said, you know, these zones aren't mutually exclusive. So they're going to be able to do multiple things. So there may be production in both the connection, collection, and central zone, but in order to move the gas from those outlying areas, you need to have a resilient core, and that's your collection area.

MR. BRITT: Does that help, Ernie, answer your question?

MR. SHAW: In a nutshell.

MR. BRITT: I just want to clarify to, I think Ernie asked about the dark blue line.

MS. REGAN: Oh, that's California.

MR. BRITT: California border. Yep.

MS. REGAN: Thank you.

MR. BRITT: Sal?

MR. DICONSTANZO: Yeah. Just, kind of, touched on it here. Is it purposeful that the California outline is being delineated or can -- can -- you know, can hydrogen be collected from out of state, as well, or is there something that's precluding that, number one.

Number two, I think we might be able to come up with better terms. I don't know if connection, collection, and central is -- I know we're on a literation with the letter C here, but I don't know if that's most descriptive of what you're trying to say.

MS. REGAN: To that point, please feel free to provide suggestions in your feedback.

But previously, you know, the area that we captured here is roughly our existing surface territory. It's not to say that in the future we wouldn't be able to potentially gain sources of hydrogen that are outside the state, and I think that having an awareness of those options for pipeline corridors in the connection zone ensures that we are maintaining that awareness in our system design and making it still a possibility, right. At this point, we are looking at pipeline in California only.

MR. BRITT: All right. I see Arthur, you have your hand raised. We'll go to you next, if you can unmute yourself.

MR. FISHER: Hi, there. Arthur Fisher, public advocate's office. I can see a lot of thought has gone into this. Thank you. Obviously there are some underlying -- underlying assumptions and criteria behind the connection, collection, central zone. Can you make those available just so you can understand what your thinking process was in defining these? Because whilst you've talked us through it, I have not -- this is -- you know, this is -- this is the first time I've really seen and you've introduced these different concepts. So it would be really appreciated if I could understand better what actually goes into them. Thank you.

MS. REGAN: Thank you, Arthur. We can definitely provide a little bit more detail. I know that we're really just looking at the technical approach now, and I don't have it in front of me. But we can absolutely follow up and provide more detail on those assumptions you referenced.

MR. FISHER: Thank you.

MR. BRITT: Okay. Does anyone else -- oh, Norm, you had your hand raised or your plaque tilted.

MR. PEDERSEN: Thank you, Chester.

Norman Pedersen, SCGC. First, regarding the connection zone, Katrina, you mentioned connecting with interstate sources. Last week I had an opportunity to ask the general counsel of the FERC whether he thought there was an adequate statutory authority in place for the FERC to exercise jurisdiction over interstate hydrogen pipelines. His answer was, no, he thought congressional action would be necessary. If you take a look at Congress, I would not hold your breath for congressional action. That leads to the observation that out of the seven award recipients -- recipients of awards from DOE, there are two that really stand out to me because they can be intrastate only, California and Texas. Texas has a big advantage in that they are focused solely on Houston, the Houston ship channel, and sources within Texas.

California is more problematic, and that leads to a question. Jack, it might have been you who mentioned a map that was available showing what Arches has in mind for this very diverse and large state in which we all live. Is there such a thing?

MR. LOPEZ: Frank?

The map?

MR. PEDERSEN: The map.

MR. LOPEZ: Yeah. I don't recall seeing any interstate pipelines or any facilities in the map. They were all intrastate.

THE WITNESS: I'm sorry?

MR. LOPEZ: I don't recall seeing any interstate facilities in Arches map. I only saw intrastate facilities.

MR. PEDERSEN: Interesting. Yeah. Okay. Well, where was the map posted?

MR. LOPEZ: It was in the Arches' press release. We can distribute it to the group via e-mail.

MR. PEDERSEN: Okay. Well, you know, I haven't visited the Arches' website recently, and basically, I haven't because it's totally useless. There's nothing on the website.

MR. LOPEZ: It's gotten better.

MR. PEDERSEN: If you're Jack Brouwer or maybe Lorraine sitting next to me or -- if you're on the inside of Arches, then you know all about Arches. But if you're on the outside of Arches, as far as the public is concerned, it's totally opaque. So what I would like to know is where do we get information about what was approved by DOE.

MR. LOPEZ: It's a good question. We don't speak on behalf of Arches, but we're happy to relay the information back to them. And then we can share the information with you that is publicly available, that they released. And I'm sure once Arches is able to disclose that information, they will do so, and we'll come back and report back on that.

MR. PEDERSEN: So what you're saying is there is no information currently available on the Arches website. Is that -- do I understand you correctly?

MR. LOPEZ: Well, there's plenty of information available. I think if you --

MR. PEDERSEN: About -- about what the California project entails, given that we've got Northern California, we've got PG&E proposing various projects for its service territory, we've got SoCal Gas proposing what we're talking about right now, within it's, generally, service territory. It's not necessarily contiguous, of course, with the natural gas service territory, but within Southern California.

So where do we see what it is that DOE was looking at when they approved the California project? We have a pretty good idea about Texas, but what about California?

MR. LOPEZ: Yeah. I believe Arches is going to still negotiate with DOE on the final implementation plan. And once they have the specifics of what ultimately end up agreeing to, they'll disclose at that time.

MR. PEDERSEN: So it's not available yet?

MR. LOPEZ: I don't believe so.

MR. PEDERSEN: Okay.

MR. BRITT: The challenge for us is that we don't represent -- like Frank mentioned, we don't represent SoCal Gas or the consultant team doesn't represent Arches. So we're relaying information where you can find it, but that's not really our focus.

MR. PEDERSEN: What really got me onto this, Chester, you said, Look at Arches website. And I found looking at the Arches' website to be a very frustrating process.

MR. BRITT: Yeah. Good news for me is I didn't create it. So I'm not offended by that, and you know, we'll relay the information and maybe they'll do a better job.

MR. PEDERSEN: It does lead to -- while I'm on the trail --

MR. BRITT: Exactly.

MR. PEDERSEN: -- here to another question.

After the last -- after the second PAG meeting that we had the set of two just before this, I asked about the slides. Now I found Yuri's slide, and Katrina, your slides to be very helpful. And it's more helpful to have the slides available than to sit here and try to scribble down notes that just contain verbiage that is readily available on the slides. I asked that the slides from the last PAG meeting be available. We never got any slides, at least I didn't. So can we get the slides from this meeting?

MR. BRITT: The short answer is yes. And I believe, Steve, they're posted until the Living Library; is that correct?

MR. PEDERSEN: What is the Living Library?

MR. BRITT: So it's a share point site that we created for the PAG. So everyone on the PAG has access to all the materials since the beginning of time. We knew, after a little bit of time with you guys, that the volume of information that we were giving you was getting a little, you know, hard to manage for you. You know, you're having to go back and look through e-mails to try to find that link that you need. So we created that share point site. We gave everyone on the PAG access to it. If you do not have access to it, Norm, or somehow it escaped your e-mail or got stuck in spam, when we are on the break, please see Stevie or Nancy or Emily over here, and one of us will have the ability to connect you directly to that site, and you should have access to all the information, including the PowerPoint slide decks --

MR. PEDERSEN: Okay.

MR. BRITT: -- all the summary reports, and all the information.

MR. PEDERSEN: I do recall getting an e-mail, but I don't think I registered.

MR. BRITT: I completely can accept that. I do that all the time. So yes.

MR. PEDERSEN: Okay.

MR. BRITT: You should not be feeling bad about that. It's a lot of information that we're sending out.

MR. PEDERSEN: Okay. Thank you very much.

MR. BRITT: Yes.

MS. PASKETT: I feel like I should make you feel better about your experience.

MR. BRITT: It's not a confession period, so don't feel bad. Please announce yourself, Lorraine.

MS. PASKETT: Lorraine Paskett with Air Products. I'm also the chair of the Arches production working group. It's a little bit different process. It's a process for an application to the Department of Energy, and there's an indication of seven awardees to begin negotiating whether or not the projects that are submitted would actually be funded over certain phases. So there isn't certainty. I think everybody, including SoCal Gas who was part of the application, would like certainty, but I think it will be a little while before we get some certainty. Because we're at the beginning of the negotiations. So I know that doesn't make you feel better, but that's where everybody is, basically.

MR. BRITT: The good news is we were one of the seven, right?

MS. PASKETT: That's right. The good news is we were one of the seven and came very close to the request at 1.2t. We got 1.2. So I have a question for Katrina, and thank you for the presentation, Katrina.

As you're thinking through the analysis and the initial evaluation of Phase 1, are you -- you had a term in your presentation, and I've forgotten it. Are you thinking about dedicated connections through to the customer or are you thinking about pipeline infrastructure investments in the zones that are on the slide?

MS. REGAN: I think you may be referencing -- I think I used the word distribution, and I know -- is that --

MS. PASKETT: No. It was like dedicated customers and then I couldn't -- because I hadn't heard that term before. So I was just wondering, as you're thinking through this and thinking about pipeline connections to production areas in the outer parts of the state, that could be collocated with wind and solar. Are you thinking about taking those pipeline investments all the way through to dedicated customer lines at the site in the LA Basin.

MS. REGAN: I think at this point, because it's so early, we're keeping awareness of all the options that we have and what we need to consider, if that is a decision we make. But I don't believe we've made any final determination on that front.

MS. PASKETT: The other question I had, because we're also thinking about this a lot within Arches, it feels a little bit like the beginning of the solar build-out when you talk about the new part of the green economy and third-party hydrogen producers -- how are you approaching trying to get your arms around the amount of potential hydrogen production that will be developed over the next 5 to 10 years.

MS. REGAN: Oh, that is such a great question, and I'm sad that Yuri isn't here. I think that is something that we will be assessing on the production side. I believe -- and I'll talk a little bit more about it later when we look at pipeline sizing, but we're starting to look at, you know, what do -- what does -- what does demand and production -- what could it look like in terms of five-year intervals to start giving us that idea. Because obviously information that is more up to date and information that is about the upcoming, you know, 5 to 10 years is less speculative than information that's 20 to 30 years out. So I think there's a lot of different components that are going to go into that determination in terms of those production volumes. I don't want to speak for Yuri and the production study because I am not involved in that as closely, but I hope that somewhat answers your question. Please follow up in writing, and I'm sure the team will be able to provide a response.

MR. BRITT: But if I could channel my inner Yuri, I would just say that it's been clear through all of these meetings that, you know, while we have 16 individual work studies programs going on as part of the feasibility study, they're all woven together. I mean, they all are interdependent on each other in some way, shape, or form in order to get to the ultimate answer of is this feasible, does it make sense. Because you can't do one without the other. And I think the breaking them up into 16 pieces was for the sake of efficiency and getting through the studies quickly and making sure that we were making progress, but they're all going to connect at some point.

And certainly at Phase 2, if we get approved to go into Phase 2, there will be a lot more focus and a lot more background with the 16 work studies behind us to understand the issues that are relevant to the questions that keep coming up, which are obviously, you know, important and they make sense, but they're hard to achieve at such a preliminary stage that we're in right now where everyone is starting the process on their individual work studies. So it's hard to know what the answers are and weave all that together at the beginning.

MS. REGAN: Yeah. Exactly, Chester. Those absolutes.

MS. PASKETT: One of the -- and this is my last question for the moment, unless Norm has other things that make me want to ask questions.

As -- as you're -- you're thinking through it, are you thinking about dedicated hydrogen pipelines or are you thinking about extending the infrastructure for blending into natural gas pipelines?

What are -- a friend of mine said at one point, We don't want to build an eight-lane highway for three bicycles. And so, I'm sure that's part of what keeps you up at night.

MS. KITSON: Thank you. Amy Kitson. It's the first time I've talked during this section.

So Lorraine, that's a great question. So part of our studies is we're looking at -- obviously Angeles Link is 100 percent hydrogen-dedicated pipeline, but as part of -- we'll get into it when we're looking at the pipeline design, as well as we are looking at repurposing both our existing infrastructure and our right-of-ways for this project.

MR. BRITT: Thank you.

MS. REGAN: And the -- when we think about system design, right, these projects and the longevity behind assets, we do need to keep a really clear perspective on what may feel like long-term projections, you know, that don't need to be considered, but given the length of time these projects take and the investment, it is really important to stay well ahead of what is needed and prepare for it on the front end.

MS. PASKETT: As you think about it, Katrina or Amy, are you also in the scope of Phase 1 thinking about the level of investment for the pipelines and the estimated costs for that?

MS. REGAN: We do have an entire study that will be evaluating the cost effectiveness and the high-level economics. Yeah. And the routing cost will be fed into that. Thank you.

MR. BRITT: Great input, so far. I just want to ask a more direct question, you know, reminding ourselves that we're here for the technical approach discussion. Because they're about to do a lot of the work and then we'll have draft findings and we'll have future meetings about that. But this four-step technical approach that

Katrina outlined, does anyone from any direct input on the four-step approach, any thoughts about it that we should understand before we move onto the next subject?

MR. PEDERSEN: Put up the four-step -- hold it right there. Good.

MR. BRITT: Oh, Norm, go ahead, please.

Norm, do you have a question?

MR. PEDERSEN: Comment -- maybe a comment and a question.

MR. BRITT: Okay.

MR. PEDERSEN: The -- the comment is this, the import of what I was saying a little while ago about the general counsel's observation that there isn't a statutory framework for regulation of interstate hydrogen pipelines is, in my view, if you're going to build a hydrogen pipeline hub system, you're going to want regulatory certainty. And the fact that there is not regulatory fame work in place where federal regulation of the kinds of systems that they're envisioning for, for example, the mid-Atlantic states, really presents a problem for the mid-Atlantic states that Texas and California don't have.

And so, to build on that, the implicit suggestion is that you not think too much about interconnections from out of state. You think about a system that will be an intrastate, if it's going to be regulated, probably CPUC-regulated system, not something that is going to be reliant upon production sources outside of the state. So that was the --

MS. REGAN: Yeah. No problem. That's a great question, Norm, or a great comment. I think as we start this process, we're really looking to maintain that baseline and create -- make sure that we're keeping the door open for opportunities. There have been a lot of changes recently, and these pipelines do take a long time to come to fruition. So you know, planning, you know, to focus on interstate and then, you know, making sure that there are capabilities to accommodate interstate, I think, is going to be really critical.

We're also aware of, you know, different opportunities that that offers the hydrogen economy. We see it in natural gas, right, there's movement across the country of that commodity. And so, there are definitely -- there are benefits to that that, I think, are recognized, in addition to opportunities for underground storage and potentially, you know, above-ground storage in other locations. So really, I think it's all about potential at this moment and at this phase, making sure that we're setting ourselves for long-term success. But thank you. That is a great point.

MR. PEDERSEN: Thank you. That's a -- I applaud that approach thinking about the potential or the long term, but perhaps focusing more on the short -- you know, the next ten years as opposed to what might happen in 30 years.

And another thing was, you mentioned possibly using some of the existing infrastructure. As far as the right-of-ways, I certainly understand that, but I am quizzical about thinking about using existing natural gas pipelines because I don't see that -- I don't see that as being feasible for moving -- I don't see it as being feasible for transitioning them to being dedicated to H2 pipelines.

MS. REGAN: Right. And I think the concept of repurposing assets for 100 percent hydrogen is something that's very interesting to the industry as a whole right now, and Phase 1, we're just going to be exploring it at a really high level. Because I would agree that there needs to be more research and concept built around it. But exactly. Thank you.

MR. PEDERSEN: Thank you.

MR. BRITT: All right. Ernie?

MR. SHAW: Ernie Shaw, president 43. If we can go back to that four-step slide there, please.

So I'm reading it, right, and I'm like, I'm missing, right. I see the word "identifying" in about three of those, you know, steps 1, 2, and 4. So it might be a simple question, maybe a simple answer, but like -- I guess who is doing that identification. Because there's only so much an engineer can do from his computer at his desk. You know, the real experts -- subject matter experts are the ones that are boots on the ground out there actually looking at these right-of-ways patrolling, surveying, flying, or on boat even.

So it's like, is there, you know, some, you know, I'd say, like, plan in place to collaborate with the local districts to, kind of, gather input?

Because I'll tell you this, the times that we've come to certain jobs and we were like, What were they thinking? Because this is impossible. So --

MS. REGAN: I appreciate that so much as an engineer and as someone who's worked in the planning department, I know when things go to execution, they can be different.

In this Phase 1, we're really trying to get the most benefit and efficiency out of the desk work on the office side of things. In subsequent phases of the project, we absolutely will be conducting field work.

Because I agree, I think there's a lot to be gained from having those experts in those field roles to see things on the ground, boots on the ground. So that's something we'll be -- we'll be working toward in subsequent phases. And in Phase 1, we're really looking to build a solid foundation and start that common language that we can all use to -- to be able to contribute and add advice and insight in the process. So thank you.

MR. BRITT: And Katrina, I see in step 4, it does say validate for constructability. So there is that -- I guess, that final litmus test, right, right before you're going to show alignments, is this constructible.

MS. REGAN: Yeah. At a high level, there are a lot of things that you can do just from, you know, aerial mapping to validate and make sure that something is physically -- could be physically possible or assess what needs to change in order to make it so. And we'll be taking the advantage of all those avenues and technology to do that.

One of our presentations later today will be talking about our Pivvot software, and that's something that's referenced in Step 3. So excited to show you that, and that has a lot of capabilities, we think, could be used in the future, as well.

MR. BRITT: All right. We've someone who has raised their hand online.

Arthur, if you could unmute yourself and ask your question.

MR. FISHER: Hi. Arthur Fisher, Public Advocates. I just want to go back to something that was said a little while ago and understand that I heard it correctly.

My understanding of Angeles Link was we are looking to locate and build and construct a transmission line -- a hydrogen transmission line. I heard some conversation about production tie-ins and distribution to customers. Can we just -- can someone reiterate that my understanding is correct, or if I'm wrong, just tell me why I'm wrong. Because I'm hearing scope creep there, and I just don't know that I heard it right or not, whether this is part of the discussion.

MS. REGAN: I'll try to answer your question, Arthur. So I mean, we do have large industrial customers that currently come off of natural gas transmission lines. We do have receipt points, you know, that are connected to our natural gas transmission lines. So I think when we think of conceptual, you know, hydrogen systems in the future, those are things that we absolutely can consider, as well. But we are thinking about this all as transmission at this point. So when I -- I think of higher pressures, I don't think of as much as we commonly think of distribution.

MR. FISHER: Okay. So yes. The answer is, yes, this is a transmission line. You maybe have industrial customers, but what I'm trying to do is not get any kind of tie-in -- inclusion of tie-ins that may potentially be part of a generation project or production project or the distribution aspect of it. That's -- that's kind of -- it's, kind of, what shape is this?

Are we talking about a single pipeline or are we talking about, sort of, a more dendritic if I have to visualize this?

MS. REGAN: Right, Arthur. I think in -- I think in an ideal scenario when we think about a fully built out Angeles Link project, we are thinking about multiple pathways that are joined together.

MR. FISHER: Okay.

MS. REGAN: Specifically, you know, if that's on the production side or on the distribution side, I think we would like a versatile network that's dynamic and allows different opportunities. And so, right now, we're just considering what that could look like and what we need to consider as we're moving forward in making decisions.

MR. FISHER: Okay. Okay. So there's a bunch of implications there for in front of the meter versus behind the meter versus generation of hydrogen -- thanks. Okay. Thanks for the response.

MR. BRITT: Thank you, Arthur.

All right. Again, we are here to talk about the technical approaches of these. Okay. We have -- I'm sorry, Sal. I didn't see your card go up right before we were going to take a break.

MR. DICONSTANZO: What's a guy supposed to do here? I already put my card up.

Just one last quick comment. I hope that, as we are identifying -- you know, as -- I hope that the first and largest dendrite, as it was referred to, makes its way down to the port, I think we're going to be huge off-takers of this product, you know, once Ernie figures out where to put it exactly and you guys figure out how to make it safe and the bean counters figure out how to make it pencil out. We -- I strongly encourage you to reach out to the ports in LA and Long Beach. They would probably be the most logical point people to collaborate with the marine terminal operator tenants and so on.

So if that wasn't already obvious, I just wanted to just make one more push for that.

MR. BRITT: No problem.

All right. As I mentioned, we are here talking about the technical approach to these different studies. These studies are underway. I should make that point very clear. Some of them are progressing faster than others. They're on slightly different schedules, but they're all going to co-inside and dovetail in next year's delivery, and we'll be talking about that more in future meetings.

We're going to take a quick break. There is food in the back, so please help yourself to that, drinks, water, coffee. As well, the restrooms are out to the left, if you need to use the restrooms. We're going to meet back at 5 to 11:00, and we'll reconvene to get us into the second half of our agenda. Thank you so much.

(A recess was held from 10:43 a.m. to 10:55 a.m.)

MR. BRITT: All right. We are going to go ahead and pick up our second half of the agenda. I want to reintroduce Amy Kitson and Katrina Regan. They're going to make an interesting presentation on a software called Pivvot, and what it can do for the route analysis, and I'm going to go ahead and turn it over to them and get us started.

MR. PEDERSEN: Chester, before we get started, I just want to recognize something that Emily just did. She has made available to some of us here in the room, exactly what I asked for in the last PAG meeting, and that was the slides with little place to take the notes on the side.

MR. BRITT: Aw.

MR. PEDERSEN: I find that very helpful, and I encourage you --

MR. BRITT: Well, you're pointing out what I already know, which is that Emily is awesome, so.

MR. PEDERSEN: Yes.

MR. BRITT: And Olga did the printing, her assistant. So --

All right. Katrina, let's get started. Because we do have a couple more presentations, and I don't want to run out of time because a lot of good information.

MS. REGAN: All right. So I think Amy and myself will be talking to you for the rest of the morning, so hopefully you enjoy the sound of our voices.

MS. KITSON: Or yours.

MS. REGAN: All right. So let's take a look at Pivvot. So Pivvot is a third-party cloud-based application that our consultant Burns & McDonnell will be using to evaluate the pipeline corridors. We'd like to just take some time today to introduce the application, tell you a little bit more about it, what it can do, and how that applies to the project.

Sometimes, technology, we're just not familiar with because we don't use it, and we think, Hey, it would be nice if someone came up with this. So we do just want to make sure you know that this exists; that we're working -- using it for Phase 1; and maybe you'll have ideas for how it can be used in subsequent phases of our project.

So what -- first, what exactly can Pivvot do for our pipeline project. So, first, it's a tool for proactive planning. So it's a mapping analysis program, and it not only contains geospatial features, but it can also produce a variety of different reports, including some of the ones shown here. Using tools like this, we can move past just lines on a map and tables and graphs and -- and various different data sources all spread out everywhere and move into one single platform, one location to do this analysis, and then we gain the ability to start describing what is around those lines and corridors. The types of reports are breakdowns of the information that we can then use separately to also conduct evaluation. And using an application like this as a basis really increases efficiency in the overall process of assessing pipeline corridors, but it also reduces the opportunity for human error.

So using Pivvot is similar to using a really robust GIS platform. It allows for data visualization from our project team from a huge variety of different sources, and allows us to determine what information to reference. All of the data is visually displayed in relation to the map. So when I said geospatial, you know, you can talk about that in a number of ways. That could be parcels, it could be easements, it could be water bodies. It's pretty much everything you would see on a GIS map. And we're really looking to start exploring what we can use this technology for in Phase 1 because -- and see if it's appropriate to leverage it in subsequent phases.

So during Phase 1, we'll really be looking to start cataloging and identifying features so that we can better understand what kinds of considerations we need to make in subsequent phases for our routing corridors.

And then wrapping up, so this section is pretty short. Again, just wanted to give you a really good overview of this tool, see if you had any questions or suggestions for us as we are talking about our technical approach today. Let's take a look. So these are a lot of different data layers here, and by no means is this comprehensive of all of the layers that the program has housed in it. These are just different dated categories that Pivvot can assess and then report on. As you can see, there are a lot, and they are continuously being updated. So these are all up-to-date, and it's all current information that's being used. We're not using datasets that are perhaps, you know, multiple years old, nothing like that. So it's all very up-to-date information that we will be using to help us describe the different features along proposed pipeline corridors.

It also has other abilities, like allowing collaboration on rerouting, and siting different types of larger pieces of land, and I think that could be appropriate for future phases of the project, and we could really use a tool like this to help support our development of outreach plans and route refinement. So, you know, again, this really gives us a great platform to have all of the information available to us that we can pull from, and then use in ways to make the project better and gain efficiency along the way.

MR. BRITT: Great. All right. So we're going to go ahead and just have a quick discussion about Pivvot. I just want to illustrate -- or not illustrate, but emphasize that, you know, in Katrina's presentation and the slide we were just looking at, where there's a significant number of databases, this software is really driven by its datasets. And, you know, there's access to incredible number of datasets. The interesting thing about these is they all have geospatial coordinates associated with them. So what the tool is going to be able to do is visualize these datasets in a way that will make route selection and route evaluation really possible in a very dynamic way.

And so, I'm curious to know, from your point of view, if there are any other datasets that you're aware of that have geospatial coordinates that maybe we can consider. Again, the software is not limited to use only certain datasets. If there are additional datasets that can added to the mix, we would love to know what those are for consideration, at least. And again, they have to have geospatial coordinates for them to work on the software, but that would be an interesting thought.

And then if there are any other questions that you have or comments about the utilization about the Pivvot software, we want to just entertain those before we move on to the next presentation.

Norm, please.

MR. PEDERSEN: Well, first of all, I notice that in the list of energy and infrastructure data, you have existing pipelines. And I assume that SoCalGas has readily available to it all the information about its rights, which could be absolutely critical for an H2 system. The observation is about the FIMSA populated places, does Pivvot disaggregate down to Class 1, Class 2, Class 3, Class 4 FIMSA areas?

MS. REGAN: Yes, I believe they do.

MR. PEDERSEN: That's terrific. It's amazing. I find it to be just an amazing tool.

MS. REGAN: It is, really. And there are additional features to it that give you even greater capabilities that I think, you know, we can consider for subsequent phases, and -- and right now, we're really just learning about the platform and -- and really using it to conduct an efficient evaluation for us.

MR. PEDERSEN: Sal, please.

MR. DICONSTANZO: Sal DiConstanzo, ILW.

Is -- is this tool available, in part or in whole, to PAG members or the public, or is this just a SoCalGas behind-the-screen tool?

MS. REGAN: Yeah. This is a licensed tool, so it is not available for access directly from PAG members.

MR. BRITT: But let me just clarify. It's a third-party proprietary tool, right?

I mean, the -- someone could hire Pivvot just like SoCalGas is hiring Pivvot, right?

MS. REGAN: Exactly, yeah. If you contract or work directly with Pivvot, you can absolutely have access to all of the same tools and capabilities the program offers.

MR. BRITT: So if the ports wanted to do that, you could have access to that, as well.

Did you have a question, as well?

MR. DOWNS: Yes. Robin Downs, UWUA Local 43.

Can we go back to the first slide, please?

Right there. Is that an actual screenshot of one of their pages?

MR. BRITT: I think it's just an illustration of how their software works, so -- from their website. So I don't know that it represents anything significant that we can take away other than how, in this particular slide, it looks like there's an aerial photograph with datalines shown on top of it, so I'm assuming that their software would also have the ability to switch the base layer from an aerial photograph to maybe a regular mapping, like, just like you can switch on your Google Maps or whatever. So this is just an illustration from their website.

MR. DOWNS: All right. And the second question I have, and I hope I can word this right. Would this be a tool the company may be looking at to roll out to give to pipeline when it comes to locate and mark, and the work we do when we got to dig up intersections or whatever where they can have as much information about that intersection as possible?

MS. REGAN: Think that there's a lot of capabilities with this program. I can't speak for how the rest of the company would plan to implement it, but I do know that folks are interested in what it's capable of.

MR. DOWNS: All right. Thanks.

MS. REGAN: No problem.

MR. BRITT: And then Arthur, I think you you've raised your hand, so we'll go to you next, if you can unmute yourself.

MR. FISHER: Hi there. Arthur Fisher, Public Advocates. So there's two observations with this sort of constraints analysis. One is the fact that you are limited only by the data you can find.

And so, my question to you is, I see that on the list of data you have community and environmental data down, like, bottom right-hand corner, like, two items. That's going to be your weakness in this tool, to be honest. You can get all the detailed data on all the jurisdictions, et cetera, and environmental constraints and biological constraints, that all exists out there. The big gap's going to be what you have on communities and how you collect that data and how you integrate that data. So my concern is there's already going to be a bias in using this tool that you need to correct for.

MS. REGAN: I can go ahead and respond to that. And I think you might have as part two, but absolutely, I think that this tool has limitations and we're aware of that. We do want to make sure that we're providing the ability to incorporate the other information from our 16 different Angeles Link studies, and we're also looking to integrate, you know, other datasets that we have that we can -- we can leverage here. But by no means does this analysis and having a report from this software take the place of working directly with communities and directly with external stakeholders like yourselves to make sure that we're aware of those issues that are difficult to capture as a data point.

MR. BRITT: So -- let me just add -- Arthur, real quick, we are going to be having a CBOSG meeting tomorrow, and we are going to be discussing this with them, as well. And, you know, we're interested to know from them just like we're asking you, if they have any information on datasets that we can utilize.

And then as Katrina mentioned, this is just one tool in the tool chest. This is not meant to be an end-all be-all selection tool. It's just another way of looking at the information and the data that's available, in addition to all the other work studies, in addition to the PAG and the CBOSG, in addition to the -- all the other things that we're going to be doing to evaluate those routes, this is just one of the tools.

MR. FISHER: So I guess my follow-up question there is, are you prepared -- are you prepared to collect and map the data that doesn't exist on communities for both the environmental justice communities and for -- for example, a lot of the California tribal communities, those that are not U.S. tribes, but actual California tribes.

MR. BRITT: Yeah. I think, if I understand your question, Arthur, and I don't want to put words in your mouth, so let me just say what I think I heard you say, which is, are we willing or are we able to collect data, and in terms of community understanding data and put it and map it into the system, is that what you're asking?

MR. FISHER: That's what I'm asking.

MR. BRITT: Yeah. And I think Jill can take that question. Go ahead.

MS. TRACY: Hi, Arthur. This is Jill Tracy, and thank you for your question. That's an issue that has come up in a lot of feedback we've received on our environmental justice study. And so, part of our Phase 1 plan is to come up with an outreach and community and tribal input plan as part of Phase 2. So if -- if you would like to provide input on the technical approach to our environmental justice study, as you know that common period is still open, and so, we really welcome further comments on part of that planning phase. So thank you for your question.

MR. FISHER: Okay. Thank you.

MR. BRITT: Thank you.

All right. To keep us on schedule, I'm going to go to our next and last presentation, which is, again, Amy and Katrina.

MS. REGAN: Hello, back again. So again, just a reminder, these are two different studies. Our routing study, we had a great conversation about that earlier, and now we're going to look at the other side of the coin, right, the -- the pipe sizing and design.

And these are the areas that we will plan to address the basis of design, talk a little bit about system hydraulics, various operating cases, system response, and five-year scoping.

So pipe sizing is an area that starts to incorporate information, again, from all of the other Angeles Links studies, and we use that to create the initial basis for design. But then we start taking a very iterative approach, continuously evaluate system hydraulics, operational scenarios, and -- and look at what happens over time to a system like this.

So while routing was about where to go, a sizing is more about how to go there efficiently and effectively. But the goal remains the same, right, I think I said this earlier, we want a pipeline route that is efficient, sustainable, and harmonious with the environment and the communities around it, but also present a system that can sustain short-term and long-term resiliency and reliability.

So pipeline sizing isn't only about diameters and -- and lengths of type. It's also about how our pipeline fits into the bigger picture, and it's really essential that we have a cohesive system. This maximizes our investment, maximizes our planning and efficiency. Our design philosophy is really holistic. We're not looking at production and demand and storage and routing in isolation. We're bringing them together. And this ensures that every design choice we make, even at this preliminary stage, considers the bigger picture.

Now, when we get into system hydraulics, we're -- we're diving deeper into a bit of the more technical side. But system hydraulics, essentially, simulate how a pipeline system would behave. And I'll go into more granularity on that in a few slides.

In the next couple areas, assessing, operating cases, looking at system response and reviewing five-year scoping, we're not applying changes -- we're applying changes to the hydraulic model, and then looking at what that system simulation looks like and what happens when those things are applied and making changes, as necessary.

In Phase 1, we're really just starting that process off, and we're sharing that with you. So our goal here is to come up with a 5 percent design, so it's a very basic design level still. And in subsequent phases of the project, we look to further increase detail in all areas, including design, looking to bring the design to 30 percent. So you can tell with the difference between 5 percent to 30 percent, even if you don't have a really engineering design background, I mean, that's a big difference. And so, in Phase 2, we're going to have much more details surrounding things like equipment, facilities, and needs. Phase 2 is also where we would start to build a portfolio of information around things that could be specific to equipment, facility, design, and the process of sourcing.

So we have had questions about sourcing and materials, and really, right now, we're at a preliminary stage. A lot of those things are -- are going to be considered in more detail in subsequent phases. So sizing and design in Phase 1 creates a solid foundation for an efficient, resilient, and future-ready pipeline system.

Now, let's go ahead and -- and talk about safety. So safety is something that we build, not only into our governance and operational structures, how we do work and why we do work, but we built it in at the design-level itself. Safety is paramount to our pipeline project. Siting, material, component selection, all of these things are made, ensuring that the proposed pipelines are not just functional, but safe. We can literally build safety into our designs. Regulations and standards drive design choices. For example, wall thickness is determined using industry standard ASME calculations, but there are other components we can assess as well. Proper placement on valving along the line, markers indicating the pipeline is buried, pipeline materials themselves at grade are just some of the different choices that can add additional safety factors to the designs themselves. And safety measures don't stop once the pipeline is laid, right? Choices like the inclusion of remote and automatic-controlled valves. Those allow us to control, monitor, and operate a pipeline at a distance in real time. Sensors that detect minute leaks, pressure changes, or external interfaces act as eyes and ears, essentially, on the ground. At compressor stations, including safety measures, like emergency shut-down or automatic depressurization, they sound like big words, but what they do is they really create and build safety into the very bare basics of operating.

And then, additionally, you know, with state of the art control centers, we're equipped to respond rapidly, ensuring that any issues, potential issues, are mitigated promptly. And again, these are just safety choices in the design. It's not necessarily all of the steps that are taken from an operational and procedural sharepoint, but I think it's really important to make sure that we're talking about these when we talk about our design and the choices that we make.

Okay. So now, we'll get into the basis of design. So this is very common, for a lot of technical projects, you'll start off with a set of your assumptions and figures at the beginning. This is where we begin to establish the parameters that we're going to consider as we draw, and we will draw a good portion of this information from the research we conduct in production, in demand, and in the storage of hydrogen, those different studies that we're working through.

For example, you know, what are the pressure requirements for equipment at offtake? What are typical operating pressures at production facilities? How much gas are we looking to move and what are the distances that are being considered? So types of information like this allow us to make specific assumptions that we can then build a system around and then build a system that meets those goals. So it's the theory -- the design parameters that we start with at the beginning of the day.

So those -- those critical pieces, those feed into a very iterative process that's built around system resiliency. We use that basis of design to develop initial system hydraulics or modeling. And at this stage, we evaluate various elements, always revisiting the model to observe the effects and make necessary adjustments to maintain system equilibrium. It's vital that supply, demand, and storage remain balanced at all times within a pipeline system.

So as we go through this process, we look at system responses, we look at various operating cases and five-year scoping. If we need to make changes to the system, diameters, compression, pressures, if we need to make those changes to ensure the system can operate properly, we make them in the model. If we introduce change down the road through any of these things, using modeling helps us know that the system is going to still be capable of functioning the way we need it.

And if you haven't worked on pipeline systems before, we use hydraulic modeling all the time to simulate events, to see what correct pipe sizes are appropriate, to see what happens with pressure. And that's something we're going to dive a little bit deeper onto next.

So system hydraulics is, essentially, using computer modeling to simulate and analyze the flow of fluids or gas in a network of pipes. You can include other features, pipes, valves, compressors, and various other components, and by having these components in software, we can see how the system will respond before we even build it.

By doing this kind of modeling, engineers can predict how gas will behave in the system under different conditions. We input data about the system in information from our basis of design, and then the software uses mathematic equations and elemental properties of gas to simulate how that flow would happen, what would happen with pressure and velocity through the network. And here, it's not about just choosing the right pipe size or diameter. We're modeling flow volumes, pressures, and distances to understand how the gas would behave within the system. And this allows us to maximize the pipeline and get the most out of the system from an operational standpoint. So essentially, system hydraulic modeling is like a virtual test environment to make informed decisions.

Next, let's talk about system responses. So there are numerous system responses to consider, as you may imagine. After establishing a baseline for system hydraulics to start from, we start checking in on the system, right. And we see how these hydraulics shift due to alterations at different points of interest. We've determined some of those points of interest to be production sites, storage areas, offtake locations, compressor station locations, and places where pipelines intersect in our modeling.

If we observe any undesirable changes in hydraulics, for example, overpressure or underpressure, the ability to not meet at the target pressure at the end of the pipeline. We make changes to ensure that the hydraulics remain an acceptable state throughout the system. So again, like I said, it's very iterative, and each time we apply change, we have to look back and look at what the simulation tells us about that change.

Next, let's talk about operating cases. So there are a lot of different operational scenarios that can occur. And in evaluating the system, it's crucial to consider these not just in a static context, how are they right now, but also across various scenarios and different changes to pipeline features. So different pipeline material, sizing, compression, horsepower, these can all have big effects on how the system functions. And this leads us to system optimization, where we aim for the most efficient choices to achieve our goals.

We also analyze here, how the system behaves under different scenarios. So it's important to know and consider what could happen, say, on days with low production, but high demand, or vice versa. And by observing hydraulic models response to these situations, we can gauge if we're building a strong, dynamic, robust system, and make changes to get the response that we want.

Lastly, we'll evaluate our pipeline sizing and design in the context of five-year intervals. So approach helps us to project growth in pipelines and storage requirements, as both production and demand increase. How should we adapt to the changes, what choices can we make now that help ensure our system is resilient in both the near term and distance future. By maximizing with -- by matching our sizing and system components with different scenarios outlined in the demand study, like the ambitious, moderate, and conservative levels, we can effectively start planning. This provides us with insight into potential variations and system components, such as pipe length, diameter, and compression.

So at the end of the study, as you saw on a previous slide, you know, we'll have preliminary sizing for the entire system, and the preferred routes. And since pipelines, I think I said this earlier, they -- we all know they take a long time to build. So it's important to plan for system growth, proactively over time. By planning and executing in ways to support multiple scenarios, we can optimize the system for potential, keep system resiliency intact, and ensure that we have a functioning and robust network. Thank you.

MR. BRITT: Thank you, Katrina.

Ernie, I saw your card go up in the middle of the presentation. I think we're finally speaking your language. Am I guessing right?

MR. SHAW: More or less. More or less. Thank you. What was it at? If you can go back a few slides, I think it was the first one. Keep going right -- that one, yeah, that one. There you go. Too far. There you go, right there. Perfect. Perfect.

Ernie Shaw, Local 483. So I noticed on the material selection, does that -- the pipe material in gray, does that include the specified yield strength, internal yield strength, to be 20 percent and above?

MS. KITSON: Yeah, great question, Ernie. I'll start, and then I'll hand it over to Katrina. So what your question is a great one. So for the hydrogen pipelines, we have -- there's a few different codes and regulations that are a little bit different than our natural gas standards, so as we look at the -- like, as the pipeline design, we will be using those codes and regulations, but they're very similar to what you just said. They just might be slightly different in implications, which is where the workforce study comes into play and how that will, you know, provide downstream effects to our company workforce.

MR. SHAW: So wait, if I understand, in a nutshell, you said since there's different standards and regulations with hydrogen and natural gas, we'd be deviating from how we normally do things now with our -- okay. I see. So a new standard would have to take place, new welding procedures, policies, all of that stuff. Nice. Potential, yeah.

MR. BRITT: You'll have to go back to school, Ernie.

MR. SHAW: Yeah. With the big, white hat on in the corner. Okay. And any idea in material selection is -- are we still in that research phase of, you know, the material selection itself, like, exotic metals, you know, X65, X88, like, you know, all of that? Is that -- that's just, kind of, going as we go, huh?

MS. REGAN: Yes, Ernie. We are still really in that research phase, wanting to look at what are the options, what is the -- what are the safe options that we can apply, and I think that we're going to have more of that information to share with you in this phase, absolutely.

MR. SHAW: Nice. All right, I like it. Cool. For the company.

MR. BRITT: So Sal, I don't know if your question has to do with safety, but before we leave this slide, I'm just curious if people are familiar with SCADA -- or SCADA. See, I'm not familiar with it. So I need someone to explain it to me.

But maybe, Katrina, you could just explain that a little bit more for the audience.

MS. REGAN: Yes, yes. So you see a lot up there, right, we have realtime reporting. And a SCADA system really provides an opportunity for you to realtime monitor your entire network of pipes. So it's very typical for -- for pipeline operators to have a SCADA system. I -- it's.

MS. KITSON: The supervisor, right?

MS. REGAN: There we go. The supervisory control and data acquisition. So if we unpack that a little, right, supervisory control, you can see what is going on on the system and control things, that's those remote and automatic valves, and then you can collect data over time about what your system is doing. What are the volumes, what are the flows at various points, and you can check-in, you know, at any time, and go, oh, okay, that's what the pressure is at this point in the system, right now, today.

MR. BRITT: Great. Sal, please.

MR. DICONSTANZO: Sal DiConstanzo, ILW. What was the -- supervisory control?

MS. REGAN: Supervisory control. Supervisory control -- data acquisition? Yeah, sorry.

MR. DICONSTANZO: Data acquisition.

MS. REGAN: That extra A in there always throws me off.

MR. DICONSTANZO: Okay. Thank you. My question was regarding the regulatory environment, you know, as we're talking about production and transmission and then offtaking of -- of hydrogen, whether it's pure or blended, do you see a landscape where there's a uniform municipal permitting process, or is it a patchwork of processes, you know, from municipality to municipality with regard to planning commissions, you know, fire marshals, et cetera. I mean, where is that?

MS. KITSON: Hi, Sal, thank you for your question. My group is performing a high-level permitting analysis that will be published with preliminary data and findings in the coming months. We would love nothing more than a streamline permitting process for a part of this permitting for the system. And so, if -- if folks have any ideas or would like to support -- support any legislative reform on that level, that would be great, because we would like to, of course, continue compliance with all of our permit conditions and mitigation measures, but we would really welcome a streamlined process.

MR. DICONSTANZO: So is -- just for my edification, obviously, there's municipal-level regulation, but on something like this, does it -- you know, how many layers are there? Does everybody have a say, is it local, county, regional, state? I mean, what -- can you illuminate that?

MS. TRACY: We -- we have -- it will be permitting through the local state and federal process, is what we expect.

MR. DICONSTANZO: Local, state, federal. Okay, thank you.

MS. TRACY: Hello, Norm. I saw you shaking your head. No? No, next to you. I'm sorry.

MR. PEDERSEN: Yeah, there you go. No, not federal.

MS. TRACY: Pardon me?

MR. PEDERSEN: We're -- you mentioned local, state, federal, and there wouldn't be any federal jurisdiction because we're keeping this within the State of California, correct?

MS. TRACY: We would still need to comply --

MR. PEDERSEN: Still have FIMSA regulation, perhaps, but not federal economic regulation.

MS. TRACY: Oh, this is environmental. I'm sorry. I wanted to be clear. This would be for NEPA or any, you know, federal lands or other federal environmental permitting triggers. And we're still in the process of evaluating what those triggers would be and what the level of review would be, but we would surely comply with NEPA as part of our review. And this is an environmental permitting, not -- not an economic or safety permitting response.

MR. PEDERSEN: Okay.

MS. TRACY: Does that help?

MR. PEDERSEN: That -- that helps, yeah.
MS. TRACY: Okay. You got me nervous when you --
MR. PEDERSEN: There are all kinds of regulation. You're -- you're explaining what type, the type you're talking about.
Just a quick question, Katrina. In your -- I think it was your very first slide of this set, you're talking about Phase 1 and Phase 2. Just for definitional purposes, you're talking about Phase 1, which has been -- for which funding has been approved by the PUC, and Phase 2 is the one that is -- for which funding is yet to come; is that correct?
MS. REGAN: Yes. That's correct. So subsequent phases of the project, generally those phases that have not yet been approved, Phase 1 is the phase we're currently in, and then the one that was approved for us to move forward on.
MR. PEDERSEN: Thank you.
MR. BRITT: You're welcome.
MS. REGAN: Thank you.
MR. BRITT: Lorraine, you're up next.
I'm sorry. I can't hear you.
MS. PASKETT: I think Joon was ahead of me in line.

MR. BRITT: Oh, okay. That's awful nice of you. Joon Hun online, Lorraine is giving you the option to go next, so if you could unmute yourself, we should be able to hear you.

MR. HUN: Yeah. I appreciate that, Lorraine. And my question was -- so from what we gather from this presentation, it seems like a lot of the concerns are centered around safety, of course important and existing safety and environmental standards. I was wondering more about how the other aspects of the Phase 1 study might inform the headline design and hydraulic modeling, specifically the leakage studies that are -- I know are included in the baseline studies, I was wondering if that was going to be an input in this study, as well, and if not, why you chose not to include that. Thank you.

MS. REGAN: Yeah, we can -- we can talk about that a little bit. Thank you. Great question. And if -- if I don't expand upon an area you think we should consider more, you know, this is our technical approach, and absolutely, please provide us with that feedback even -- especially as a written comment, it's really helpful for us to make sure that we're addressing and including all of your concerns.

I think the basis for design is probably the area where we really see the most integration between a lot of the different studies coming together right away. We're looking at what kinds of pressure are needed, what kinds of volumes are needed, and these really drive the functionality of the system itself, how the system operates and what it needs to do, and what it can do.

So those different pieces of information are absolutely critical, and if you have anything specific, or, Jill, if you have anything to add about how we can incorporate other types of information from studies specific to leakage, I'm interest -- we can -- we can discuss that.

MS. TRACY: Okay. Thanks, Katrina. And, Joon, this is Jill Tracy. We are, as you know, part of our air studies includes hydrogen leakage, and also a review of existing and emerging technologies associated with mitigation for that leakage. And so, that information will be incorporated into the pipeline sizing and the design, and it will be part of that monitoring. I hope that answers your question. Okay. Great. I got two thumbs up. So --

MR. BRITT: It's always good.

All right. Lorraine, we're going to go back to you. Thank you for being patient. I appreciate that.

MS. PASKETT: Of course. Lorraine Paskett, Air Products. I had a couple of questions. And if you go forward a couple of slides -- there we go.

MR. BRITT: I wonder -- back --

MS. PASKETT: Back -- yeah, there you go.

MR. BRITT: There you go. Back, back, back, back.

MS. PASKETT: This has demand production, routing, and storage, and I noticed -- I probably should have asked this sooner in the workshop, but there were a lot of questions around the production. That you have -- let's see, storage and the pipelines that you're looking at in this phase and production for third party, so I was hoping to get clarification from the SoCalGas team on the production piece of it. Yuri had mentioned that it was third party in your general rate case, you're requesting authority for SMR and electrolysis production. And so -- and I think when you kicked off the workshop series earlier this year, your president mentioned that you wouldn't do production.

So that was one question, if you could give some clarity because the final decision for the link-removed production, it had production in there, and SoCalGas had requested, and it was removed by the PUC.

And then subsequent this year in your general rate case, there's a pretty strong push for production with both SMR electrolysis, so that's one question.

Because I think Yuri mentioned that you were not planning to do that, and that's inconsistent with the three-year planning. So that's the one.

And the others are on safety.

MR. BRITT: Well, let's just take that one first, and then we'll go on to safety.

So, Jill?

MS. TRACY: Okay. So, Lorraine, Jill Tracy. For production, the hydrogen production was never part of our original application for Angeles Link. All production associated with the system is third-party production. So that was never a part, nor is it, as you know, part of the financial decision, as well, but I just wanted to make that clarification that it was not part of the application.

With respect to the GRC, I believe that the funding request associated with it has nothing to do with Angeles Link, and I think it's more related to research and development of merging hydrogen production technologies. And so, that -- that that funding request from the GRC doesn't have anything to do with Angeles Link.

MS. PASKETT: Would you anticipate, because you have the request for funding and authority for production through SMR electrolysis, to pursue that outside of the link as part of the gas utility operations?

MS. TRACY: I don't have any knowledge about those plans. All I know is that it's part of our research and development program. So we're happy to put you in touch -- Yuri is an encyclopedia of that information. He could -- we're happy to reach out and give you more information on -- on the actual work that's being contemplated in the RG and D space in the GRC, if that helps.

MS. PASKETT: I think it would be good to know, as you're looking at the link holistically, because production is part of the evaluation. We're talking about production demand today. And as you're looking at the pipeline sizing and design and routing, that production centers and production capability are part of it. And so, if -- if the R&D at SoCalGas that's requesting authority in your general rate case to do electrolysis and steam methane reform will eventually transition it out of R&D into actual utility base production of hydrogen, I think it would be -- it would be helpful to know that. Even though it's outside of the link, it may be part of the -- the overall analysis.

MS. TRACY: And just to be perfectly clear, all of the -- for Angeles Link, there's -- there's -- it's pure third-party production of hydrogen, and there's, no, like, real linkage with our RG and D work that's contemplated now or in the GRC. Thank you.

MR. PEDERSEN: Just for point of clarification.

MR. BRITT: Just announce yourself for the court reporter. I'm sorry.

MR. PEDERSEN: Norman Pedersen SCGC. In the general rate case, SoCalGas did propose funding, rate pair funding, for production as part of its Honor Rancho compressor modernization project, and as part of its Moreno -- will the SDG and E Moreno compressor modernization project. However, parties, including SCGC, opposed repair funding for the production of hydrogen. Separate and apart from the --

MS. TRACY: Those facilities are not -- those are -- are -- Moreno was an SDG and E, and GRC.

MR. PEDERSEN: Okay. What -- Honor Rancho is a SoCalGas project, Moreno is an SDG and E project?

MS. TRACY: That's correct. And that will be ancillary to that facility and not associated with Angeles Link, that production.

MS. PASKETT: As you look at the permitting, I don't know if this is for Amy or for Jill, are you going to look to the PAC for safety oversight, or are you going to look to Finzer DOT?

MS. TRACY: Amy is our safety, so I'll -- I'll

turn it over to her.
MS. KITSON: So it's -- at this time, for our safety studies, we're looking at the current industry standards and practices that exist, and then we'll support, you know, regulation and policy as it comes to be, but in the meantime, that's what we're designing our systems around and what looking for for our safety site.
MS. PASKETT: And my last question is for Jill.
You had mentioned expedited permitting, the possibility of some reforms. So I was curious about that, if you had any more details about what might be helpful.
MS. TRACY: We are in the planning phases of evaluating our permitting and what would be beneficial, and that's part of the routing analysis, as well. And so, once we get more information that we can start sharing on our environmental permitting, I think that will probably be a topic for our quarterly meeting in December, so I'll have more information at that time. Thanks.
MR. BRITT: All right. Tyson, I think I see your hand up online, if you could unmute yourself.
MR. SIEGELE: Hi, my name is Tyson Siegele. I am representing the Utility Consumers' Action Network. I have a couple questions. One is on the alternatives,

I -- I know that within this meeting. We're spending a lot of time on pipelines, we're spending a lot of time on Angeles Link, when we are going over all of the different components of Phase 1, it would be great to have this type of meeting on the alternatives, as well. So an entire meeting devoted to alternatives, possibly separate meetings for each different alternative.

Is there any anticipation of that being scheduled into the -- the meeting process for the PAG at this point.

MR. BRITT: Yeah. So, Tyson, on that point, I think we already had a meeting that focused on alternatives, but again, we're going through a series of meetings starting with meetings being focused on scoping, technical approach, draft findings, and then draft reports. So we'll be coming back to the alternatives as the work is getting completed, and have more detail in terms of preliminary information, and then the final draft report will also be bringing that, as well, related to alternatives. That's one of the 16 work studies.

MR. SIEGELE: That would be great. I -- I would really appreciate more details on what SoCalGas is doing on the alternatives that would take a look at how to get hydrogen to customers that are non-pipeline alternatives.

The question related to this particular

presentation, the pipeline sizing design criteria, one of the -- you know, on this slide here, demand is listed as one of the bases for the -- the design. When we've -- we've gone through and talked about the demand for hydrogen, the Utility Consumer Action Network has been very clear that we see the demand study at this point as much, much higher than what the actual demand will be. We are currently working on a -- an analysis to provide to SoCalGas to illustrate why we think demand is so high. We're using both resources that SoCalGas has used as -- as its basis for and puts in assumptions as well as other resources.

And so, my question on pipeline sizing and design is, when -- when you're going through and doing the work that you're doing right now, if you get to the point that you say, Oh, the demand is actually going to be about one tenth or less of what our current demand study is showing, how big a difference is that going to make, is that going to be a -- a major redesign, is that going to invalidate all the work that is done on the pipeline sizing and design, or -- or how does it affect.

MS. REGAN: Thank you, Tyson. Great question. So I think that's a really common factor, as we go through these different studies, we're taking a really iterative approach because the information does change over time. And I think that the way we are presenting our solution and the way we're thinking about this system upfront, I used the word "potential" earlier, and I would use it again here. We're designing the concept and the foundation for a system that has potential to operate in different ways, and that is flexible.

So as we move forward, we're still only in Phase 1. I don't want to get ahead of myself here. And in subsequent phases, there will be more analysis that really is done. So the work that we're doing here today and the engagement that we're getting in all of our studies is absolutely critical, and there's immense opportunity for it to be applied, regardless of the demand levels that these different studies come up with in the future. Thank you.

MR. SIEGELE: So -- and please correct me if I'm wrong. What I heard was that the pipeline routing is probably going to be the same, regardless of pipeline demand, but the sizing of the -- the pipe might be different, or are you saying that the -- everything might change? The routing, the size of the -- you know, the diameter of the pipeline, what -- what -- when you go through the iterative process that you mentioned, what -- what do you anticipates as being the changes?

MS. REGAN: Oh, there -- there could be a lot of changes, Tyson. So as we think about, even our hydraulic study at this stage, I think I mentioned we will be including various different demand levels in that to see what needs to happen to the different system responses and -- and different points of interest in the system. If that's placement of compression, if that's horsepower effects diameter, there are just a lot of different options that can be chosen to allow the system to function under these different conditions, and demand presents different conditions.

So we are looking to optimize to make sure that the selections chosen make the most sense in terms of short-term and long-term needs.

MR. SIEGELE: Got it. And in terms of one of the -- one of the things that was mentioned earlier was that -- really, because of the cost of electricity and because of the -- I think Jack was mentioning this -- and because of the rate structures, most of the cost effective hydrogen production is behind the meter or is not tied to the electricity grid. You're not pulling electricity off the grid in order to create the electrolysis.

Are you -- are you considering in the -- the overall design that the demand for hydrogen may be small enough that a -- a pipeline system itself doesn't really make any sense because there's a lot of -- there's a lot of cost that goes into the -- the pipeline itself, regardless of diameter, and then if you have, for instance, one-tenth of the -- the demand, then you are increasing the amount of infrastructure cost by ten times for each unit of hydrogen that's sold.

Can you -- can you talk a little bit about that, I guess?

MS. REGAN: Absolutely, yeah. So as I said, when we conduct our hydraulic modeling. We're looking at a variety of different factors, including various levels of demand that we will pull from that demand study. There is another study, the alternative study, and there is a study that focuses specifically on cost, and that's our cost-effectiveness and high-level economic study. So I -- I really don't want to speak for -- for those teams leading that work, and I think that if you have additional comments that are specific to those studies, please definitely submit those in writing.

MR. SIEGELE: Absolutely, yeah. And we definitely will submit comments in writing. The -- the other -- the other -- you mentioned various levels of demand. One of the -- one of the questions there is -- I know that there are three levels currently in the demand study, from conservative all the way to ambitious. I'm assuming that, of course, you're going to include analysis of those three levels. When I say one-tenth of the demand that is forecast, I mean one-tenth of the demand of the -- the low-end, the -- the conservative -- the conservative scenario.

Are you taking a look at -- in your various levels, are you taking a look at demand that is -- is at that level, one-tenth of the demand of the conservative scenario?

MS. REGAN: So, Tyson, I don't know if I can comment on -- on one tenth specifically, but we are going to be doing staging and looking at what it looks like in terms of system growth in five-year increments and how that applies to the various demand levels and the growth as it occurs over time. So we are including a temporal element there as demand grows with regard to time and the different levels.

MR. SIEGELE: Okay. Thank you. I appreciate it.

MR. BRITT: All right. I don't know if Lorraine and Ernie, you guys left your tags up on purpose or did you have follow-up comments?

Ernie, did you have any follow-up?

Okay. I know that Jack has his hand up, so I'll go to Jack next.

Jack, if you could unmute yourself online.

MR. BROUWER: Hi, this is Jack Brouwer from UCI. I just wanted to comment a little bit on the -- what you were just talking about, Tyson. I agree, and I think every study that's looked at it agrees that we will very likely move a lot less hydrogen around than we are currently moving, for example, natural gas around. So we're not going to need as many pipes or as much infrastructure, from my perspective. So I think that that is true.

On the other hand, all the studies that look at the provision of hydrogen to various-end uses in society show that pipeline delivery is the cheapest, by far, means of moving it from the production site to the end use. So I think that pipes are a very, very important aspect of the hydrogen future that will make hydrogen cheaper, and as a result, able to be used in, you know, some of the applications we're talking about, ships out of ports, and long-haul trucks, et cetera.

So it's -- it's basically just a comment on how I think pipelines are going to be super important to low cost moving of hydrogen in society. Yeah.

MR. BRITT: Thank you, Jack.

All right. Ernie, we'll go back to you.

MR. SHAW: Thank you, Mr. Pedersen. Way to pass the mic. Ernie Shaw, president of 43, and good to hear you from you, Tyson. I haven't heard from you in a while, man. Your beard is getting a little darker, man. I noticed that about you. You look younger. So real quick, yeah. So just a couple things, you know, as usual, broken record here, I'm going to keep it going.

So as far as the safety oversight, I know you guys mentioned safety oversight and all that, but, you know, I just wanted to mention that, you know, man, if we're going to go out there and use standard, you know -- what do you call it? -- industry standards, right, all that, for -- for -- I mean, there's no better industry than, like I said, ourselves for my -- you know, my members and, you know, just like I said, I'm just going to keep mentioning it for the record, right, that's all for comment.

But, like, you know, stop the job, we got root-cause analysis, you know, safety committees monthly, annual safety congress even stand-downs that we do pretty frequently in the event that we have an incident, somebody gets hurt or -- could've been pretty bad, you know, we assess it right away and try to prevent that. So I just want to -- just mention that just to say that already, as is, we practice safety constantly and our record speaks for itself, you know, knock on wood.

Nobody has gotten hurt, dead, or, you know, done for. So that's good to mention.

Also, speaking of my membership, is there a projected forecast for, like, a workforce in this research phase?

MS. REGAN: Great. Great question. Thank you for your comments, Ernie. Absolutely. Those type of our numbers will be part of our workforce study that we do have in the works right now.

MR. SHAW: Sweet. I like it. Cool, cool. And -- and, you know, like I said, so talking about, like, just want to add, you know, like, with, like, the delivery and the pipeline and all that, like, you know, same thing, right. Experts on-hand, we do it every day. So you don't got to spend a bunch of -- of no, no. Oh, yeah. Keep going, keep going, keep going. Oh, there you go, there you go. On the siding, it says, "pipeline set back" under "depth"; is that in regards to, like, above ground?

MS. REGAN: That could be, like, set back from, like, various structures that are already in place.

MR. SHAW: Thank you.

MR. BRITT: Thank you. All right. We are -- okay. Tyson, I think you raised your hand again, so we'll end with you because we are way over schedule, but that's okay. I think this has been a really good conversation.

I mentioned at beginning we had a lot of presentations that are really detailed, and I think, obviously, the discussion has kind of shown how interested you guys were in the topics we covered today. So, Tyson, if you could unmute yourself, we'll take your comment, and then we'll have one slide for next steps, and then we'll adjourn.

MR. SIEGELE: Thank you. Tyson Siegele, Utility Consumers' Action Network. I appreciate, Jack, what you're saying about the pipelines being the lowest cost way to get the hydrogen from production to end use. I guess the -- the piece that I am very interested in seeing studied as well is the -- the production occurring at the location of venues so that the pipeline is -- is then not required. I know that with -- with this versus natural gas, hydrogen has a unique ability to be produced on-site; natural gas clearly does not.

And so, I'd be interested in seeing the analysis on how production at the point of use would -- would function in terms of the economics.

Then the other -- the other piece I -- I want to mention with that is that we've already seen within California that with, for instance, solar, that you can create an off-grid solar array at a lower cost that's 100 percent reliable; a lower cost than buying electricity from the electric utility. The -- the question for hydrogen is -- is interesting in that over all framework in that, could the same be done for hydrogen?

And so, that's -- that's really a question for you, Jack. And then the -- the other one I had for you, and I -- I really appreciate you being on these calls because it -- it -- it brings a lot of -- a lot of background, a lot of information that we appreciate.

The other question is, in terms of -- in terms of the demand study, I'm sure that you've taken a look and you have gone over the demand study that SoCalGas has put together. Like I said, I'm going to be providing some feedback on that. I'd -- I'd be really interested to hear your thoughts on the demand study and on, you know, is -- is it too high, too low, is it about right, and so, any thoughts you have --

MR. BRITT: All right. Thank you, Tyson, for that. We're going to go ahead and end our meeting now. It's almost -- did Ernie or Jack -- did someone have their hand raised? No. I think we're good. Oh, for Jack. Okay. I didn't see Jack raise his hand in response. Right. I understand. But did Jack want to respond? Is he available? I don't see his name --

MR. BROUWER: Yes. I'm here. I'm here.

MR. BRITT: Okay. There you go.

MR. BROUWER: Can you guys hear me?

MR. BRITT: I can hear you now. Yes.

MR. BROUWER: Okay. Thank -- thank you, Tyson. I also appreciate your inquiries and your contributions here very much. Thanks. Couple of things that you asked directly. One is that this distributed production of hydrogen is, as you point out, a positive feature associated with hydrogen that may enable a lot of options for local production. And I mean, a lot of options. So for example, we could have solar that is placed in the desert and have wires deliver that electricity, maybe even plus storage in the desert, all the way to, let's say, port locations where you could actually do the hydrogen production at the port, okay, something like that.

Okay. That's a possibility. You could also do it, like I was saying before, like, just behind the meter purpose-built places, right? So you have a place, let's just say near SunLine Transit in -- near Palm Springs where they're already using hydrogen for their buses, they're already putting solar directly adjacent to electrolysis and then putting it into the buses. Okay.

Those kinds of things are -- are the very best way to actually use hydrogen, make it right where you're going to use it, and then you avoid the cost and the complexity of having to move it around in society.

Most of the studies that include, let's say, an amount of hydrogen, like the SoCalGas study here is showing, would require that there would be some centralized production and some transmission and distribution because you can't do all distributed production. You can't do all distributed at those kinds of quantities. Now, at the one-tenth quantity that you're suggesting, it might be possible, okay, to make it all distributed. I suggest, though, that the one-tenth seems very low from my perspective. I do see -- there -- there are studies all around the world that have been accomplished and, you know, I have, I don't know, 20 or so of them that I could refer you to, and in almost all of those studies, there's a certain fraction, like, between 10 and 20 percent of total primary energy that is delivered in the form of hydrogen.

And this SoCalGas study and their high or -- what did they call them again? I think it's optimistic and conservative range is -- is reasonable compared to those other studies. Okay. So that's -- that's what I suggest, at this moment. Yeah. And again, we -- we could be wrong, but -- and -- and maybe you could be right that we only need a 10 percent, but most studies are showing that it's in this same range. And over time, we'll know, right? Because -- because -- okay. Even -- even in the -- even on the hubs that we started talking about right now, it's a very small fraction of total energy that we're going to put into the hubs, okay, and then we'll see if the costs start coming down and see how much pipe we actually need to start to see how much is going to be used in various end use of applications. You know, I mean, all 20 of those studies can be wrong.

MR. BRITT: All right. Thank you.

MR. BROUWER: I appreciate the opportunity to respond since he called me on it any way. Thank you.

MR. BRITT: I didn't want to put you on the spot. I was waiting for your hand to go up, but thank you for responding. That is good.

All right. I think we're good. Okay. We're going to go to Emily now, who's going to talk about next steps, and then the food awaits.

MS. GRANT: I hate being between you all and lunch. So thank you, again, for your participation today and your continued participation, especially as we've been meeting almost monthly, but I think that speaks to the importance of your feedback and the work that we're doing, so we really appreciate you.

Before we get to the December workshops, it's not on this slide, but I do want to flag for you that we are likely going to be meeting in November. I don't have those dates yet. That meeting topic will be on the demand study report. So I don't have a date for you because it's going to be dependent upon when that report is ready, and then, of course, we want to give you an opportunity to have that before we meet. So we'll be working backwards from that date. So as soon as I have it, I will get that date for you. It will likely be the week before Thanksgiving, so just kind of keep your eyes and ears open for that information. And again, I apologize, but we'll get that November date to you as soon as possible.

Moving forward from there, we have set our date for our final quarterly meeting for this year, if you can believe that. Friday, December 15th. We will be back here at the ERC; it will be the same format, a hybrid meeting. So we'll have virtual participants, we're ready for you, but we'd love to see you here in person if that is at all possible. The technical approach to the studies reviewed today for today's workshop will be open for feedback until Friday, November 3rd. Hopefully you all received the matrix that is now on the living library. I know the dates keep changing as we tackle different studies in the workshops. We want to open those feedback windows for a little bit longer, knowing that you've had a deeper dive on that information. So if you have any questions about what we're expecting when, just shoot me an e-mail or give me a call. I'd be happy to walk you through that.

The previous deadline for all the other studies was initially Friday the 13th, but we've extended that window until this Friday the 20th. I believe you all know by now that the feedback goes to Insignia who is tracking all of your feedback and comments during these meetings, and then of course today's presentation and the meeting recording will be available soon on the Living Library, and I'm happy if anybody has any questions on that or how to access it, we can walk you through that. And if there aren't any questions, I think we'll be good to go.

Oh, and the November meeting will be 100 percent virtual. So there will not be an in-person meeting, we expect it will probably just be about an hour. Perfect, thank you.

MR. BRITT: All right. Again, I want to thank everyone for making the time today, those in person, especially, and those online, as well. So thank you so much, and we will look forward to talking to you in possibly November.

(Whereupon proceedings concluded at 12:06 p.m.)

CERTIFICATE OF SHORTHAND REPORTER

---oOo---

I, Nicole Hatler, a Certified Shorthand Reporter of the State of California, do hereby Certify that I am a disinterested person herein; that I reported the foregoing hearing in shorthand writing; that I thereafter caused my shorthand writing to be transcribed into typewriting.

IN WITNESS WHEREOF, I have hereunto set my hand this 24th day of October 2023.

Nicole Hatler

Nicole Hatler CSR# 13730

B

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REGAL COURT REPORTING

APPENDIX 6 – CBOSG MEETING MATERIALS

WELCOME CBOSG MEMBERS

Arrival and Continental Breakfast

Workforce Planning & Training Evaluation Technical Approach
*Floating Safety Moment: Great California ShakeOut

SoCalGas Welcome & Opening Remarks

Project Options & Alternatives Technical Approach
Member Discussion

Pipeline Routing Technical Approach
Member Discussion

BREAK

Workforce Planning & Training Evaluation Technical Approach
Member Discussion

Next Steps/Upcoming Meetings

Adjourn/Lunch

October 19, 2023
9:30 a.m. – 12:00 p.m.

ANGELES LINK

Community Based Organization Stakeholder Group (CBOSG)

October Workshop

Warm welcome to our participants!
We will be starting shortly after 9:30 a.m.
to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

SoCalGas

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Please feel free to use the Zoom chat to provide input and ask questions

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen

Wireless microphones will be passed to those speakers attending in person

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AGENDA: OCTOBER WORKSHOP

- Welcome, Land Acknowledgement & Roll Call
  - *Floating Safety Moment: Great California ShakeOut
- SoCalGas Welcome & Opening Remarks
- Project Options & Alternatives Technical Approach
  - Member Discussion
- Pipeline Routing Technical Approach
  - Member Discussion
- Break
- Workforce Planning & Training Evaluation Technical Approach
  - Member Discussion
- Next Steps/Upcoming Meetings
- Adjourn/Lunch

ANGELES LINK

LAND ACKNOWLEDGEMENT & ROLL CALL

SoCalGas

SOCALGAS WELCOME & OPENING REMARKS

ANGELES LINK

NEIL NAVIN
Chief Clean Fuels Officer
SoCalGas

SoCalGas

PROJECT OPTIONS & ALTERNATIVES TECHNICAL APPROACH

ANGELES
LINK

YURI FREEDMAN
Senior Director
Business Development

SoCalGas

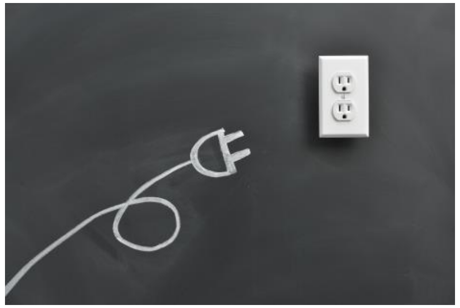
PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH

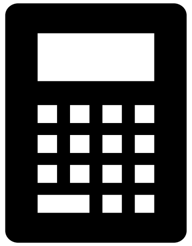
The Purpose and Need for Angeles Link:

Meet State of California's Decarbonization Goals

Improve California's air quality by replacing fossil fuels

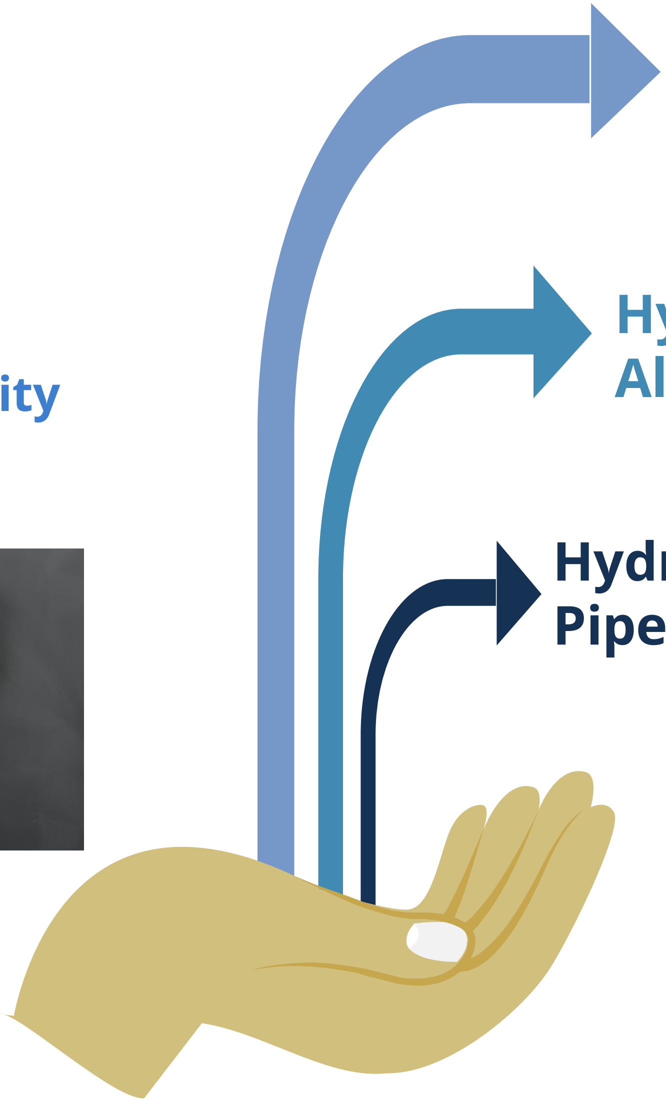
Enhance energy reliability and resiliency





Provide cost effective, affordable energy at reasonable rate

Are there other options or alternatives that can meet the same goals of Angeles Link?



Non-Hydrogen Alternatives

Hydrogen Delivery Alternatives

Hydrogen Pipeline Alternatives

PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH

What's the purpose of looking at project alternatives?

Hydrogen

- Hydrogen as complementary to multiple decarbonization alternatives (e.g., electrification, energy efficiency, renewable natural gas, carbon management etc.)

Alternatives

- Allows comparison of cost effectiveness and environmental impacts of the alternatives.
- Assess options for aligning with California's decarbonization goals.

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PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH

6 Step Process

Step #1

Identify Potential Alternatives including Localized Hub

Step #2

Evaluate Potential Alternatives Against Identified Criteria

Step #3

Dismiss Alternatives that Fail to Satisfy Step 2 Criteria

Step #4

Select Alternatives to Carry Forward for Analysis

Step #5

Feed Alternatives into Cost Effectiveness Study and Environmental & Social Justice Study

Step #6

Summary Analysis Include: Cost, Environmental Impacts, and Purpose and Need

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PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH

Identification & Analysis of Potential Alternatives

Electrification

Energy Efficiency

Renewable Natural Gas (RNG)

Continued Use of Traditional Fuels with Carbon Management

Hydrogen Delivery Alternatives

Hydrogen Pipeline Alternatives

Localized Hydrogen Hub

Non- Hydrogen Alternatives

Hydrogen Delivery Alternatives

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PHASE ONE PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH

Defined Criteria of Elements for Initial Project Screening and Evaluation

Technological Feasibility

Does the alternative achieve the needed scale to meet the end use demand?

End User Requirements

Does the alternative support potential end use cases?

Compatibility with State Policy

Does the alternative align with California's Clean Energy and Environmental Policies?

Reliability and Resiliency

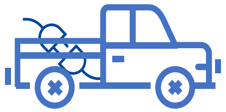
Does the alternative support energy reliability and resiliency?

Initial Screening Criteria

Approaches to Technical Alternatives: Non-Hydrogen Alternatives

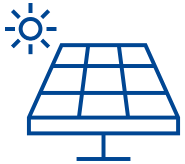
Direct Electrification

Electrify end uses instead of using hydrogen
Example: comparative assessment of the mobility sectors across various technological attributes (travel distance, refueling time, payload, etc.)



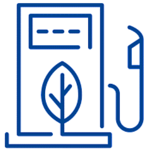
Energy Efficiency

Customers reducing energy usage and consumption



Continued Use of Fuels with Carbon Management:

E.g., source-capture, ambient capture



Renewable Natural Gas (RNG):

Methane from dairy, landfills, organic waste instead of hydrogen for power and commercial and industrial sectors

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Hydrogen Delivery Alternatives

Trucking

Marine

Rail

Electric transmission of renewable energy sources for hydrogen production in-basin

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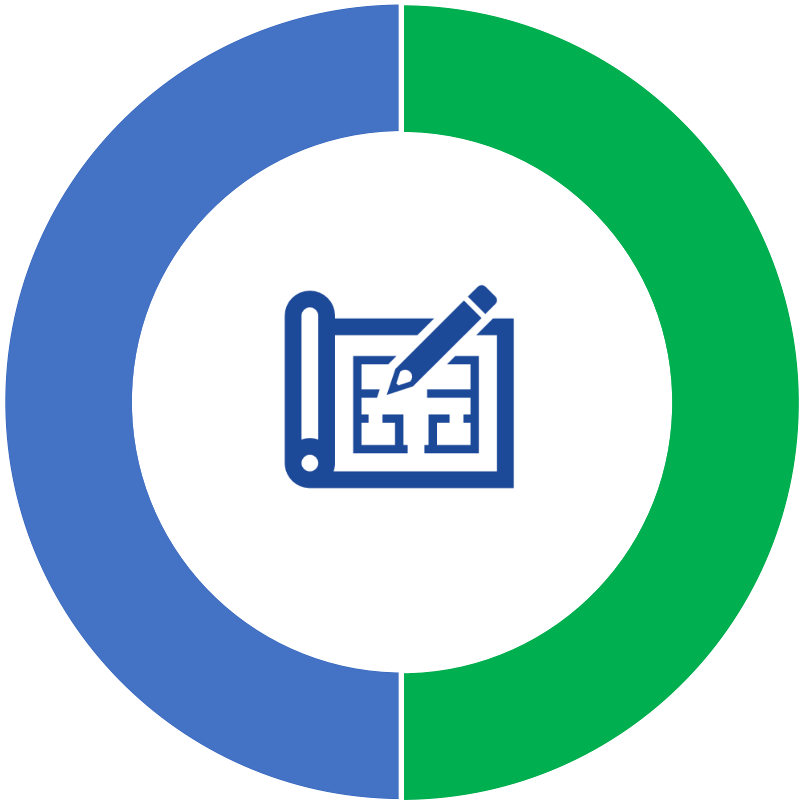
Hydrogen Pipeline Alternatives

Alternative Routes or Configurations:
Alternative pipeline phases, segments, and/or configurations, storage locations, and compressor station locations



Localized Hydrogen Hub:
Localized system serving Los Angeles Basin with in/near basin production

MEMBER DISCUSSION:
PROJECT OPTIONS & ALTERNATIVES

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
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PIPELINE ROUTING/CONFIGURATION ANALYSIS

ANGELES LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
Engineering & Technology
Development Manager

SoCalGas

TECHNICAL APPROACH – PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

- System Evaluation
  - Proposed system that forms a preliminary Master Plan for the fully built-out Angeles Link System
  - Multiple pipeline corridors included
  - Various production & demand locations accommodated
- Various Operating Cases
  - Localized hub system serving LA Basin with in-basin/close proximity production, demand, storage, and a common carrier open access pipeline
- Preferred Routes
  - Specific routes that we would consider evaluating further in subsequent phases of the Project
  - Would be evaluated and further refined in Phase 2

Phase 1 is Expected to Include:

- Desktop Study
- Connect identified areas of hydrogen production & demand throughout the Southern and Central California area
- High-level preliminary hydrogen storage options
- Pipeline corridor evaluation

Phase 2 Could Include:

- Development of criteria for further evaluation
- Mitigation plans
- Refine preferred selected routes further

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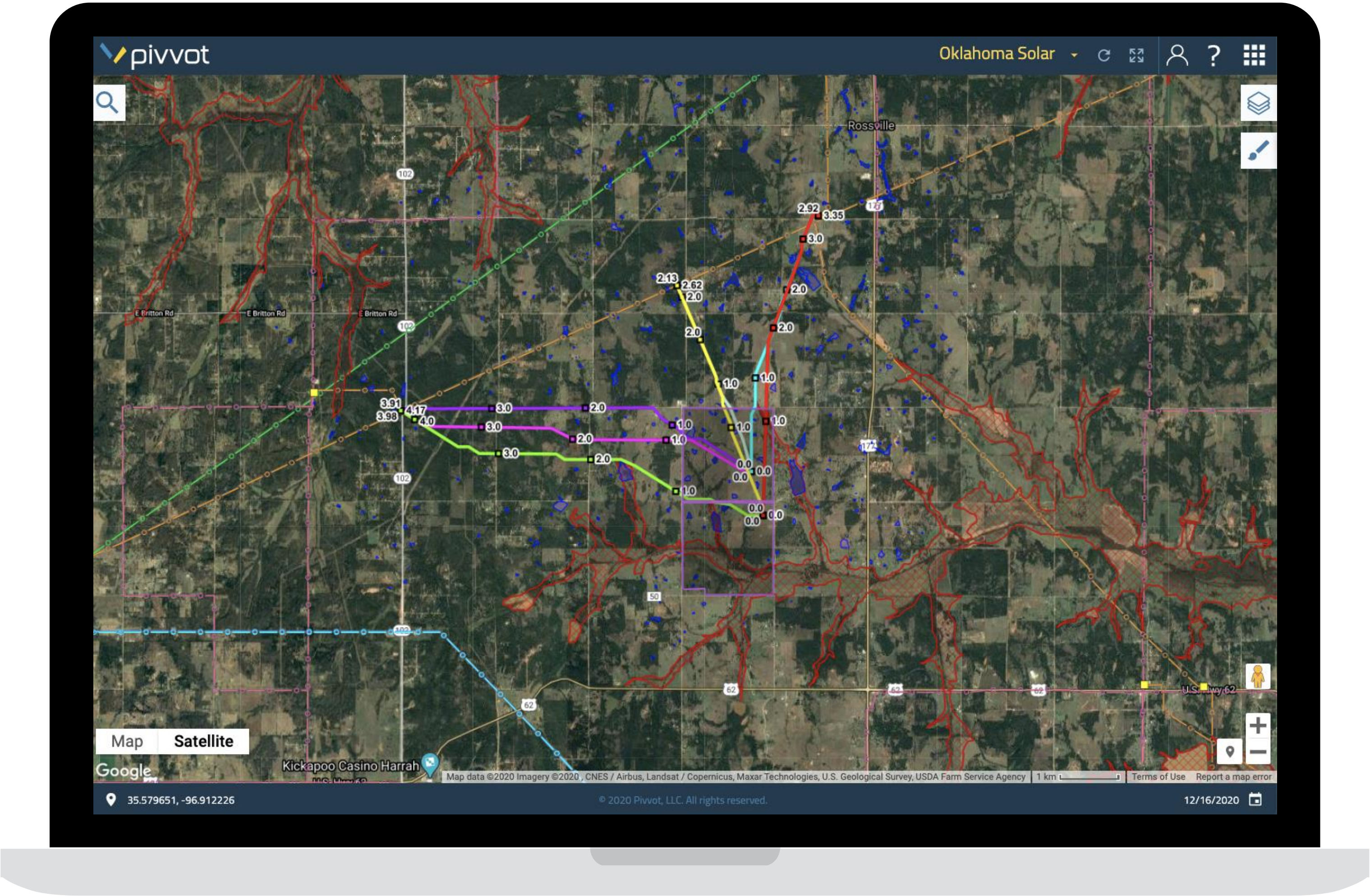
WHAT CAN PIVVOT DO?



Pivvot

Crossing & Impact Report: Evaluate crossing lengths and critical impacts for any linear corridor

Project Analysis: Drop a location, draw a polygon or a route and gain a detailed understanding of your surroundings

Parcel Report: Immediately generate detailed parcel reports outlining critical attributes for development projects

TECHNICAL APPROACH – PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

System Evaluation

Step One: Identify general system routing/pathways and functional areas considering potential Production, Storage, and Demand locations

Step Two: Identify preferred corridors in each of the functional zones assessing Production, Storage, and Demand potential: Connection, Collection, Central

Route Evaluation

Step Three: Refine routes using Pivvot software platform

Step Four: Identify social, engineering, and environmental components for each route for awareness, validate for constructability, and assess social justice implementation.

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PIVVOT

Data on Demand

Data Visualization

Data Library

Data Consulting

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MEMBER DISCUSSION:
PRELIMINARY ROUTING/CONFIGURATION ANALYSIS TECHNICAL APPROACH

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ANGELES LINK

BREAK

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WORKFORCE PLANNING & TRAINING EVALUATION TECHNICAL APPROACH

ANGELES LINK

CHANICE ALLEN
Engineering & Technology
Project Manager

SoCalGas

SHARING KNOWLEDGE

WORKFORCE PLANNING & TRAINING EVALUATION

Build, Develop, and Transition Workforce

Workforce Action

- Planning
- Development
- Management

Change Management

- Standards, Protocols, Specifications
- Facilities/Technologies
- Job Tasks/Classification

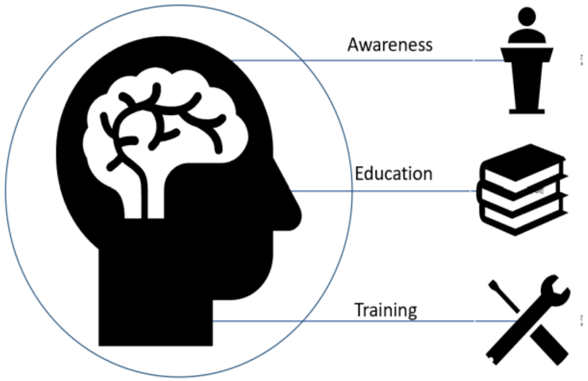
Regulatory Drivers

- Operations & Maintenance
- Operator Qualifications
- Training

WORKFORCE PLANNING & DEVELOPMENT

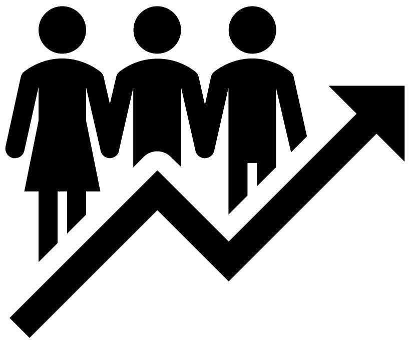
Sharing Knowledge

Collaborate with industry, government, unions, and communities on workforce initiatives



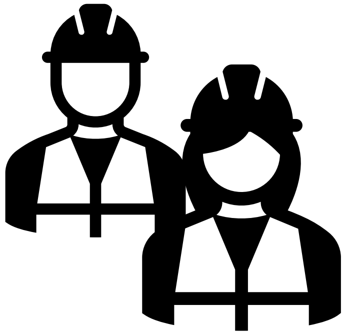
Workforce Planning

Utilize data science to plan for hydrogen industry workforce needs; new skilled and upskilled workers



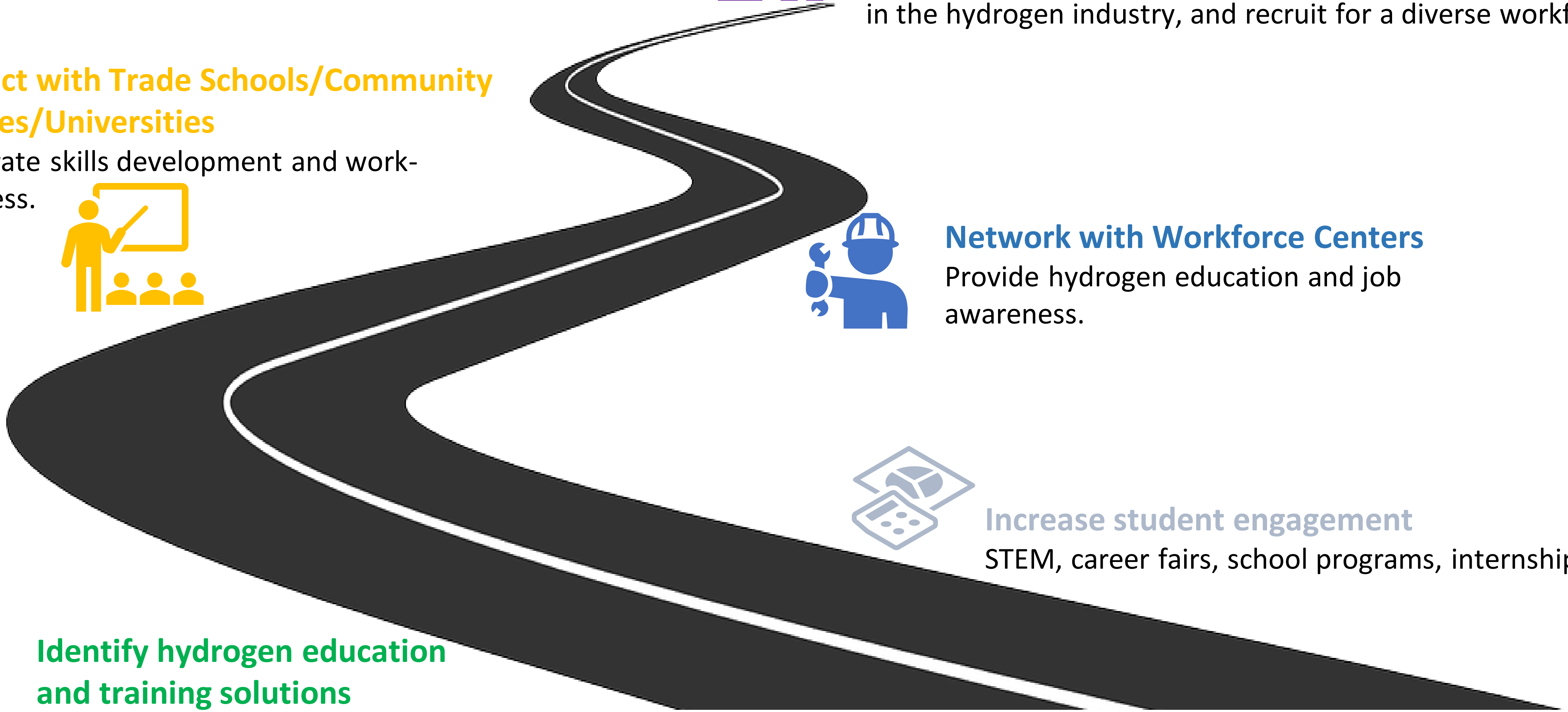
Build Hydrogen Job Pathways

Support workforce centers, universities/trade schools, and skills/training programs



WORKFORCE METHODOLOGY/FORECASTING

PROMOTE JOB PATHWAYS



Continued Collaboration with Communities
Focus on developing local skills and employing local workers in the hydrogen industry, and recruit for a diverse workforce.

Connect with Trade Schools/Community Colleges/Universities
Accelerate skills development and work-readiness.

Network with Workforce Centers
Provide hydrogen education and job awareness.

Increase student engagement
STEM, career fairs, school programs, internships

Identify hydrogen education and training solutions
Accredited companies/programs, toolkits.

MEMBER DISCUSSION:
WORKFORCE PLANNING & TRAINING EVALUATION

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NEXT STEPS & UPCOMING MEETINGS

- SAVE-THE-DATE: DECEMBER WORKSHOPS
  - WEDNESDAY, DECEMBER 13, LOCATION TBD
  - Hybrid option will be available
- The technical approach studies reviewed during today's October Workshop will be open for feedback until Friday, November 3
- Previous deadline on other studies extended to Friday, October 20
- All feedback goes to: ALP1_Study_PAG_Feedback@insigniaenv.com
- Today's presentation and meeting recording will be available soon on the living library

THANK YOU FOR YOUR PARTICIPATION

LUNCH

December 13, 2023
12:30 p.m. – 4:00 p.m.

ANGELES LINK

Community Based Organization Stakeholder Group (CBOSG)

December Q4 Quarterly Meeting

Warm welcome to our participants!
We will be starting shortly after 12:30 p.m.
to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

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Vice President Gov. Relations
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AGENDA: QUARTERLY MEETING #4

- Arrival and Lunch
- Land Acknowledgement, Safety Message & Roll Call
- Greater Zion Church Family Welcome: Associate Pastor Chidi Olunkwa
- ARCHES Update
- Preview of Preliminary Findings: Air Emissions: GHG and NOx
- Breakout Session: Air Emissions & Our Community
  - Report Out
- Overview: Demand Study Draft Report Out
  - Member Discussion
- Break: Porto's and Coffee
- Hydrogen Economy Emerging 101: David Park, Hydrogen Fuel Cell Partnership
  - Member Discussion
- Stakeholder Comment Updates
  - Member Discussion
- CBOSG Roundtable: Community Announcements
- Calendar/Next Steps/Adjourn

4

LAND ACKNOWLEDGEMENT, SAFETY MESSAGE & ROLL CALL

SOCALGAS WELCOME AND ARCHES UPDATE

ANGELES
LINK

ANDY CARRASCO
Vice President Communications,
Local Government &
Community Affairs

SoCalGas

GREATER ZION CHURCH WELCOME

ANGELES
LINK

CHIDI OLUNKWA

Associate Pastor

Greater Zion Church

SoCalGas

PREVIEW OF PRELIMINARY FINDINGS: GREENHOUSE GAS (GHG) EMISSIONS EVALUATION AND NITROGEN OXIDE (NOX) & OTHER AIR EMSSIONS ASSESSMENT

ANGELES LINK

DARRELL JOHNSON

SoCalGas Manager
Environmental Services

RECAP: HIGH-LEVEL METHODOLOGY FOR GREENHOUSE GAS EMISSIONS

- Analyzes emissions changes for low, mid, and high demand scenarios
- Mobility (medium and heavy duty) sectors evaluated for replacement of diesel and gasoline with hydrogen fuel cells
- Power generation and hard to electrify industrial sectors for replacement of natural gas with hydrogen fueled combustion equipment
- Evaluates infrastructure including electrolysis and RNG SMR for production, as well as transmission and storage

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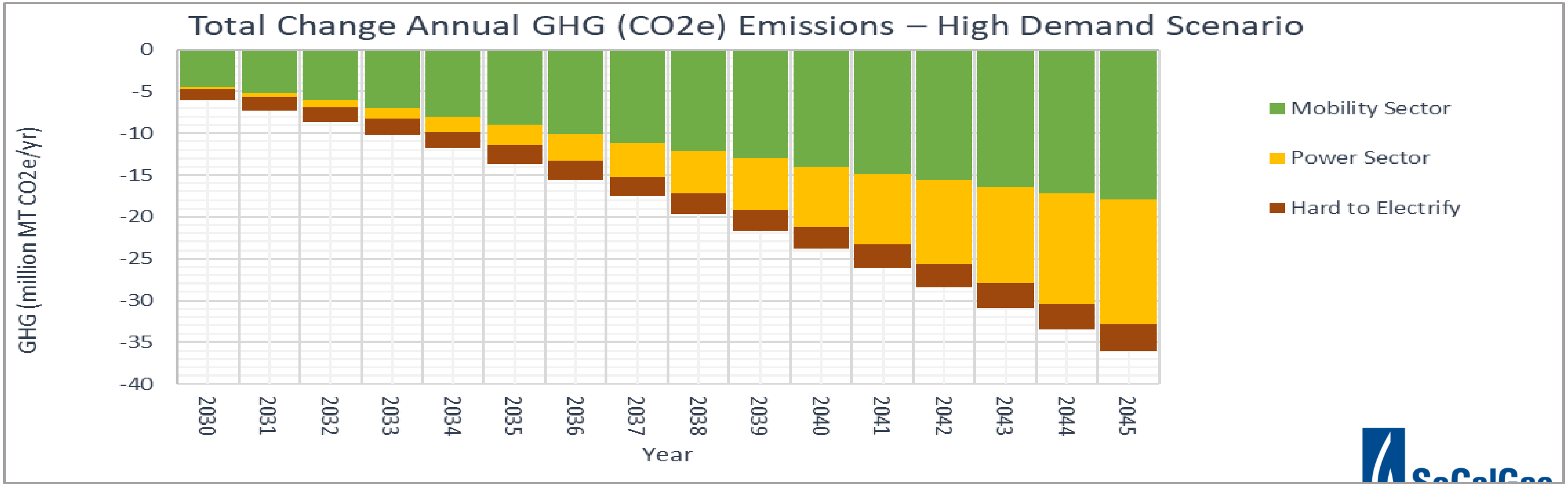
PREVIEW: OVERALL PRELIMINARY RESULTS FOR GREENHOUSE GAS EMISSIONS EVALUATION

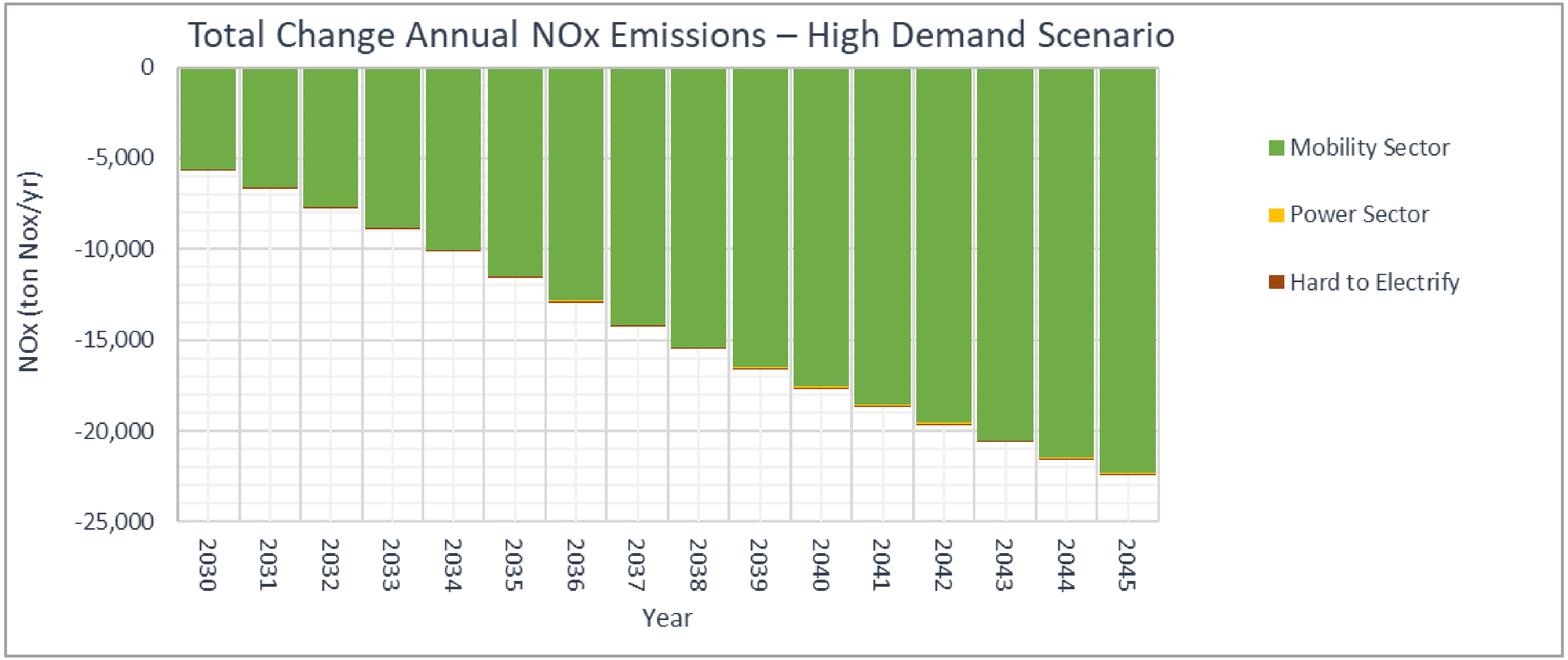
- Predicts a significant decrease in GHG combustion emissions with increased hydrogen adoption
- Projects up to 36 million metric tons of CO2e removal per year in SoCalGas geographic area by 2045
- Mobility sector hydrogen fuel cell substitution eliminates 100% of GHG emissions
- Power generation and industrial sectors contribute 29.2% and 12.2% to overall GHG reductions, respectively



SoCalGas

PREVIEW: OVERALL PRELIMINARY RESULTS FOR NOx EMISSIONS EVALUATION

- Overall NOx emissions associated with AL are expected to be reduced by over 20,000 tons per year by 2045
- Mobility NOx emissions are eliminated with hydrogen fuel cell substitution
- Industrial and Power Generation NOx permitted emissions are expected to stay the same or decrease
- Infrastructure NOx emissions are significantly smaller than end-user reductions



Projected overall NOx reductions in 2037 are up to 20% of South Coast AQMD's forecasted NOx Emissions in 2037

SoCalGas

PREVIEW: PRELIMINARY RESULTS FOR MOBILITY SECTOR

GHG KEY FINDINGS

» **Mobility is the largest end-user source of GHG reductions**, accounting for 59% of overall reductions with heavy-duty vehicles 61% of that

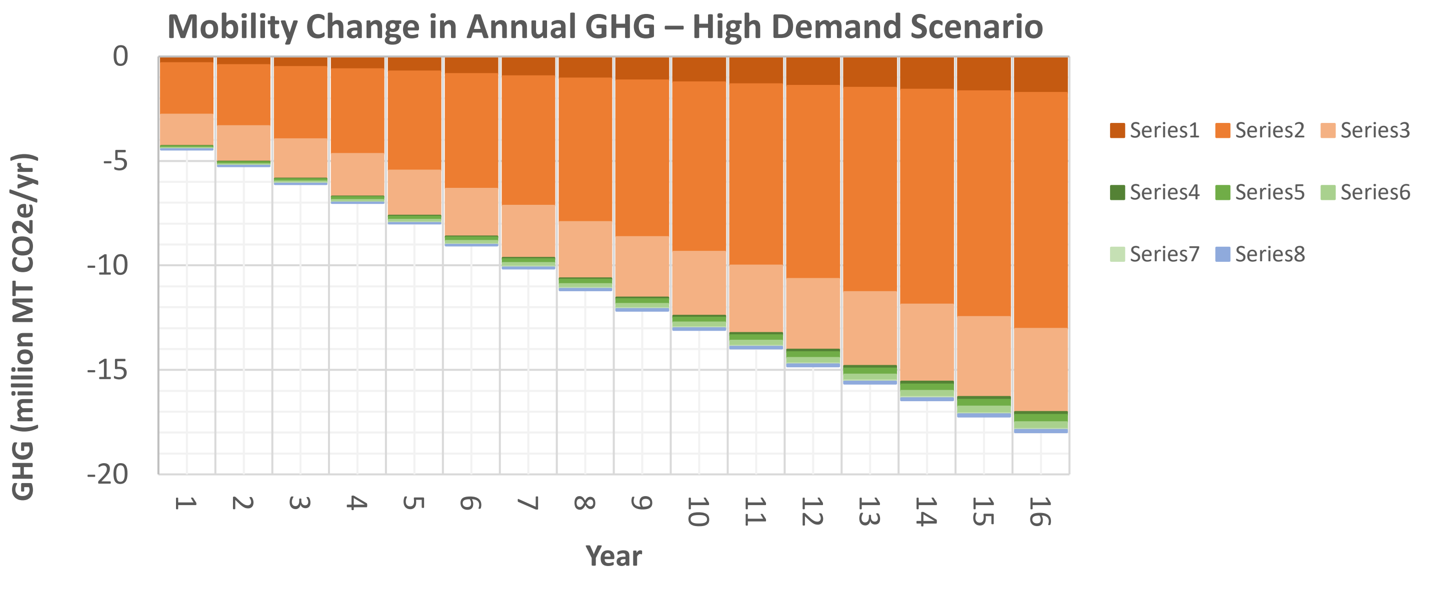
» Hydrogen fuel cell substitution results in **100% GHG reduction** in the mobility sector

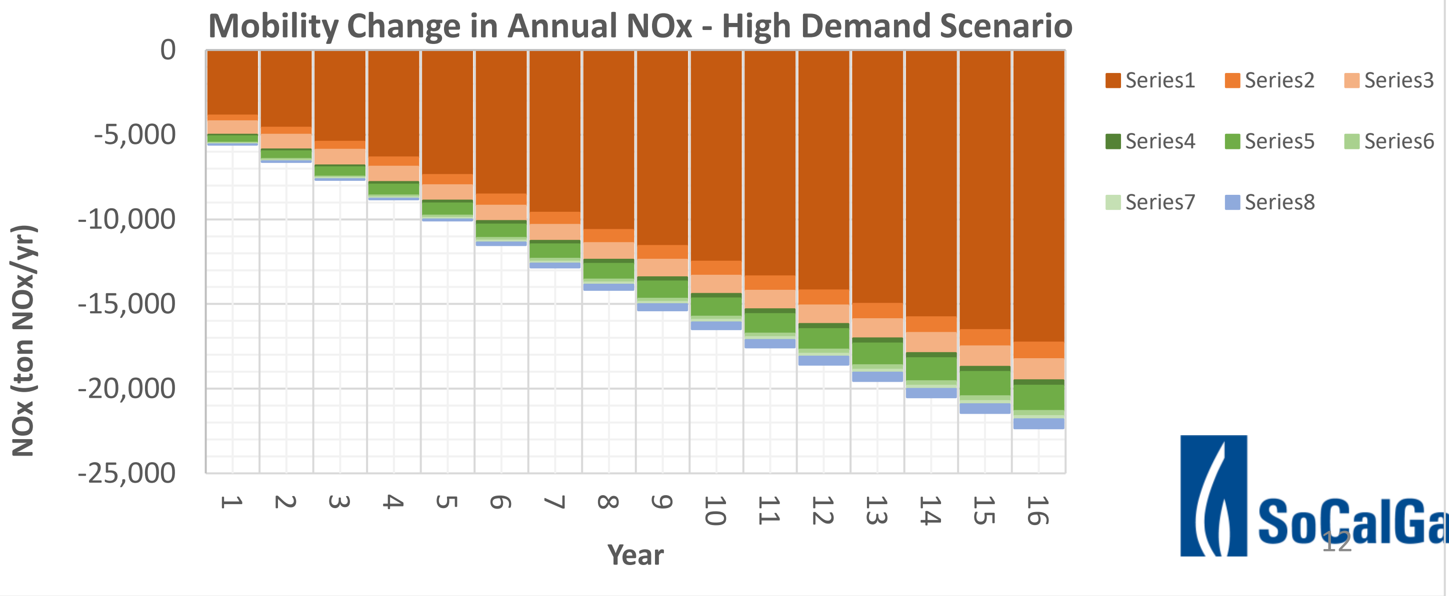
NOx KEY FINDINGS

» **Mobility is the main source of NOx reductions,** accounting for 99.5% of total reductions with heavy-duty vehicles accounting for 75% of that

» Hydrogen fuel cell substitution results in **100% NOx reduction** in the mobility sector

» Overall, hydrogen adoption in mobility **significantly lowers** NOx emissions





SoCalGas

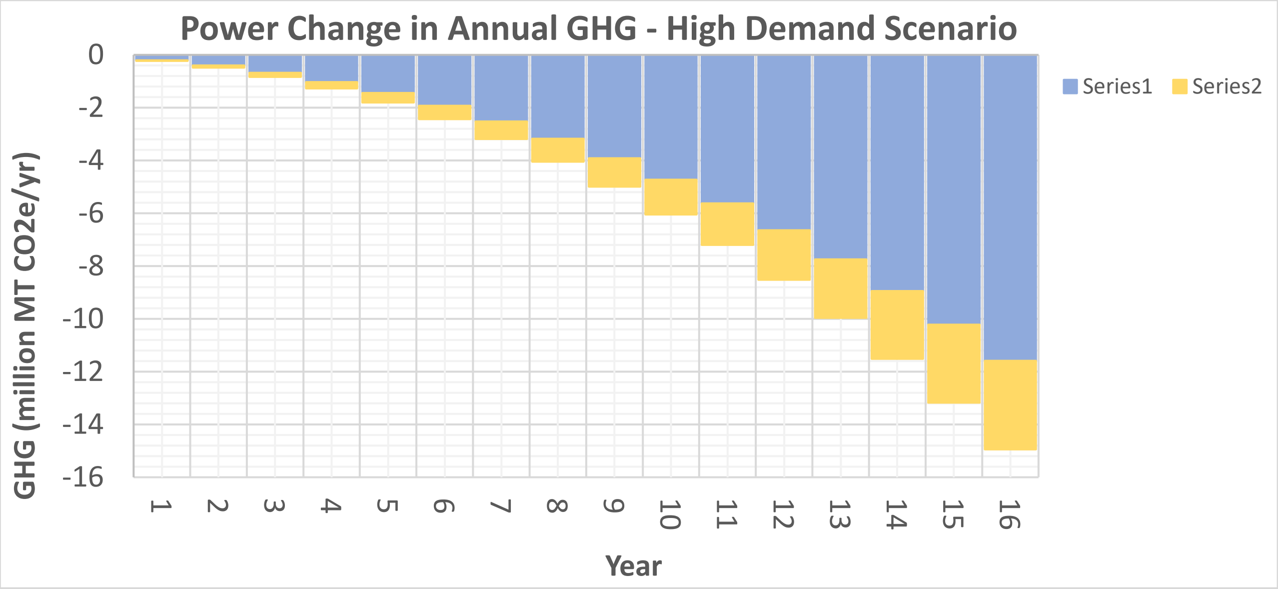
PREVIEW: PRELIMINARY RESULTS FOR POWER GENERATION SECTOR

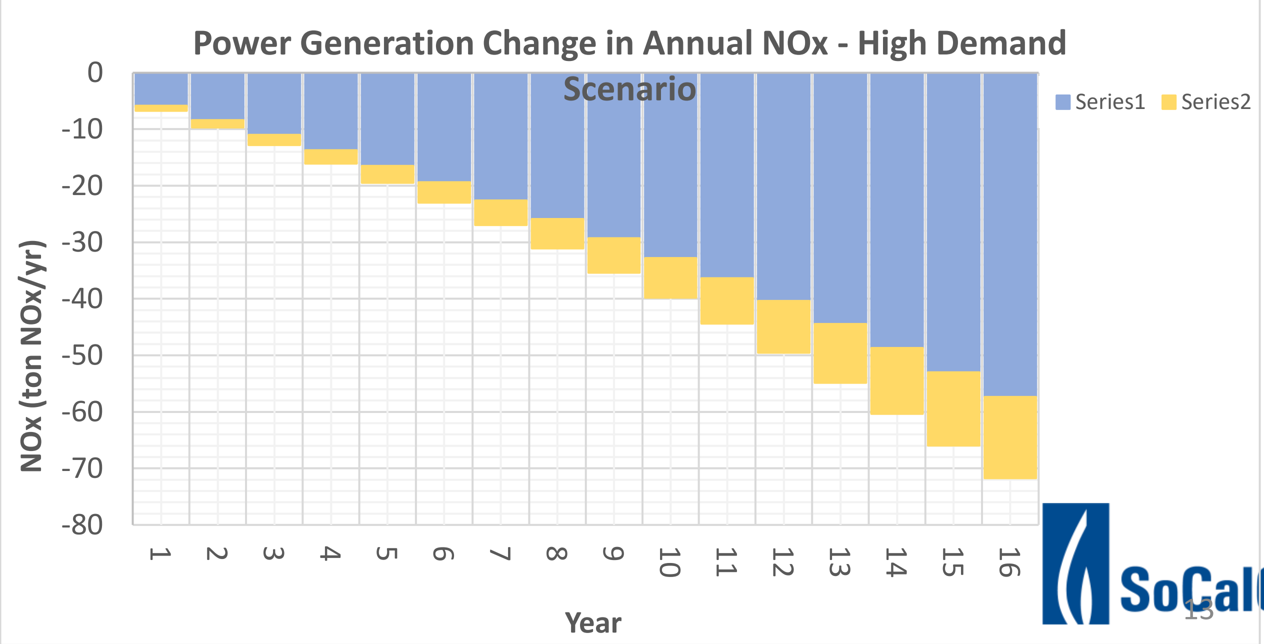
GHG KEY FINDINGS

- Hydrogen fuel substitution **reduces GHG emissions by 99.6%** in power generation
- Power generation accounts for **29% of overall GHG reductions**
- **Projected annual GHG reductions** for high demand scenario in 2045 equivalent to **electricity use of nearly 3 million homes for one year** (EPA calculator)
- **Hydrogen displaces natural gas** leading to significant GHG reductions

NOx KEY FINDINGS

- NOx permitted emissions from power generation are **expected to stay the same or decrease**
- Power generation accounts for **0.25% of overall NOx reductions**





SoCalGas

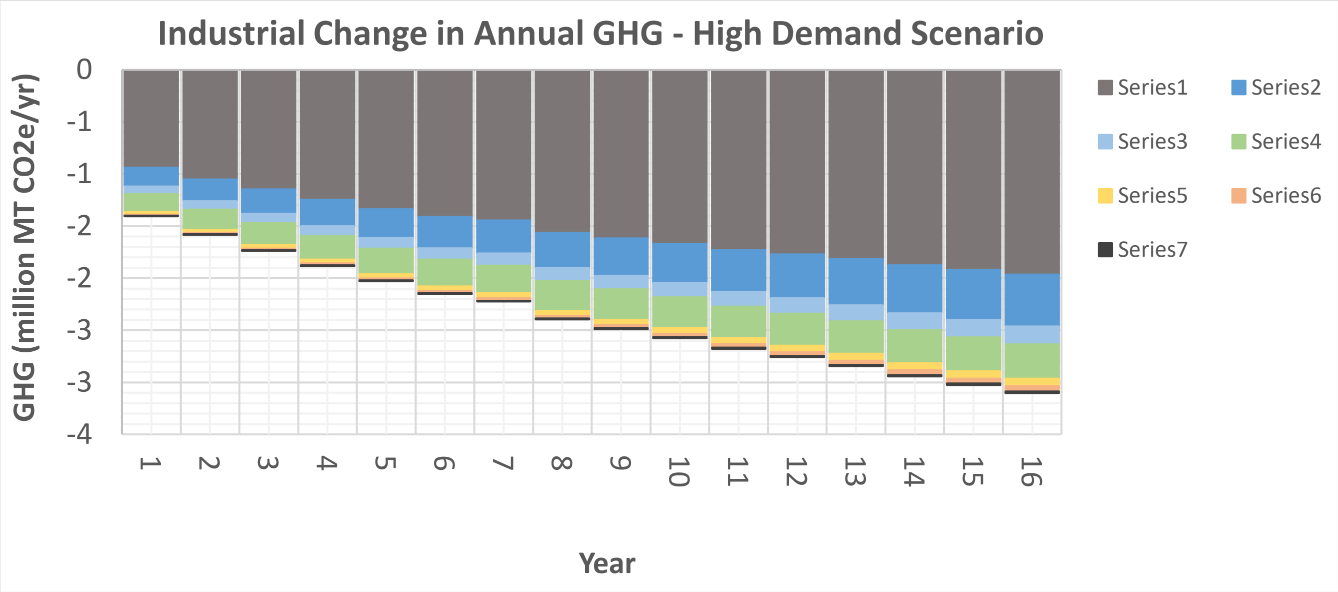
PREVIEW: PRELIMINARY RESULTS FOR HARD-TO-ELECTRIFY SECTOR

GHG KEY FINDINGS

» Hydrogen fuel substitution **reduces GHG by 99.6%** in hard-to-electrify industrial sectors

» Contributes **12.2% to overall GHG reductions**

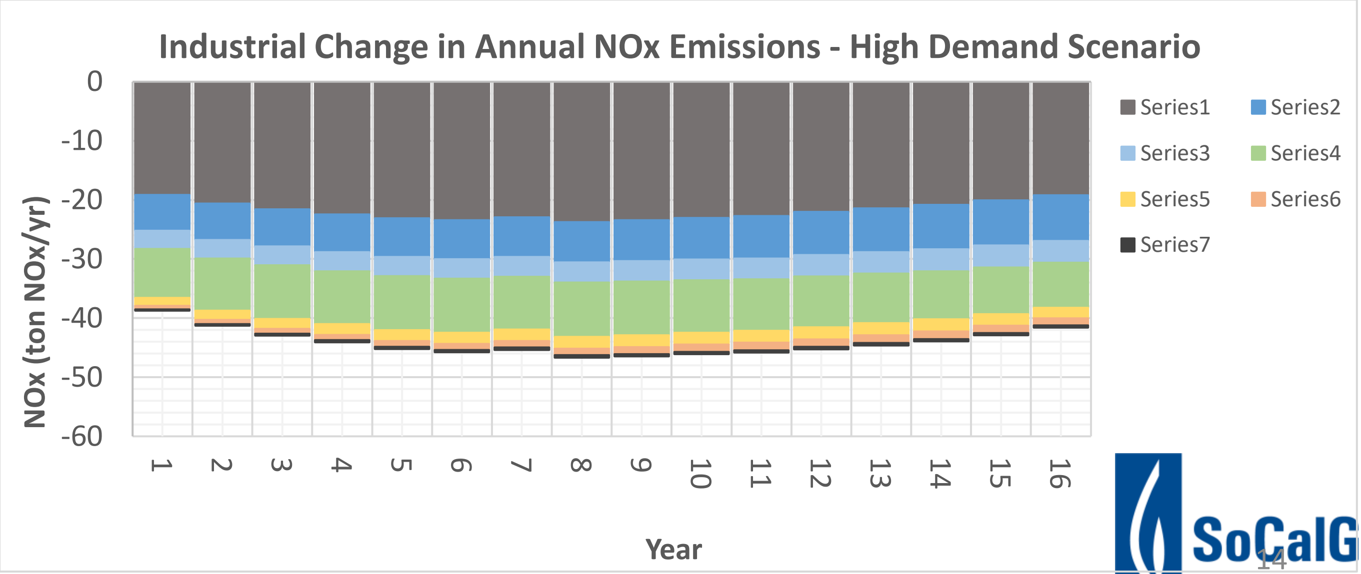
» **Projected annual GHG reductions** for high demand scenario in 2045 equivalent to **electricity use of over 600,000 homes for one year** (EPA calculator)



NOx KEY FINDINGS

» NOx permitted emissions in industrial sectors are **expected to stay the same or decrease**

» Industrial end-users contribute **0.31%** to the overall NOx reductions



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PREVIEW: PRELIMINARY FINDINGS FOR NEW INFRASTRUCTURE

- **Infrastructure combustion emissions are negligible:** up to 0.2% and 4.7% of end-user reductions for GHG and NOx, respectively
- **Production**
  - Zero GHG & NOx when use 100% electrolysis and/or biomass gasification
  - Some GHG & NOx when use 100% RNG SMR
- **Storage and Transmission**
  - Electric driven compressors using renewable electricity do not have GHG or NOx emissions
  - Hydrogen fueled reciprocating engines & turbines driving compressors may have minor GHG emissions and some NOx emissions

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PREVIEW: PRELIMINARY RESULTS FOR OTHER AIR EMISSIONS

- Clean renewable hydrogen is a clean-burning, non-carbon containing fuel that eliminates diesel particulate matter (DPM) when replacing diesel
- Hydrogen usage does not produce direct volatile organic compound (VOC) emissions and may be entirely eliminated when replacing fossil fuels
- Hydrogen substitution significantly reduces DPM which can lead to adverse health impacts, and VOC emissions which contributes to smog formation
- Projected **DPM Reductions are up to 82%** of South Coast AQMD's forecasted PM2.5 Emissions in 2037
- Projected **VOC Reductions are up to 28%** of South Coast AQMD's forecasted VOC Emissions in 2037

SoCalGas

AIR EMISSIONS AND OUR COMMUNITY

The Preview of GHG and NOx Emissions Evaluation worksheet is meant to serve three key objectives:

1. **Facilitate understanding of the GHG Evaluation and NOx Assessment**
2. **Relay key findings that we think are important to our stakeholders**
3. **Create an engaging discussion in breakout groups and capture key insights from members**

GUIDING QUESTIONS

1. How can SoCalGas achieve transparency in sharing emissions information related to Angeles Link?
2. What are some ways current levels of emissions impact health? Local businesses? The workforce? Youth?
3. What factors should SoCalGas consider when evaluating emissions?
4. Are emissions an area of concern for your community? Why or why not?

SoCalGas

BREAKOUT SESSIONS:
AIR EMISSIONS AND OUR COMMUNITY

- To create an enriching discussion, we will breakout into groups of 3-4 members
- In-person and online members will be able to participate
- There will be one scribe per group
- Be concise and focus on discussion topics
- Feel free to utilize the post-it notes throughout the meeting to provide additional feedback on any topic

MEMBER REPORT OUT:
AIR EMISSIONS AND OUR COMMUNITY

- A representative from each group will share the discussions and outcomes from their breakout session
- In-person and online members will be able to participate
- Be concise and focus on discussion topics
- Feel free to utilize the post-it notes throughout the meeting to provide additional feedback on any topic

PREVIEW: DEMAND STUDY DRAFT REPORT

ANGELES LINK

YURI FREEDMAN
Senior Director
Business Development

SoCalGas

RECAP: KEY CONSIDERATIONS ON DEMAND SCOPE AND AREAS FOR ANALYSIS

- The **Demand Study** examines potential hydrogen demand from 2025-2045 in Mobility, Power Generation, and Industrial sectors

- Four primary factors were used to determine future hydrogen adoption across sectors:
  - Policy & Legislation
  - Technology Feasibility
  - Commercial Availability
  - Business Readiness

- Model conservatively omits variables such as future electric load growth that could significantly increase future hydrogen demand

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RECAP: DEMAND MODEL APPROACH AND METHODOLOGY

» Predicts a transition from current fuels to hydrogen based on sector-specific assessments
» Approach includes validation through interviews and aligning with market growth projections

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement

- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

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DRAFT DEMAND REPORT PREVIEW: MOBILITY SECTOR HYDROGEN DEMAND

- Clean renewable hydrogen demand in the mobility sector is projected to reach between 1.0 and 1.7 M TPY by 2045

- Key driver for mobility sector demand is the Advanced Clean Fleets regulation

- Operational characteristics such as long-range requirements, heavy load requirements, long duty-cycles, and fast fueling requirements lead to heavy duty applications being prime candidates for hydrogen adoption over alternative low-carbon technologies

- CARB's proposed 2023 Low Carbon Fuel Standard (LCFS) amendments would also create incentives for clean fuel production and refueling infrastructure, which could further accelerate Zero Emission Vehicle (ZEV) adoption and hydrogen demand

Potential mobility sector hydrogen demand in SoCalGas service territory is projected to be between 1.0 and 1.7M TPY by 2045

SoCalGas

DRAFT DEMAND REPORT PREVIEW: POWER GENERATION SECTOR HYDROGEN DEMAND

- Clean renewable hydrogen demand in the power generation sector is expected to range between 0.7M and 2.7M TPY by 2045
- Key drivers include policy (SB 100 and SB 1020) and LADWP target of supplying 100% renewable energy by 2035
- Directionally aligned with CARB forecast that roughly 9 GW of incremental hydrogen capacity will be needed as an electricity resource by 2045
- As combustion technologies mature over time, hydrogen uptake is expected to grow as well

Potential power generation sector hydrogen demand in SoCalGas service territory is projected to be between 0.7 and 2.7M TPY by 2045

SoCalGas

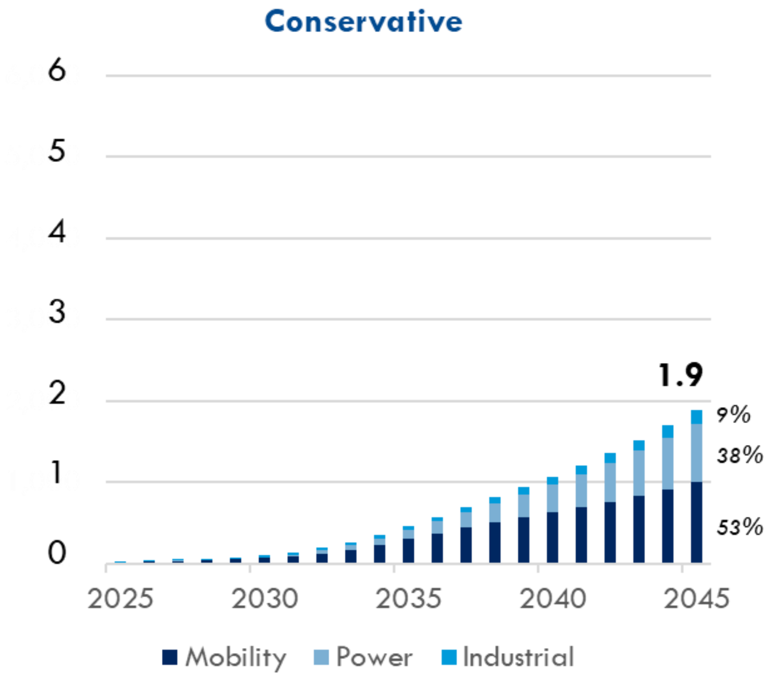
DRAFT DEMAND REPORT PREVIEW: INDUSTRIAL SECTOR HYDROGEN DEMAND

- Demand volume in the industrial sector is expected to range between 0.2M and 1.5M TPY by 2045
- Focused on subsectors of metals, food & beverage, stone, glass & cement, aerospace & defense, and refineries, and included evaluation of on-site power cogeneration
- Key drivers included co-generation, refining, and fuel-switching
- Study does not consider expansion of production capabilities within CA, which could further drive demand

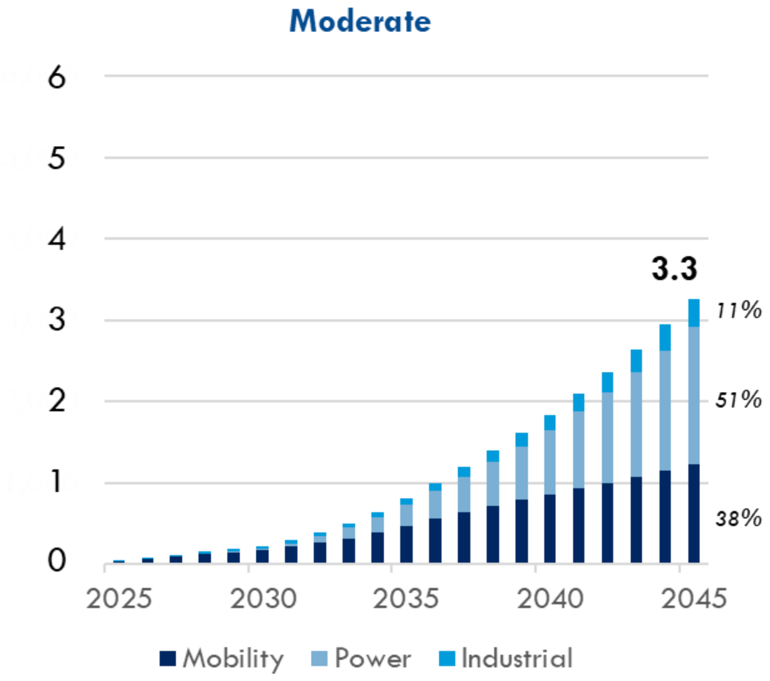
SoCalGas

DRAFT DEMAND REPORT PREVIEW: CLEAN RENEWABLE HYDROGEN DEMAND

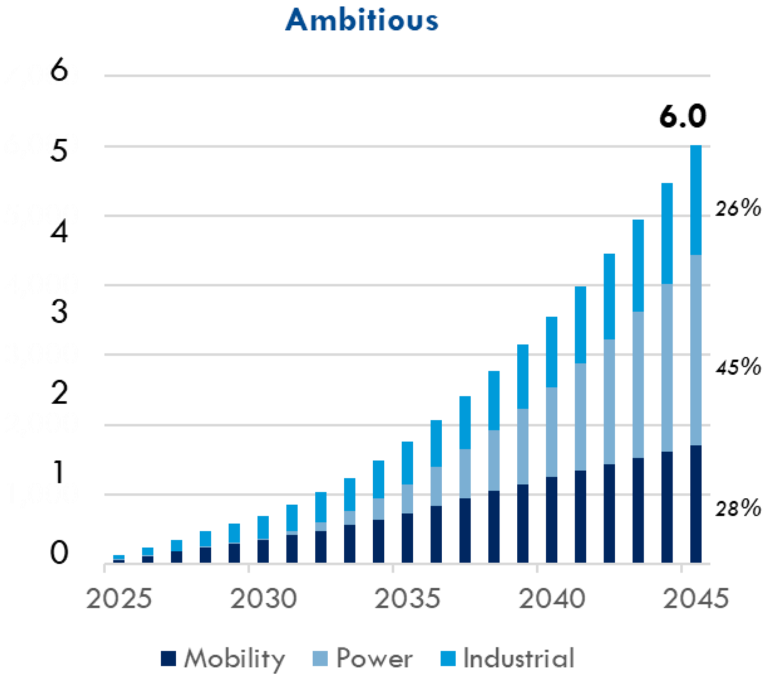
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory



The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

SoCalGas

HYDROGEN DEMAND STUDY

The Preview of Demand Study worksheet is meant to serve three key objectives:

1. **Facilitate understanding of the Hydrogen Demand Study**
2. **Relay key findings that we think are important to our stakeholders**
3. **Create an engaging discussion in breakout groups and capture key insights from members**

GUIDING QUESTIONS

1. What hydrogen impacts are the most valuable? Consider the following areas:
   a. Workforce
   b. Youth
   c. Health/Emissions
   d. Cost
2. What are the challenges of hydrogen demand in a community?
3. How could an increased demand for hydrogen affect a community?

MEMBER DISCUSSION:
DEMAND STUDY DRAFT REPORT PREVIEW

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

BREAK: PORTO'S TREATS AND COFFEE

THE FUTURE OF HYDROGEN

ANGELES LINK

DAVID PARK
Industry Affairs Director
Hydrogen Fuel Cell Partnership

SoCalGas

Hydrogen Economy Emerging
-101-

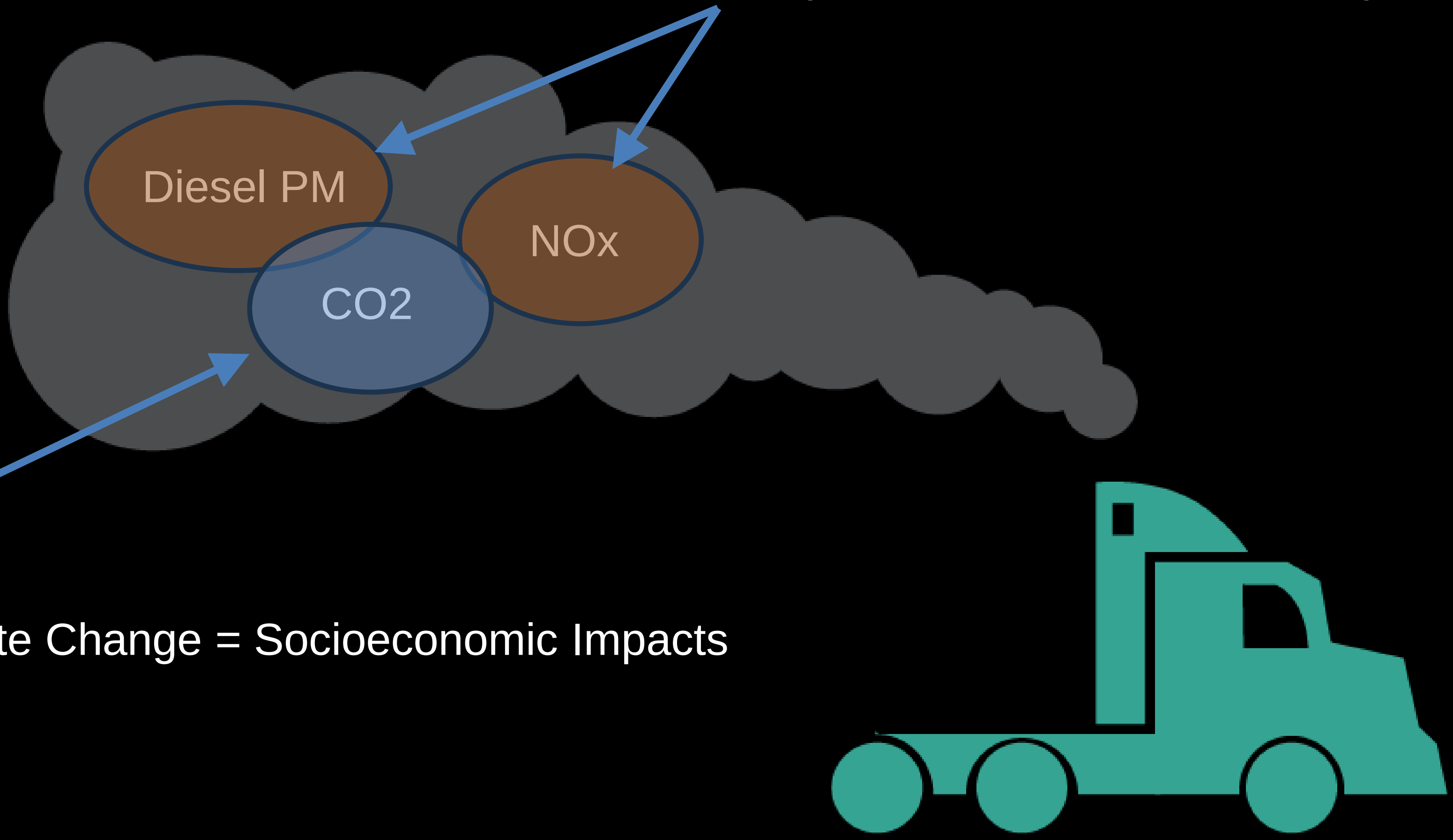
David Park, Industry Affairs, dpark@h2fcp.org

Angels Link Community Based Organization
Stakeholder Group Meeting
Compton, CA
December 13, 2023

Why hydrogen?

The I-710 truck corridor is essential to US commerce and is also one of the nation's most congested.

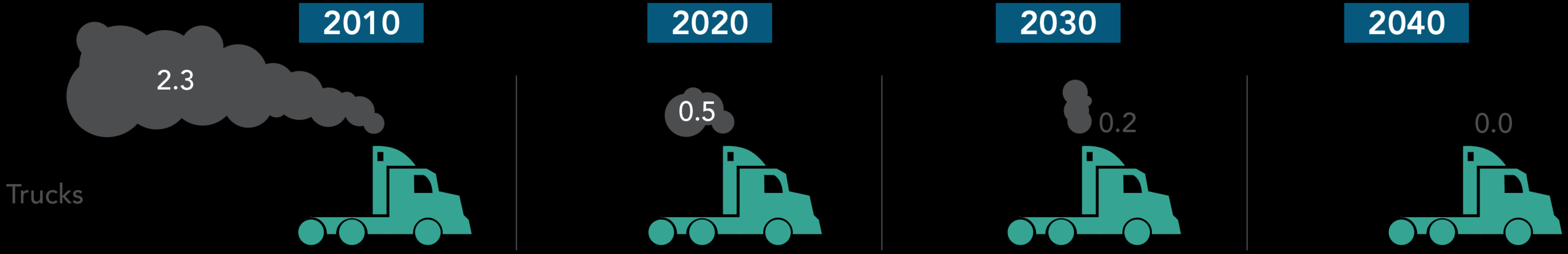
Criteria Air Pollutant Exposure = Adverse Health Impacts



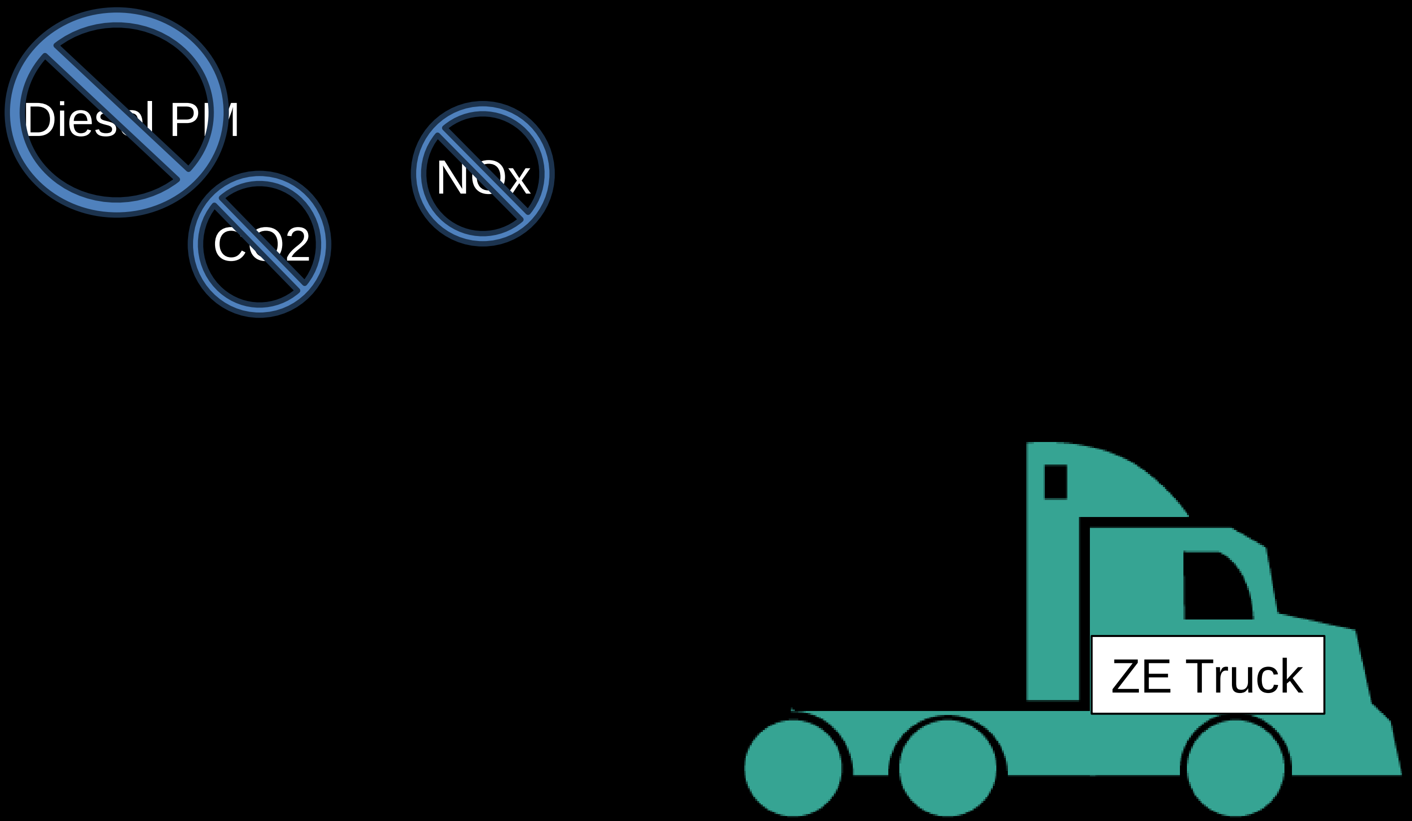
Green House Gas = Climate Change = Socioeconomic Impacts

Diesel truck pollution on the I-710 corridor is both unhealthy and contributes to climate change.

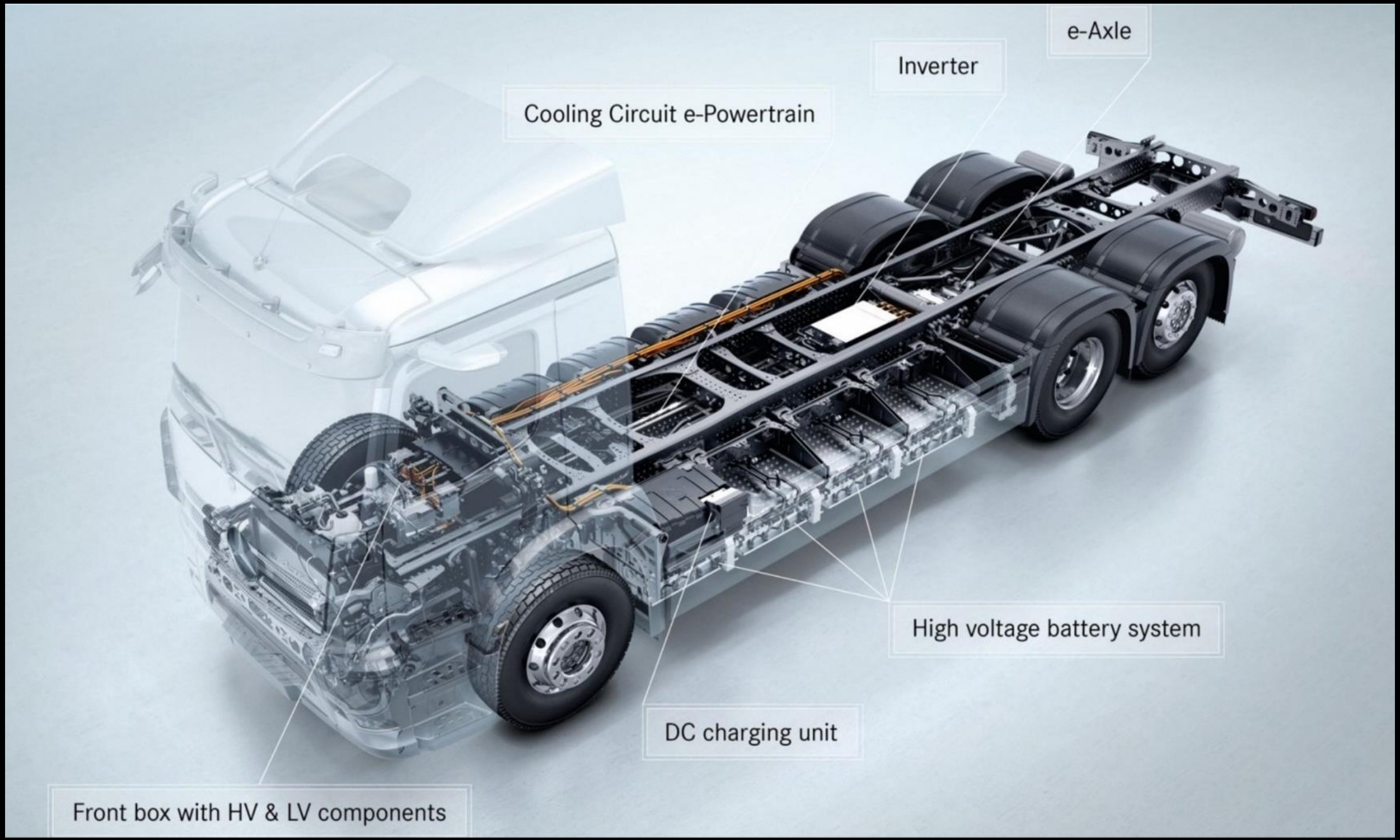
Total $PM_{2.5}$ Emissions in Communities within 20 Miles of the Ports



The California Air Resources Board has required diesel trucks to be increasingly cleaner over time, which is great.
But burning diesel also produces CO2. How to reduce CO2?

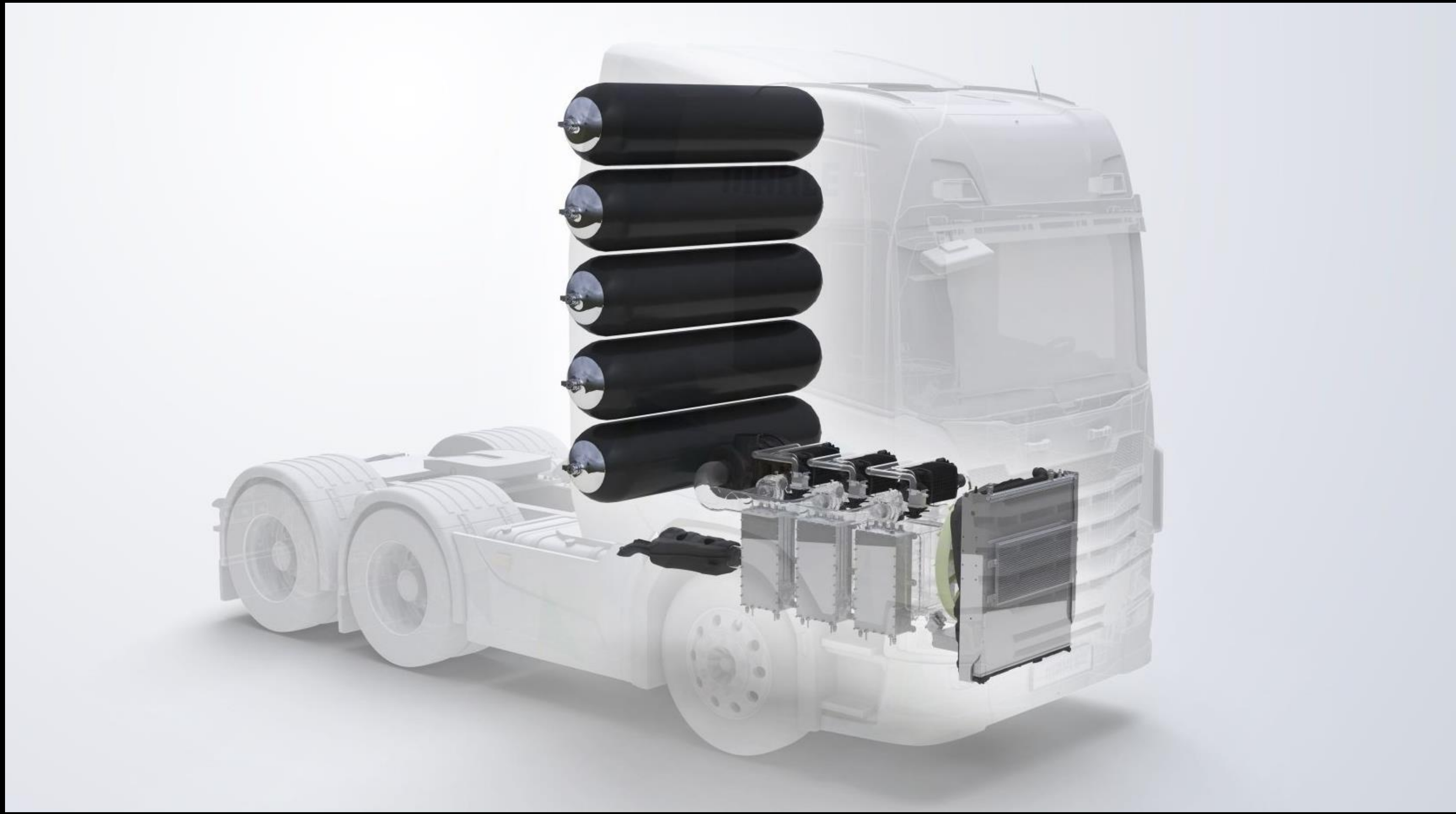


By 2035, the California Air Resources Board requires all truck sales to be zero-emission trucks. This marks a transition from gasoline and diesel (fossil fuels) to electricity and hydrogen.



Battery-electric Truck

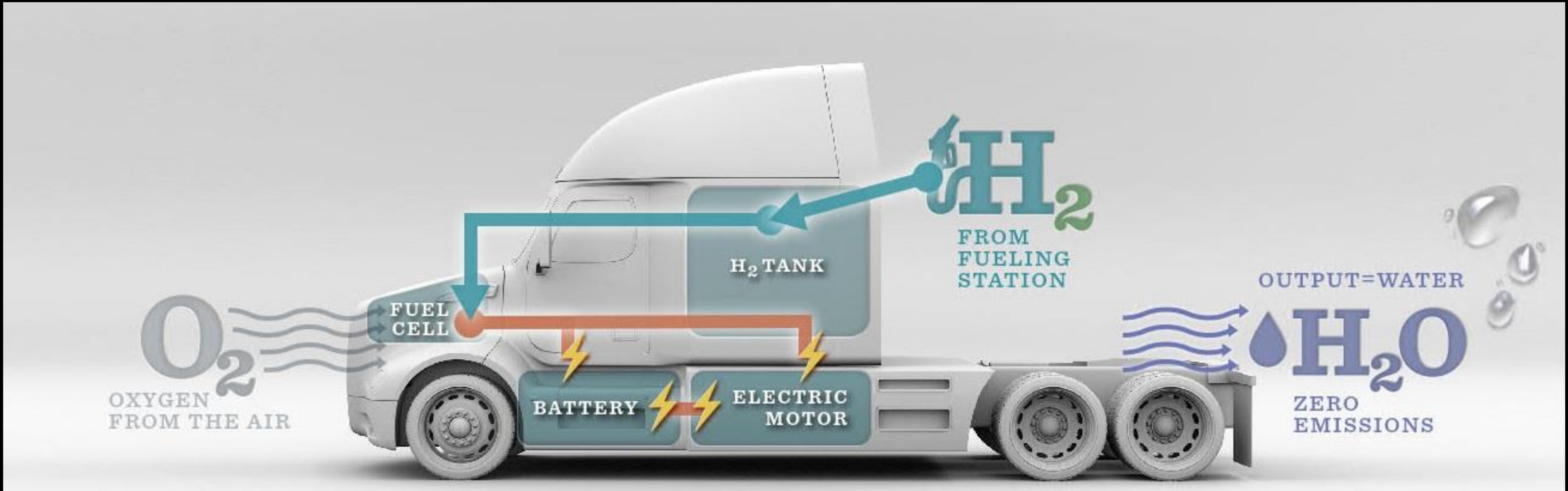
A zero-emission truck can be powered by a battery pack or …



Hydrogen Fuel Cell-electric Truck

…or a zero-emission truck can be powered by a hydrogen fuel cell.

Hydrogen Fuel Cell Powered Truck



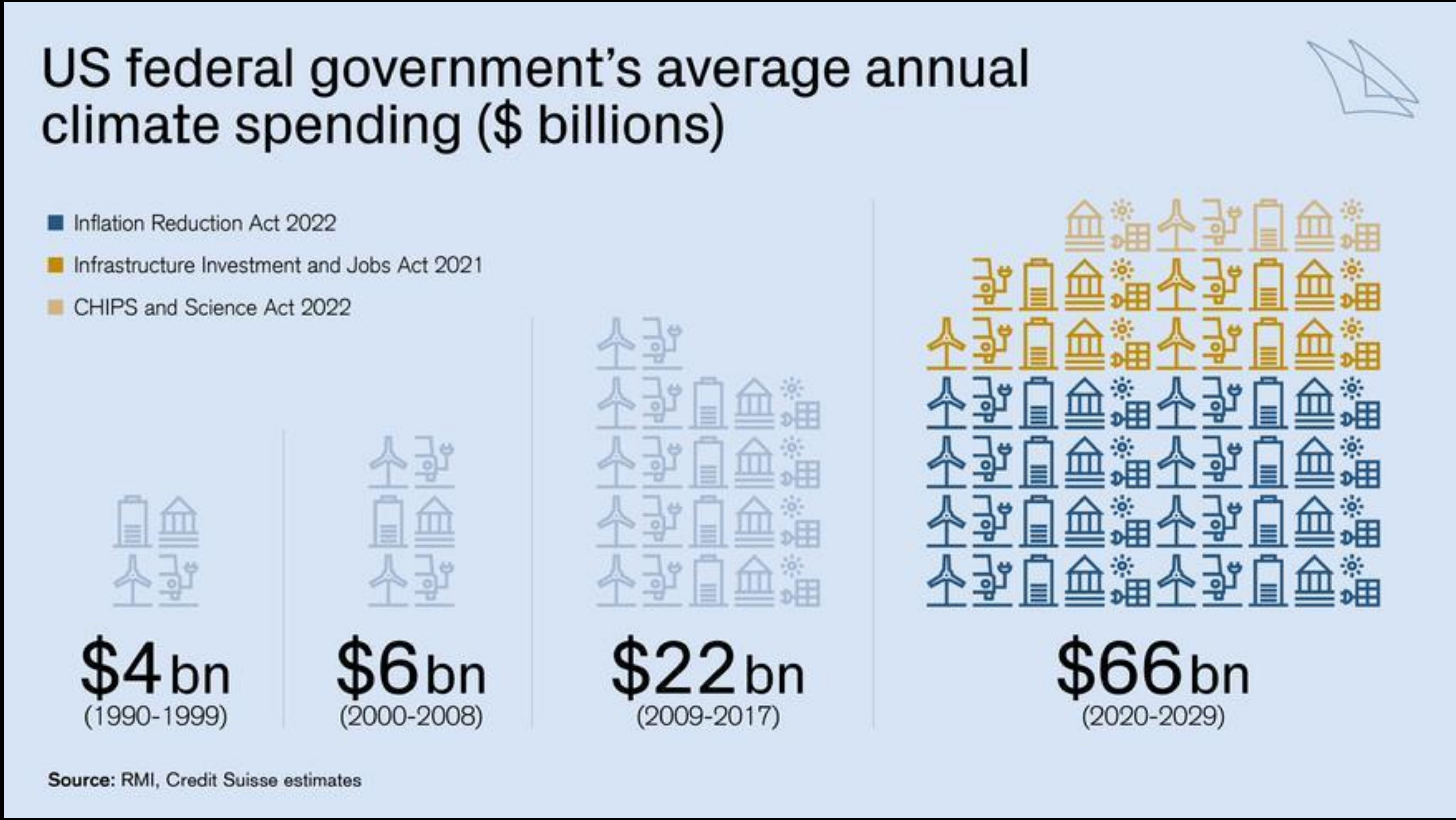
The only byproduct from a hydrogen fuel cell truck is pure water.

But why should this matter to me?

Where is hydrogen used today?

Where will hydrogen be used tomorrow?

United States Hydrogen Market Drivers



https://www.credit-suisse.com/about-us-news/en/articles/news-and-expertise/us-inflation-reduction-act-a-catalyst-for-climate-action-202211.html

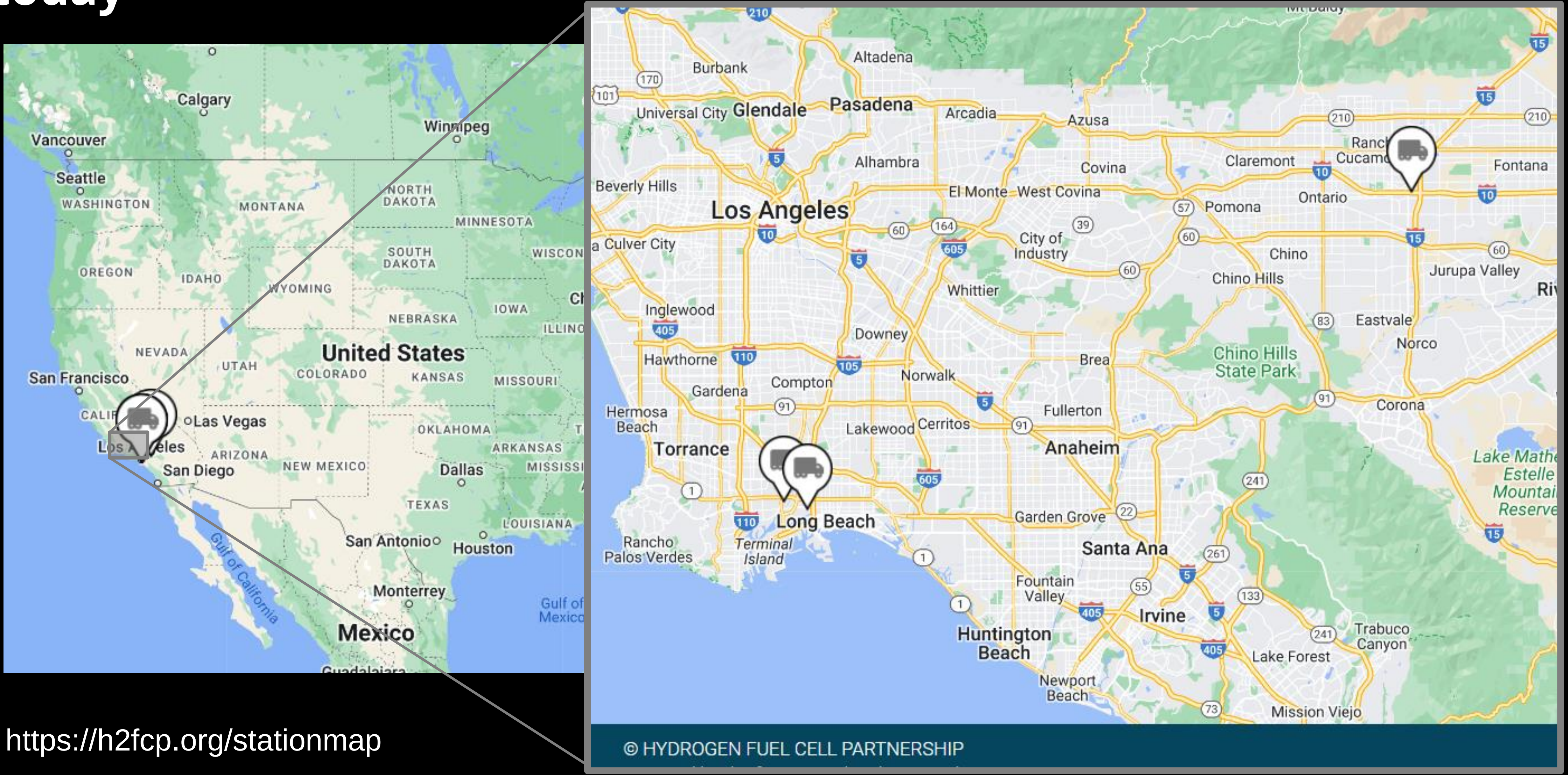
US DOE is investing $7billion into the development of regional hydrogen production hubs.

Alliance for
Renewable
Clean
Hydrogen
Energy
Systems

California's ARCHES won a $1.2 billion grant to develop one of these hubs.

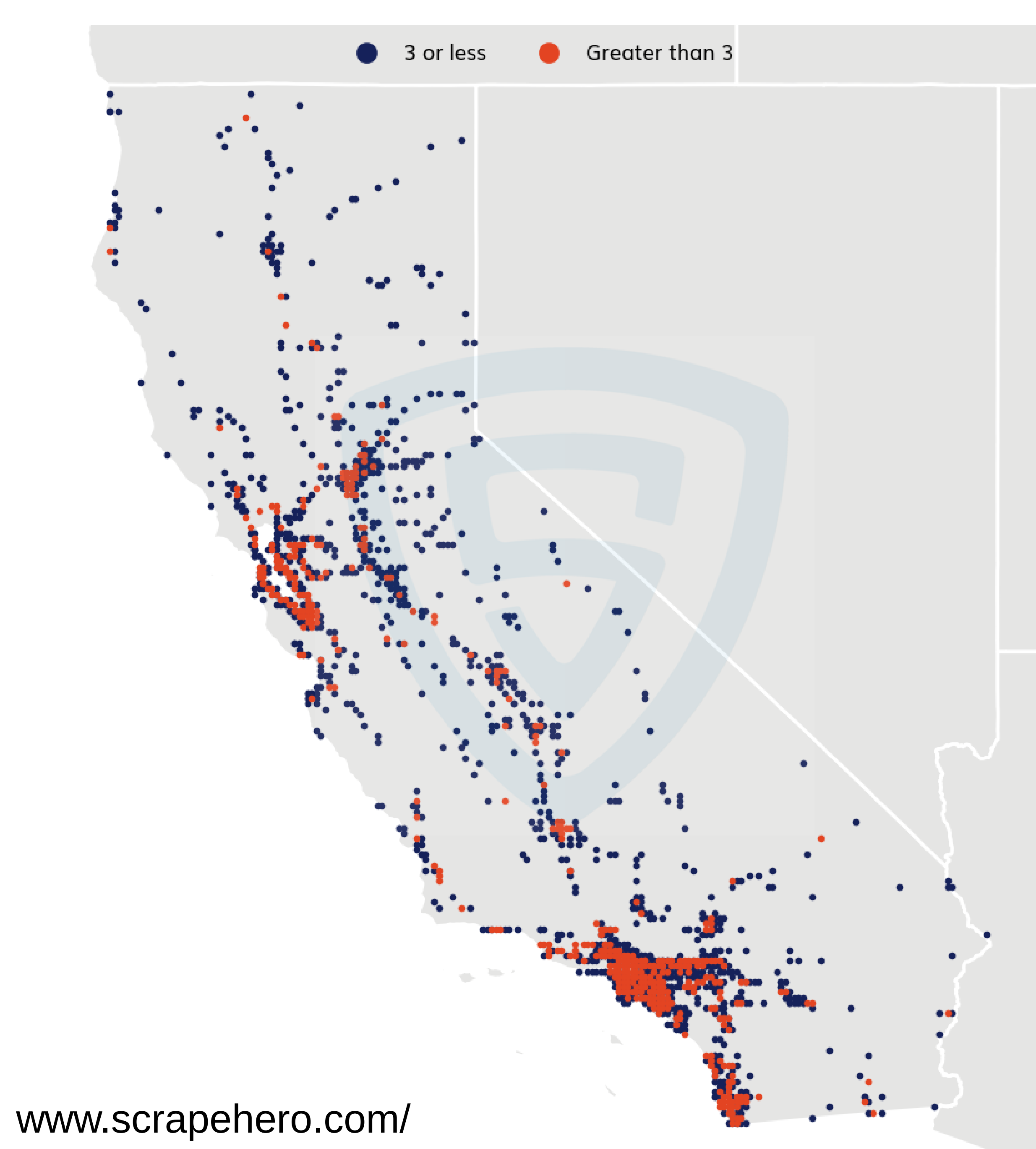
This heavy-duty commercial truck hydrogen fueling station is in Wilmington, CA.

This is the US commercial truck hydrogen fueling network, today



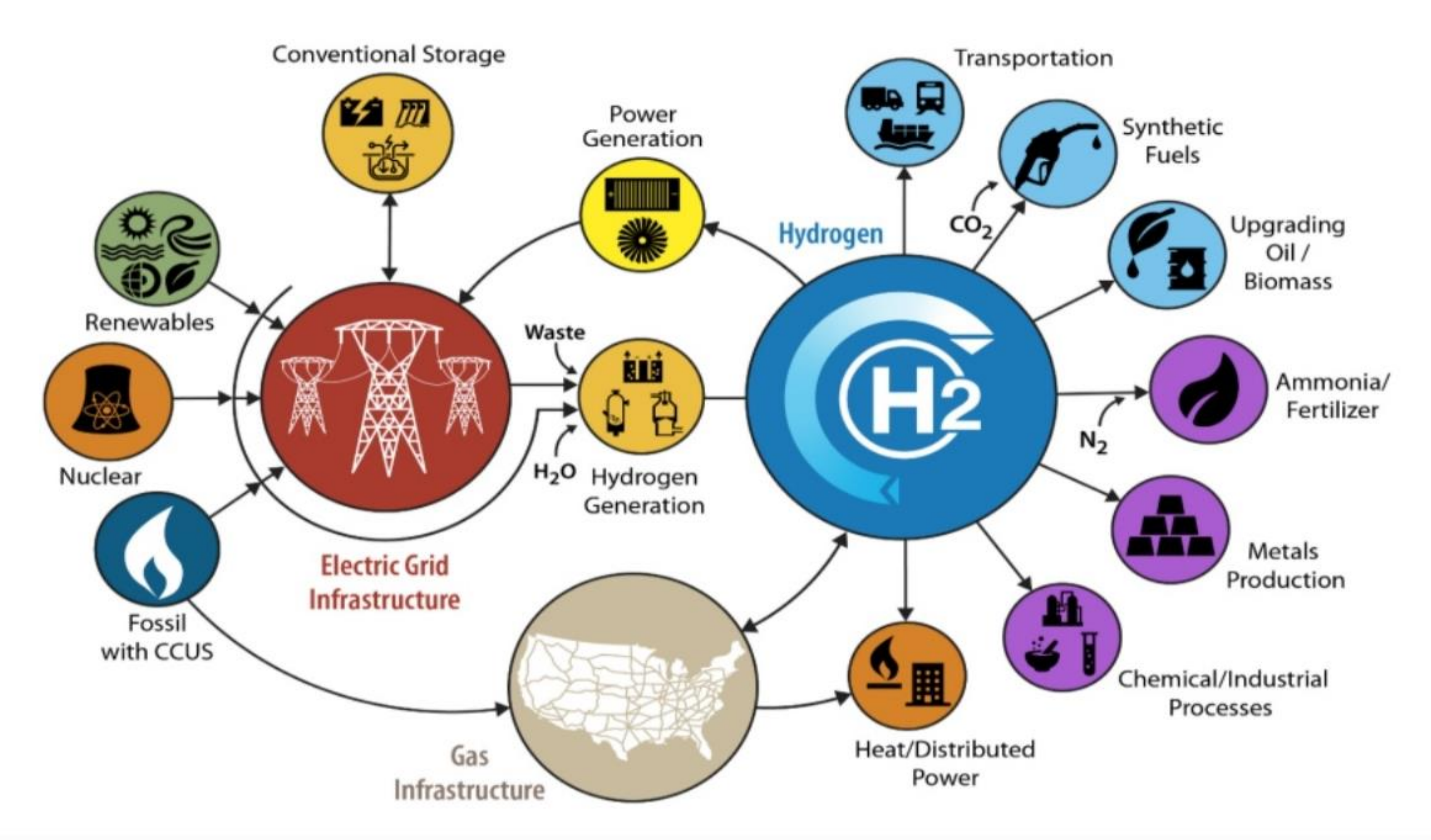
https://h2fcp.org/stationmap

The current California diesel fueling network will be tomorrow's hydrogen fueling network.



www.scrapehero.com/

But why a hydrogen pipeline?



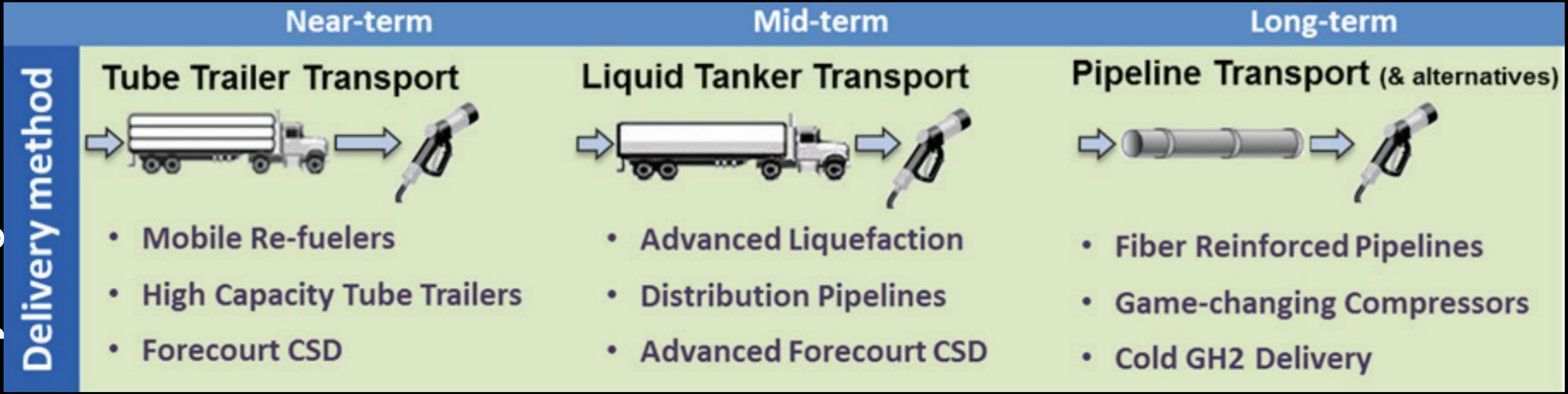
https://www.energy.gov/eere/fuelcells/h2scale

A hydrogen price of $36.00/kg is equivalent to a gasoline price of about $18/gallon.

In today's early market, hydrogen is delivered by truck, which drives up cost.

2011 - 2021 | 2021 - Present | ~2027 +

Hydrogen

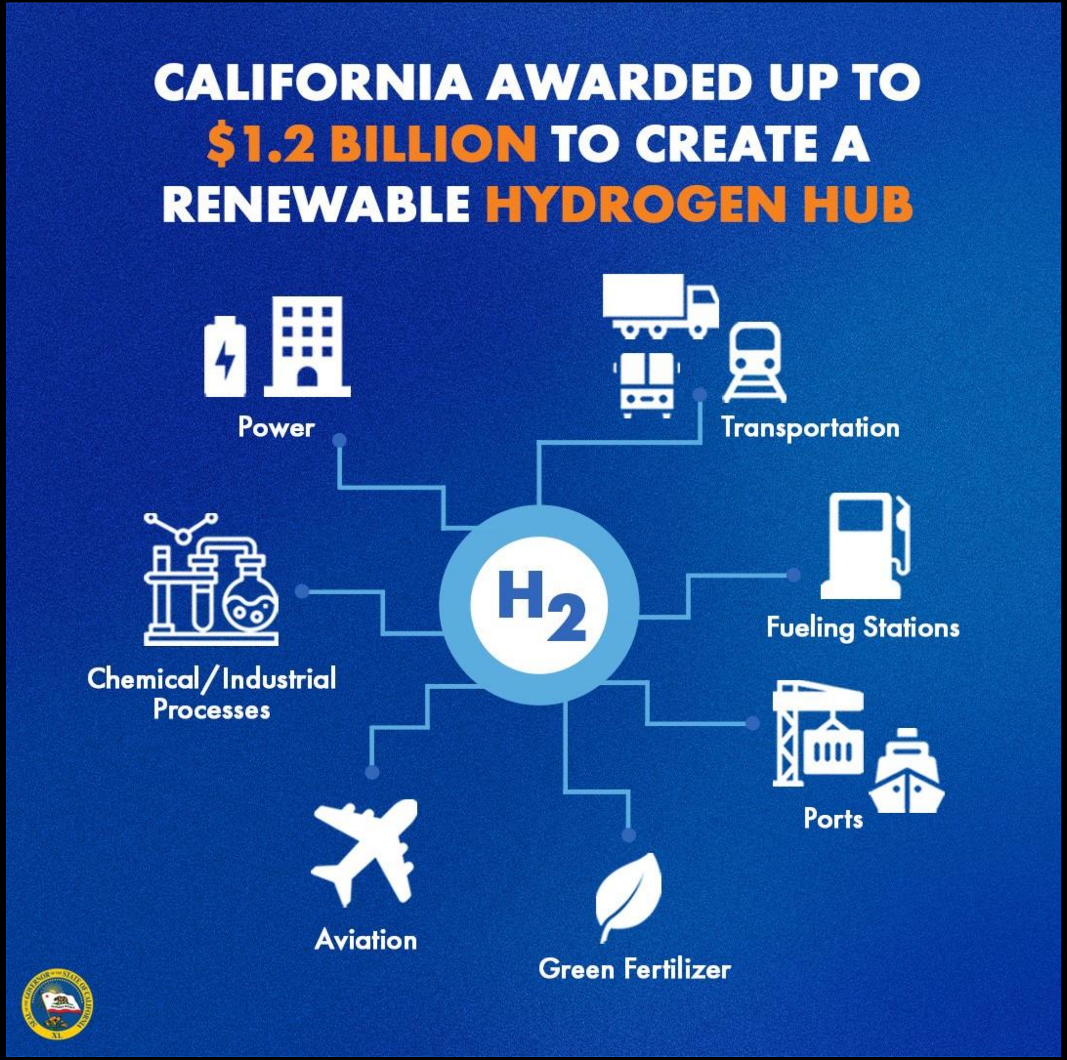


https://www.energy.gov/sites/prod/files/2015/11/f27/QTR2015-7D-Hydrogen-Production-and-Delivery.pdf

In the future, common carrier hydrogen pipeline dedicated to public use will greatly reduce hydrogen distribution costs.

And why might this interest you?

Alliance for
Renewable
Clean
Hydrogen
Energy
Systems



The US DOE $7 Billion is just the tip of the iceberg. Private investment is ~16x. The job creation potential alone is massive.

https://modeltfordfix.com/the-1914-model-t-ford/

Thank you

H2FCP Members

— 23 years of collaboration —

MEMBER DISCUSSION:
FUTURE OF HYDROGEN

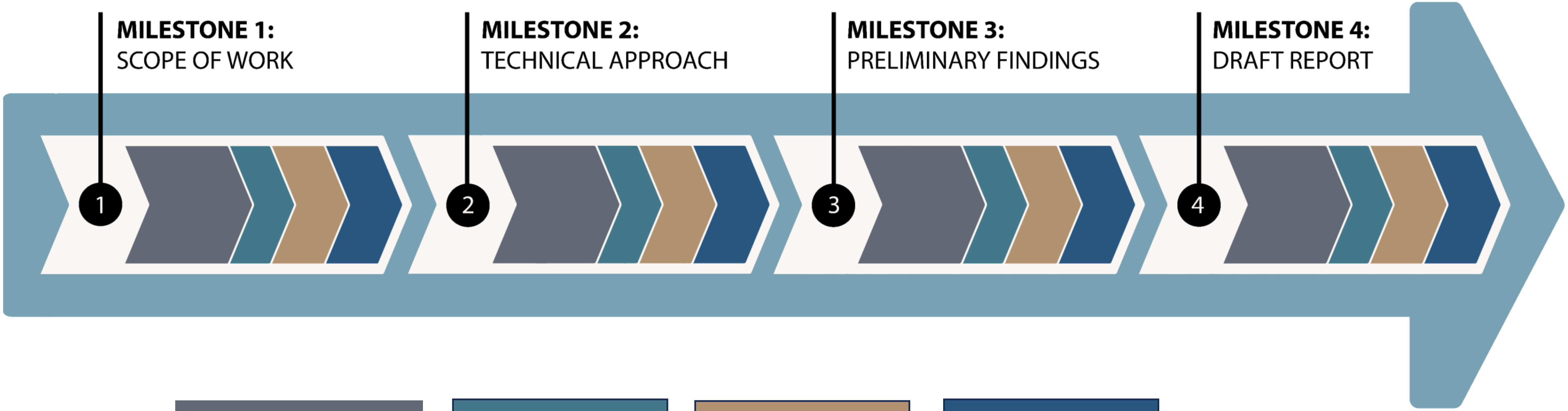
- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat

STAKEHOLDER COMMENT UPDATE

ANGELES
LINK

JILL TRACY
Angeles Link
Senior Director
Regulatory & Policy

STAKEHOLDER COMMENT UPDATE: MILESTONES AND REVIEW



Stakeholder Meeting and Comment Period

Comments are Recorded

SoCalGas Drafts Response to Comments

Revisions Incorporated

STAKEHOLDER COMMENT UPDATE: RESPONSE CATEGORIES

Comment Response Categories

- Comment Incorporated Into Applicable Phase One Study
- Comment Addresses Issue or Topic Already Part of Applicable Phase One Study
- Comment May be Considered in Future Phases
- Comment is Beyond Angeles Link Scope or Outside Milestone

EXAMPLE OF COMMENTS INCORPORATED (TECHNICAL APPROACH)

» Greenhouse Gas Emissions Evaluation

- Study will now include a table summarizing the existing information available from scientific research regarding estimates for Global Warming Potential (GWP) 100 and GWP 20 associated with hydrogen.

» Environmental & Social Justice Analysis

- Study will now consider the *Equity Principles for Hydrogen- Environmental Justice Position on Green Hydrogen in California* issued on October 10, 2023.

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MEMBER DISCUSSION:
STAKEHOLDER COMMENT UPDATE

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

CBOSG ROUNDTABLE: COMMUNITY ANNOUNCEMENTS

NEXT STEPS

- The feedback window on the GHG Emissions Evaluation and NOx and Other Air Emissions Assessment will be opened in the coming weeks in conjunction with the release of the preliminary findings for those studies
- Similarly, SoCalGas will begin accepting feedback on the Demand Study Draft Report upon its issuance and will communicate the comment period timeline when the draft report is posted
- Today's presentation and meeting recording will be available soon on the living library
- If your questions or comments were not answered today verbally, please submit them in writing at your next convenience
- Next meeting date/time will be shared as soon as it is available

THANK YOU FOR YOUR PARTICIPATION

HAPPY HOLIDAYS!

CBOSG QUARTERLY MEETING AGENDA

12:00 – 4:00PM

- Arrival and Lunch
- SoCalGas Safety Moment, Land Acknowledgement & Roll Call
- Greater Zion Church Welcome from Assistant Pastor Chidi Olunkwa
- ARCHES Update
- Preview of Preliminary Findings: Air Emissions: GHG and NOx
- Breakout Session: Air Emissions and Our Community
    - Small Groups + Worksheet w/ Guiding Questions
- Air Emission Breakout Session: Member Report Out
- Preview: Demand Study Draft Report
    - Member Discussion + Worksheet w/ Guiding Questions

BREAK: Porto's Desserts & Coffee

- Guest Speaker: David Park, Industry Affairs Director · Hydrogen Fuel Cell Partnership
- Stakeholder Comments and Incorporated Changes to Technical Approach
- CBOSG Roundtable: Community Announcements
- Calendar/Next Steps/Adjourn

APPENDIX 7 - PAG MEETING MATERIALS

WELCOME PAG MEMBERS

Arrival and Continental Breakfast

Welcome & Land Acknowledgement

SoCalGas Safety Moment & Roll Call

Production Planning & Assessment Technical Approach
Member Feedback

Pipeline Routing Technical Approach
Member Feedback

BREAK

Pivvot Platform Presentation

Pipeline Sizing & Design Technical Approach
Member Feedback

Next Steps/Upcoming Meetings

Adjourn/Lunch

October 18, 2023
9:00 a.m. – 11:30 a.m.

ANGELES LINK

Planning Advisory Group (PAG)
October Workshop

Warm welcome to our participants!
We will be starting shortly after 9:00 a.m.
to make sure everyone is present in-person and online.

SoCalGas

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak

Zoom microphones are muted by the host to eliminate background noise. You will need to unmute your microphone when called on to speak. *For both in-person and on-line participants please speak directly into the microphone to ensure everyone can hear*

We encourage you to turn on your cameras so we can better engage with you

Please feel free to use the Zoom chat to provide input and ask questions throughout the meeting

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen

Wireless microphones will be passed to those speakers attending in person

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

SoCalGas

AGENDA

- Welcome, Land Acknowledgement & Roll Call
- SoCalGas Welcome & Opening Remarks
- Production Planning & Assessment Technical Approach
  - Member Discussion
- Pipeline Routing Technical Approach
  - Member Discussion
- Break
- Pivvot Platform
  - Member Discussion
- Pipeline Sizing & Design Technical Approach
  - Member Discussion
- Next Steps/Upcoming Meetings
- Adjourn/ Lunch

LAND ACKNOWLEDGEMENT & ROLL CALL

SOCALGAS WELCOME AND OPENING REMARKS

ANGELES LINK

FRANK LOPEZ
Director – Regional Public Affairs

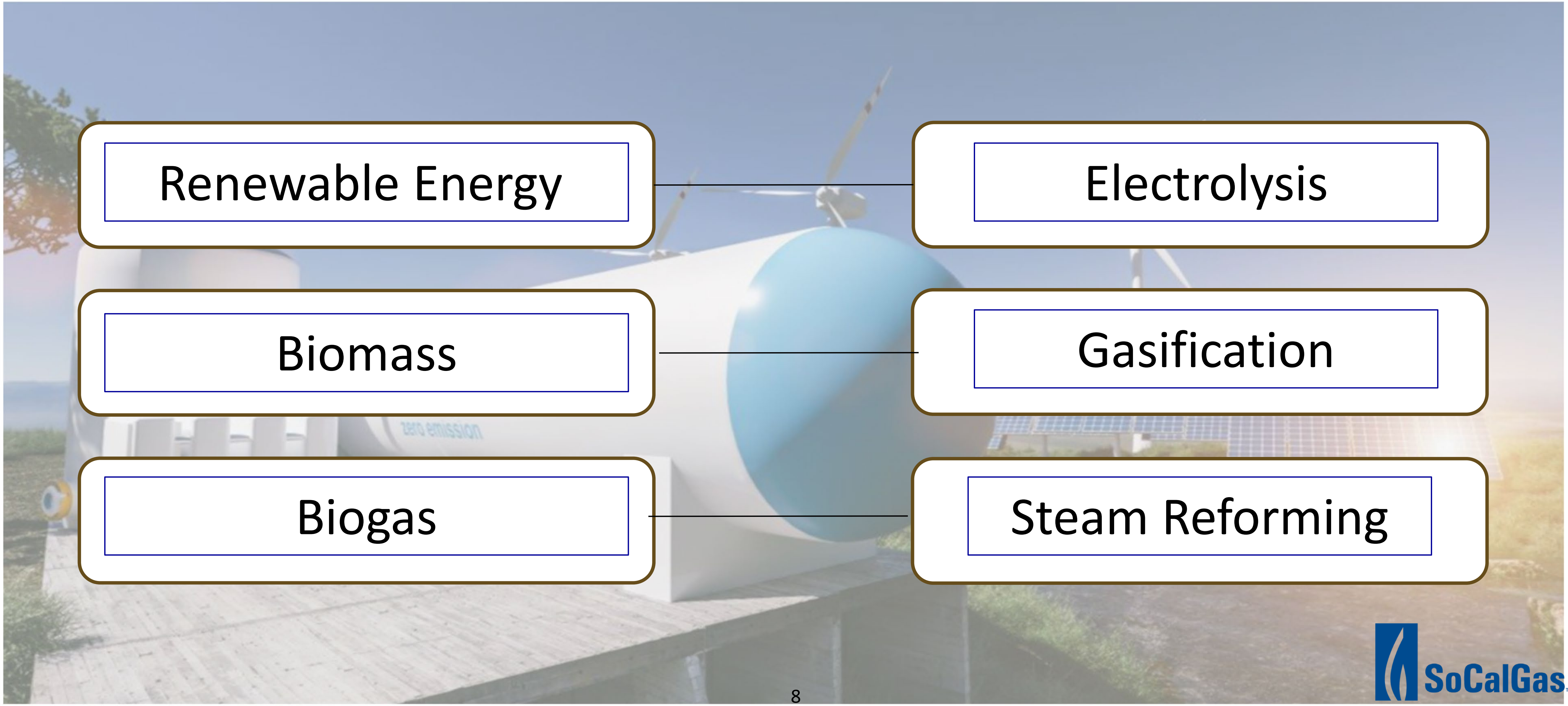
SoCalGas

PRODUCTION PLANNING & ASSESSMENT TECHNICAL APPROACH

ANGELES LINK

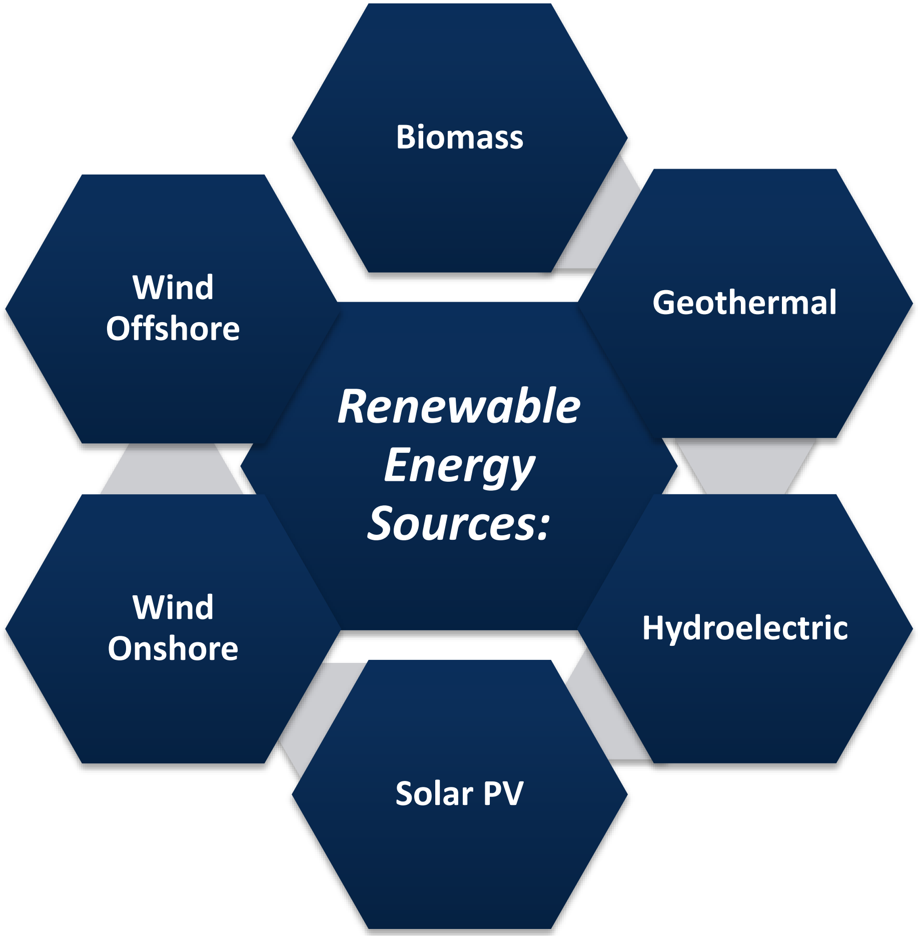
YURI FREEDMAN
Senior Director
Business Development

Summary of Hydrogen Production Pathways



- Renewable Energy — Electrolysis
- Biomass — Gasification
- Biogas — Steam Reforming

Summary of Renewable Energy Sources for Electrolysis



Item	Biomass	Geothermal	Hydroelectric	Solar – PV	Wind – Onshore	Wind - Offshore
Assumed Useful Life (years)	45	30	100	30	30	30
Capacity Factor	64%	80%	66%	28% - 34% 1/	19% - 37% 1/	52%
Construction Years	4	8	3	1	3	3
CAPEX (2021 $/kW)	$4,186	$7,010	$7,553	$764	$1,299	$4,149
Fixed O&M Costs (2021 $/kW/year)	$157.22	$124.10	$47.00	$14.84	$25.90	$70.44
Variable O&M Costs (2021 $/MWh)	$5.04	$0.00	$0.00	$0.00	$0.00	$0.00

SOURCE: NREL 2023 ATB data for 2040 unless otherwise indicated.
1/ Based on NREL SAM for projects in SCG territory.
2/ Excludes time for permitting and generation interconnection requirements.

Considerations for Renewable Energy Sources for Electrolysis

Item	Biomass	Geothermal - Hydrothermal	Hydro - Run of River	Solar - PV	Wind - Onshore	Wind - Offshore
Maturity	Mature	Mature	Mature	Mature	Mature	Developing
Feasibility	Moderate	Moderate	Difficult	Easy	Easy	Moderate
Scale	Small	Moderate	Moderate	Large	Large	Large
Location/Siting	Moderate	Difficult	Difficult	Easy	Moderate	Difficult
Land Requirements	Minimal	Minimal	Minimal	Significant	Significant	n/a

Summary of Storage Technologies

Storage technologies considered to assist with production evaluation:

- Utility Scale Lithium-Ion Battery 4-hour
- Pumped Storage Hydro Energy
- Utility Scale Flow Battery
- Compressed Air Energy Storage (adiabatic)

Item	Utility Scale Lithium-Ion Battery 4-hour	Pumped Storage Hydro Energy	Utility Scale Flow Battery 1/	Compressed Air Energy Storage (adiabatic) 1/
Typical Project Size (MW)	60	879	10	100 – 1,000 2/
Assumed Useful Life (years)	15	100	12	60
Duration	2 - 10 hours	8 - 12 hours	10 hours	12 - 24 hours
Roundtrip Efficiency	85%	80%	65%	52%
Construction Years 3/	< 2 years 4/	3	2	5
Year Cost Basis	2021	2021	2022	2022
Year of Cost	2040	2040	2030	2030
CAPEX ($/kW)	$1,018	$2,250	$3,386	$1,639
Fixed O&M Costs ($/kW/year)	$25.46	$18.66	$10.63	$10.04
Variable O&M Costs ($/MWh)	$0.00	$0.54	$0.00	$0.00

Source (unless otherwise noted): 2023 NREL Annual Technologies Baseline

1/ From PNNL 2022 Grid Energy Storage Technology Cost and Performance Assessment
2/ No existing project exist. PNNL uses 100 MW and 1,000 MW in its assessment.
3/ Excludes time for permitting and generation interconnection requirements.
4/ Construction years were not provided by NREL on its ATB. Construction times will vary depending on configurations.

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Considerations for Storage Technologies

Item	Utility Scale Lithium-Ion Battery 4-hour	Pumped Storage Hydro Energy	Utility Scale Flow Battery	Compressed Air Energy Storage
Maturity	Mature	Mature	Developing	Developing
Feasibility	Easy	Moderate	Moderate	Difficult
Scalability	Large	Large	Moderate	Large
Location/Siting	Easy	Difficult	Easy	Difficult
Typical Storage Duration	Short	Long	Varies	Long
Land Requirements	Minimal	Moderate	Minimal	Minimal

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MEMBER DISCUSSION: PRODUCTION PLANNING & ASSESSMENT TECHNICAL APPROACH

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

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PIPELINE ROUTING TECHNICAL APPROACH

ANGELES
LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
Engineering & Technology
Development Manager

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TECHNICAL APPROACH – TWO STUDIES

Preliminary Routing/Configuration Analysis

- System Evaluation
- Localized Hub
- Preferred Routes

Pipeline Sizing & Design

- Basis of Design
- System Hydraulics
- Various Operating Cases
- System Response
- 5-Year Scoping

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TECHNICAL APPROACH – PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

» <u>System Evaluation</u>

- Proposed system that forms a preliminary Master Plan for the fully built-out Angeles Link System
- Multiple pipeline corridors included
- Various production & demand locations accommodated

» <u>Various Operating Cases</u>

- Localized hub system serving LA Basin with in-basin/close proximity production, demand, storage, and a common carrier open access pipeline

» <u>Preferred Routes</u>

- Specific routes that we would consider evaluating further in subsequent phases of the Project
- Would be evaluated and further refined in Phase 2

<u>Phase 1 is Expected to Include:</u>

- Desktop Study
- Connect identified areas of hydrogen production & demand throughout the Southern and Central California area
- High-level preliminary hydrogen storage options
- Pipeline corridor evaluation

<u>Phase 2 Could Include:</u>

- Development of criteria for further evaluation
- Preliminary pipeline rerouting scenarios
- Mitigation plans
- Refine preferred selected routes further

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TECHNICAL APPROACH – PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

System Evaluation

Step One: Identify general system routing/pathways and functional areas considering potential Production, Storage, and Demand locations

Step Two: Identify preferred corridors in each of the functional zones assessing Production, Storage, and Demand potential: Connection, Collection, Central

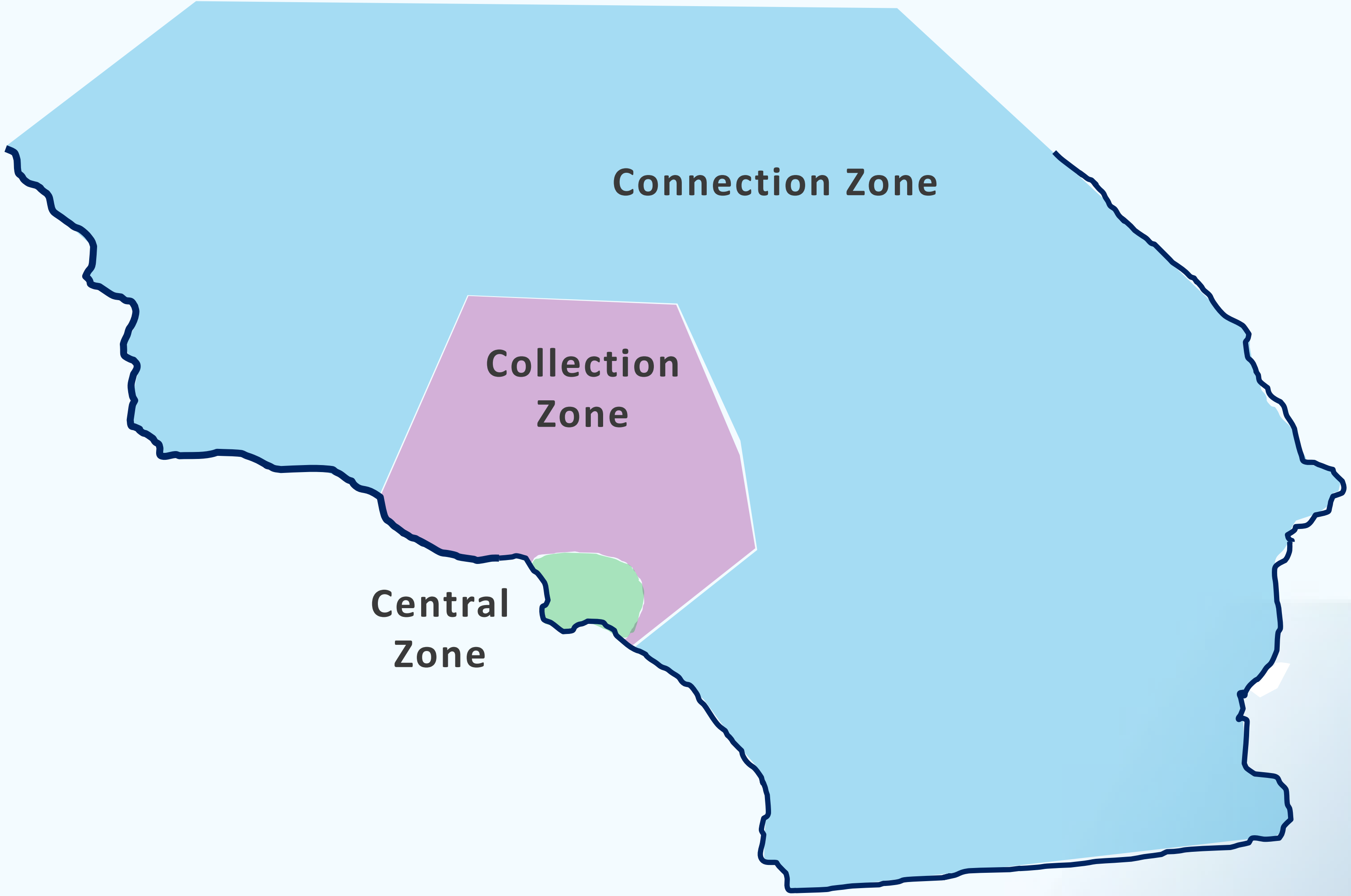
Route Evaluation

Step Three: Refine routes using Pivvot software platform

Step Four: Identify social, engineering, and environmental components for each route for awareness, validate for constructability, and assess social justice implementation.

How is This System Resilient and Reliable?

- Connection Zone
  - San Joaquin Valley
  - High Desert
  - Low Desert
  - Southern Desert
- Collection Zone
  - Connection to LA Basin
- Central Zone
  - LA Basin

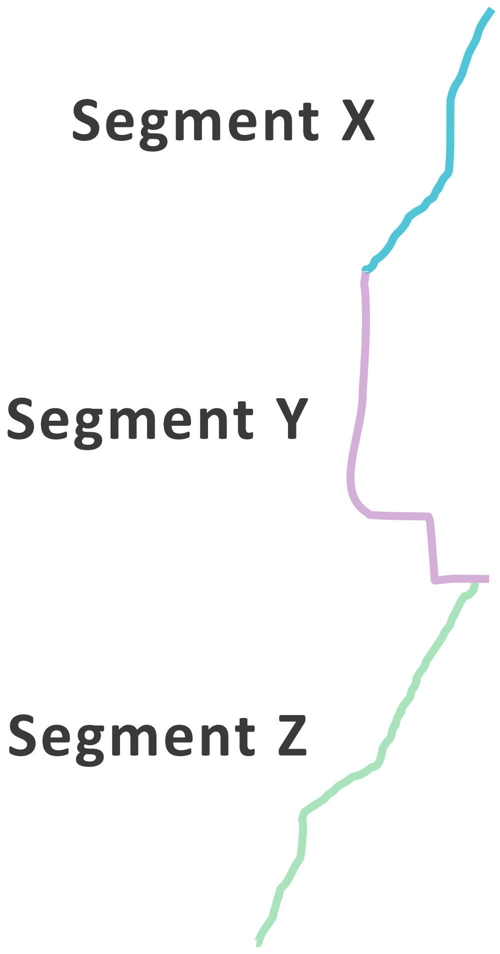


Example Illustration of Preliminary Routes

- Segment from the Connection Zone
- Segment from the Collection Zone
- Segment from the Central Zone

Segment X
Segment Y
Segment Z

Route is made up of Segments X, Y, and Z



ANGELES LINK

MEMBER DISCUSSION:
PRELIMINARY ROUTING/CONFIGURATION ANALYSIS TECHNICAL APPROACH

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BREAK

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PIVVOT PLATFORM

ANGELES LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
Engineering & Technology
Development Manager

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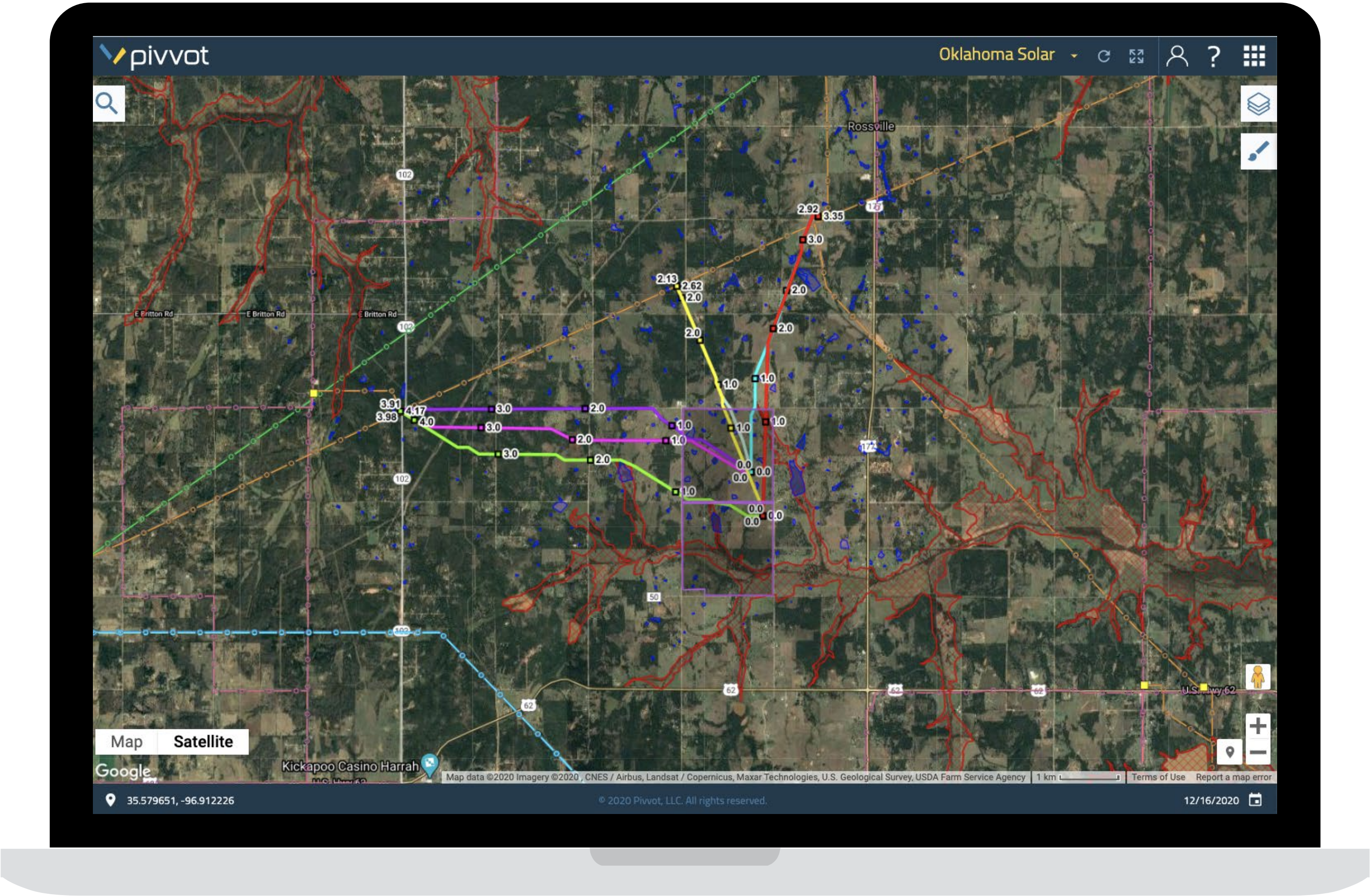
WHAT CAN PIVVOT DO?



Pivvot

Crossing & Impact Report: Evaluate crossing lengths and potential impacts for any linear corridor

Parcel Report: Immediately generate detailed parcel reports outlining potential attributes for development projects

Project Analysis: Drop a location, draw a polygon or a route and gain a detailed understanding of your surroundings

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PIVVOT

Data on Demand

Data Visualization	Set constraints and evaluate usable area in Geo Databases, with detailed reports to support your findings
Data Library	Visualize environmental, jurisdictional, parcel, hydrological, and infrastructure data instantly
Data Consulting	Data consultants to find, acquire, and prepare data for your projects

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PIVVOT

Jurisdictions Data
- County Boundary
- Dept. of Transportation Districts
- Municipal Boundary
- State Boundary
- U.S. ACE Districts
- U.S. BIA Regions
- U.S. BLM Admin. Units
- U.S. BOR Regions
- U.S. DOI Regions
- U.S. EPA Regions
- U.S. FEMA Regions
- U.S. Federal Lands
- U.S. FWS Regions
- U.S . FS Regions
- U.S. NMFS Regions
- U.S. NRCS Regions
- U.S. Tribal Lands

Hydrology Data
- Aquifer
- Commercially Navigable Waterway
- EPA Protected Waterbody
- 100-Year Flood Plain
- 500-Year Flood Plain
- Levee
- NHD Flowline
- NHD Waterbody
- NWI Wetlands
- Watershed
- Wild & Scenic Rivers
- USGS Stream Gauges

Boundary Data
- Congressional District
- Electric Retail Service Territories
- Energy Regulatory Region
- Natural Gas Service Territories
- Oil & Gas Production Area
- Organizational Boundary
- PHMSA Populated Places
- Public Land Survey
- Public Safety Answering Point
- School Districts
- State Legislative Districts

Geotechnical Data
- Depth to Bedrock
- Elevation
- Fault Area
- Fault Lines
- Geological Unit
- Enhanced Karst Topography (Terracon)
- Landslide Risk
- Peak Ground Acceleration
- Percent Slope
- Depth to Water
- Hydric Soils (Potential Wetland Soil Landscape)
- Hydrologic Soil Groups
- Prime Farmland (Terracon)
- Soil Behavior Class (Terracon)
- Soil Corrosivity (Terracon)
- Soils
- Steel Corrosivity

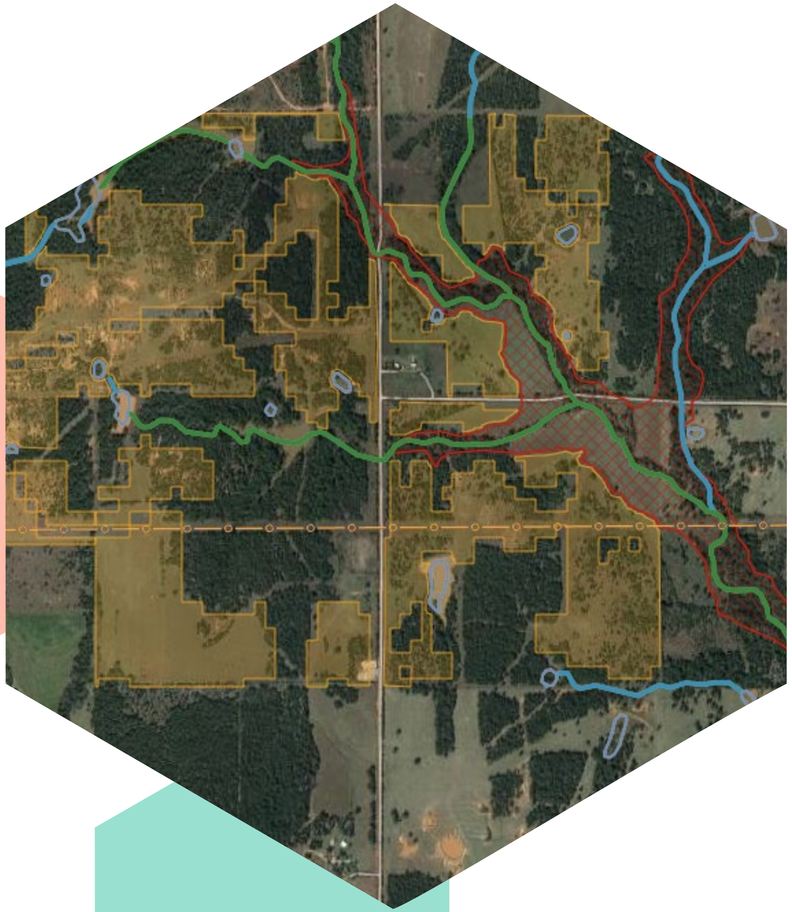
Weather Data
- Hail Events
- Lightning Strikes
- Tornado Events
- Wind Events

Energy & Infrastructure Data
- Communication Towers & Obstacles
- Contaminated Sites
- Electric Transmission Powerline
- Electric Transmission Substations
- Existing Pipeline
- Fifty Foot Structure Buffer
- Greenhouse Gas Emitters
- Interconnect Queue
- Points of Interest
- Cemeteries
- Federal Registered Sites
- Railroads
- Roads
- Trails
- Wind Turbines

Ecology & Environmental Data
- Critical Species Habitat
- Species/Habitat Range
- Ecosystem Region Boundary
- Species Habitat

Land Use Data
- Property Parcel
- Land Cover
- Land Ownership Conflicts

Community & Society Data
- Environmental Justice
- Social Vulnerability



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MEMBER DISCUSSION: PIVVOT PLATFORM

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PIPELINE SIZING & DESIGN TECHNICAL APPROACH

ANGELES LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
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Development Manager

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TECHNICAL APPROACH – TWO STUDIES

Pipeline Routing/Configuration Analysis

- System Evaluation
- Localized Hub
- Preferred Routes

Pipeline Sizing & Design

- Basis of Design
- System Hydraulics
- Various Operating Cases
- System Response
- 5-Year Scoping

TECHNICAL APPROACH – PIPELINE SIZING & DESIGN

» Basis of Design
- Integration of Production, Demand, Storage, and Routing Information

» System Hydraulics
- Pipeline sizing, diameter, compression flow modeling

» Various Operating Cases
- Assess system hydraulics under different scenarios

» System Response
- Evaluate and adjust hydraulic modeling

» 5-Year Scoping
- Align 5-Year Production and Demand forecasting with Routing and Design

<u>Phase 1 is expected to include:</u>

» Initial system hydraulic model

» Pressure & material optimization analysis

» 5-Year scoping aligned with production & demand

» 5% Design

<u>Phase 2 could include:</u>

» Detailed facility designs

» Detailed equipment lists

» Material sourcing

» 30% Design

Safety - How is safety incorporated into the design of a pipeline?

Siting

- Regulations & Standards
- Design Factors
- Pipeline Depth
- Pipeline Setback
- Class Location
- Mainline Valve Spacing
- Dig Alert Markers

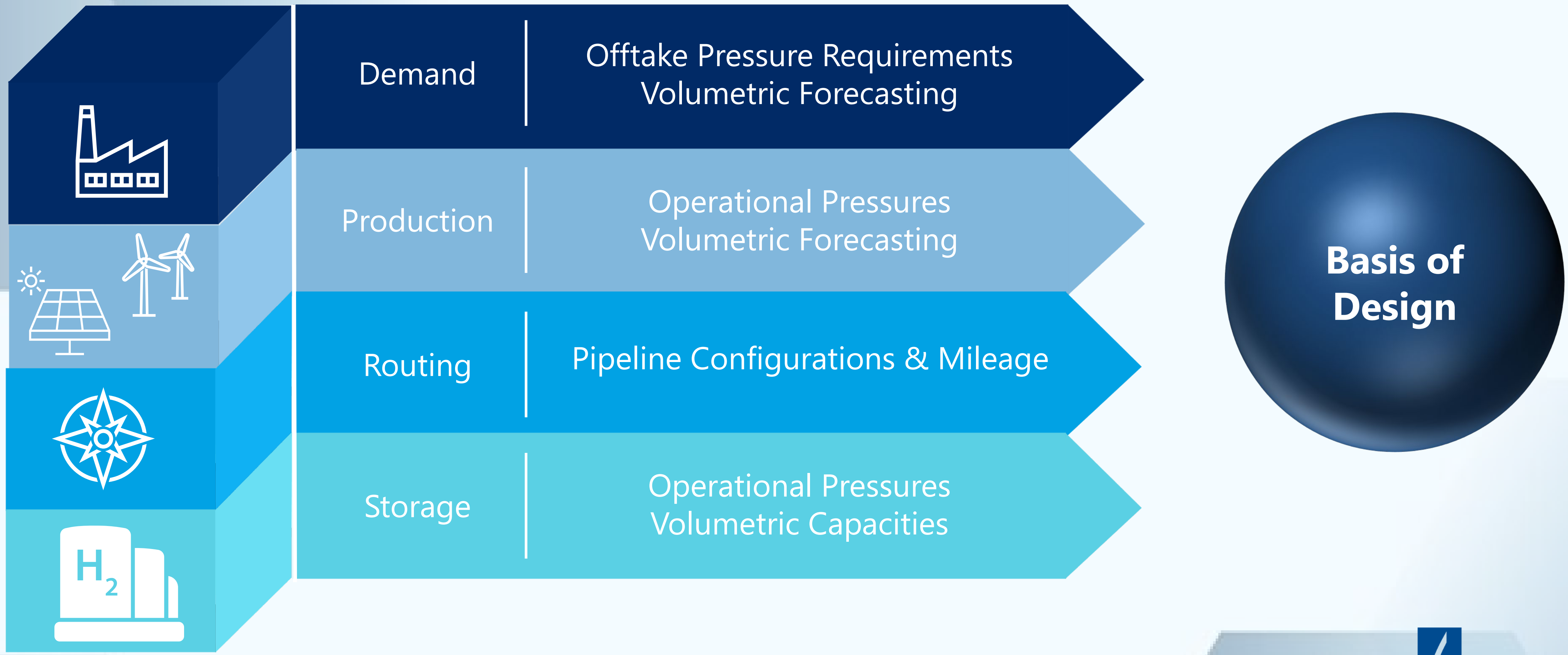
Material Selection

- Wall Thickness
- Diameter
- Pipe Coating
- Pipe Material & Grade

Monitoring & Control

- SCADA
- Remote & Automatic Controlled Valves
- Real-Time Reporting
- Cathodic Protection
- Future Integrity Testing: Hydrostatic & In-Line
- Fiberoptics & Leak Detection
- Overpressure Protection

PIPELINE SIZING & DESIGN CRITERIA: BASIS OF DESIGN



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PIPELINE SIZING & DESIGN CRITERIA – TECHNICAL APPROACH

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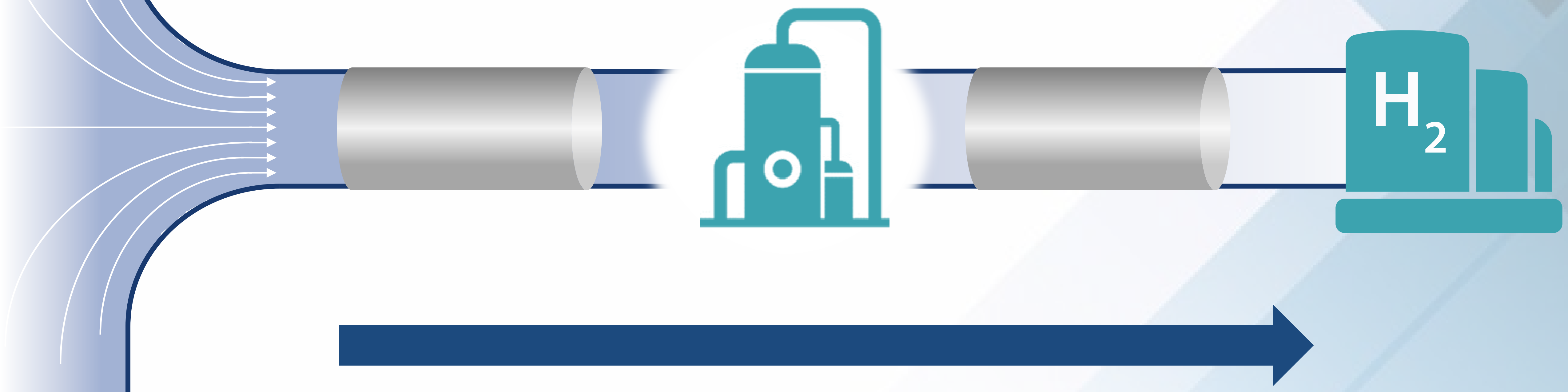
PIPELINE SIZING & DESIGN CRITERIA – SYSTEM HYDRAULICS

Evaluate the controlled, pressurized flow and distribution of clean renewable hydrogen, transforming compressed gas into actionable energy

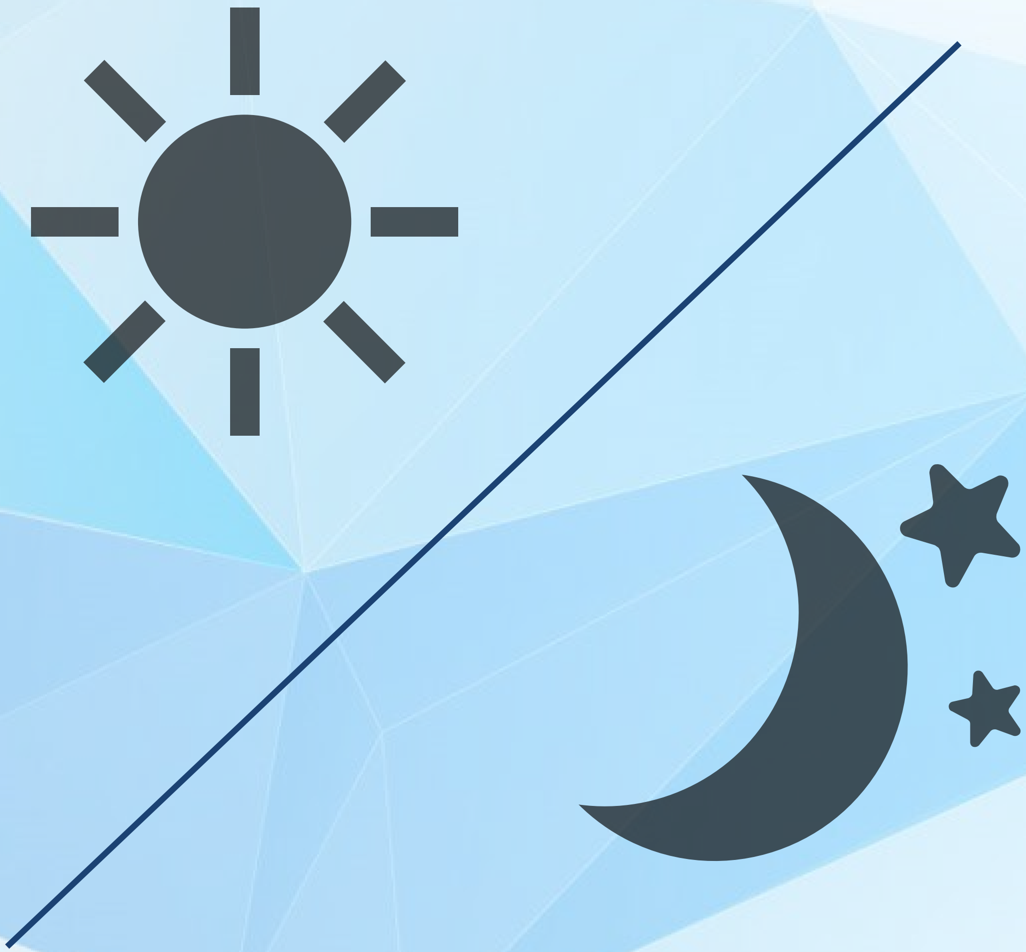
- Piping quantities & other materials
- Operating pressures
- System optimization
- Size potential compression (hp)
- Loops & branches



PIPELINE SIZING & DESIGN CRITERIA – SYSTEM RESPONSE

- System Nodes
  - Production Sites
  - Storage Locations
  - Off-take Locations
  - Compressor Station Locations
  - Points of Pipeline Intersection
- Significant System Responses
  - Overpressure
  - Under-pressure
  - Insufficient flow/volume

PIPELINE SIZING & DESIGN CRITERIA – OPERATING CASES



- Assess the System Hydraulic Response under Various Operating Considerations:
  - Changes in pipeline material
  - Changes in pipeline sizing
  - Changes in compressor station or horsepower
- Changes to System Conditions:
  - Daily load profile
  - Low production/high demand
  - High production/low demand
  - Temporal pressure changes

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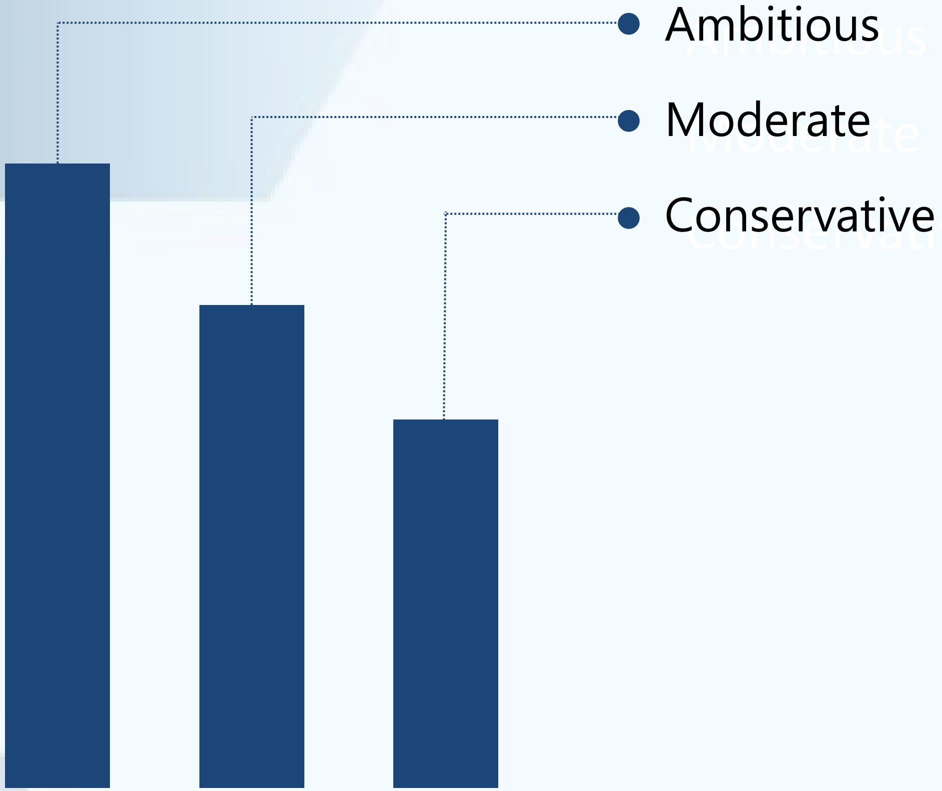
PIPELINE SIZING & DESIGN CRITERIA – 5-YEAR SCOPING

2023 · 2025 · **2030** · **2035** · **2040** · 2045



- Production Volume
- Demand Volume
- Storage Siting & Volume
- Infrastructure Adjustments

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MEMBER DISCUSSION:
PIPELINE SIZING & DESIGN TECHNICAL APPROACH

ANGELES LINK

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NEXT STEPS & UPCOMING MEETINGS

- SAVE-THE-DATE: DECEMBER WORKSHOPS
  - FRIDAY, DECEMBER 15 at ERC
  - Hybrid option will be available
- The technical approaches to studies reviewed during today's Workshop will be open for feedback until Friday, November 3
- Previous deadline on other studies extended to Friday, October 20
- All feedback goes to: ALP1_Study_PAG_Feedback@insigniaenv.com
- Today's presentation and meeting recording will be available soon on the living library

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THANK YOU FOR YOUR PARTICIPATION

LUNCH

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PAG QUARTERLY MEETING AGENDA

- Arrival and Continental Breakfast
- SoCalGas Safety Moment, Land Acknowledgement & Roll Call
- SoCalGas Welcome & ARCHES Update
- Demand Study Recap/Process Review
- Preview: Demand Study Draft Report
  - Member Discussion: Demand Study Draft Report
- Preview of Preliminary Findings: Greenhouse Gas Emissions Evaluation
  - Member Discussion: Greenhouse Gas Emissions Evaluation

BREAK/LUNCH (30 minutes)

- Stakeholder Comments and Incorporated Changes to Technical Approach
  - Member Discussion: Incorporated Feedback
- Preview of Preliminary Findings: Nitrogen Oxide (NOx) & other Air Emissions Assessment
  - Member Discussion: NOx & other Air Emissions Assessment
- Next Steps & Adjourn

December 15, 2023
10:00 a.m. – 2:00 p.m.

ANGELES LINK

Planning Advisory Group (PAG)
December Q4 Quarterly Meeting

Warm welcome to our participants!
We will be starting at 10:00 a.m.
to make sure everyone is present.

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WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

SoCalGas

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak

Zoom microphones are muted by the host to eliminate background noise. You will need to unmute your microphone when called on to speak. *For both in-person and on-line participants please speak directly into the microphone to ensure everyone can hear*

We encourage you to turn on your cameras so we can better engage with you

Please feel free to use the Zoom chat to provide input and ask questions throughout the meeting

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen

Wireless microphones will be passed to those speakers attending in person

AGENDA

- Arrival and Continental Breakfast
- Land Acknowledgement, Safety Message & Roll Call
- SoCalGas Welcome & ARCHES Update
- Demand Study Recap/Process Review
- Preview: Demand Study Draft Report
  - Member Discussion
- Preview of Preliminary Findings: GHG Emissions Evaluation
  - Member Discussion
- Break
- Stakeholder Comment Update
  - Member Discussion
- Preview of Preliminary Findings: NOx and Other Air Emissions
  - Member Discussion
- Next Steps
- Adjourn

LAND ACKNOWLEDGEMENT & ROLL CALL

SOCALGAS WELCOME & ARCHES UPDATE

ANGELES LINK

NEIL NAVIN
Chief Clean Fuels Officer
SoCalGas

SoCalGas

DEMAND STUDY RECAP/PROCESS REVIEW

ANGELES LINK

YURI FREEDMAN
Senior Director
Business Development

JILL TRACY
Senior Director
Regulatory & Policy

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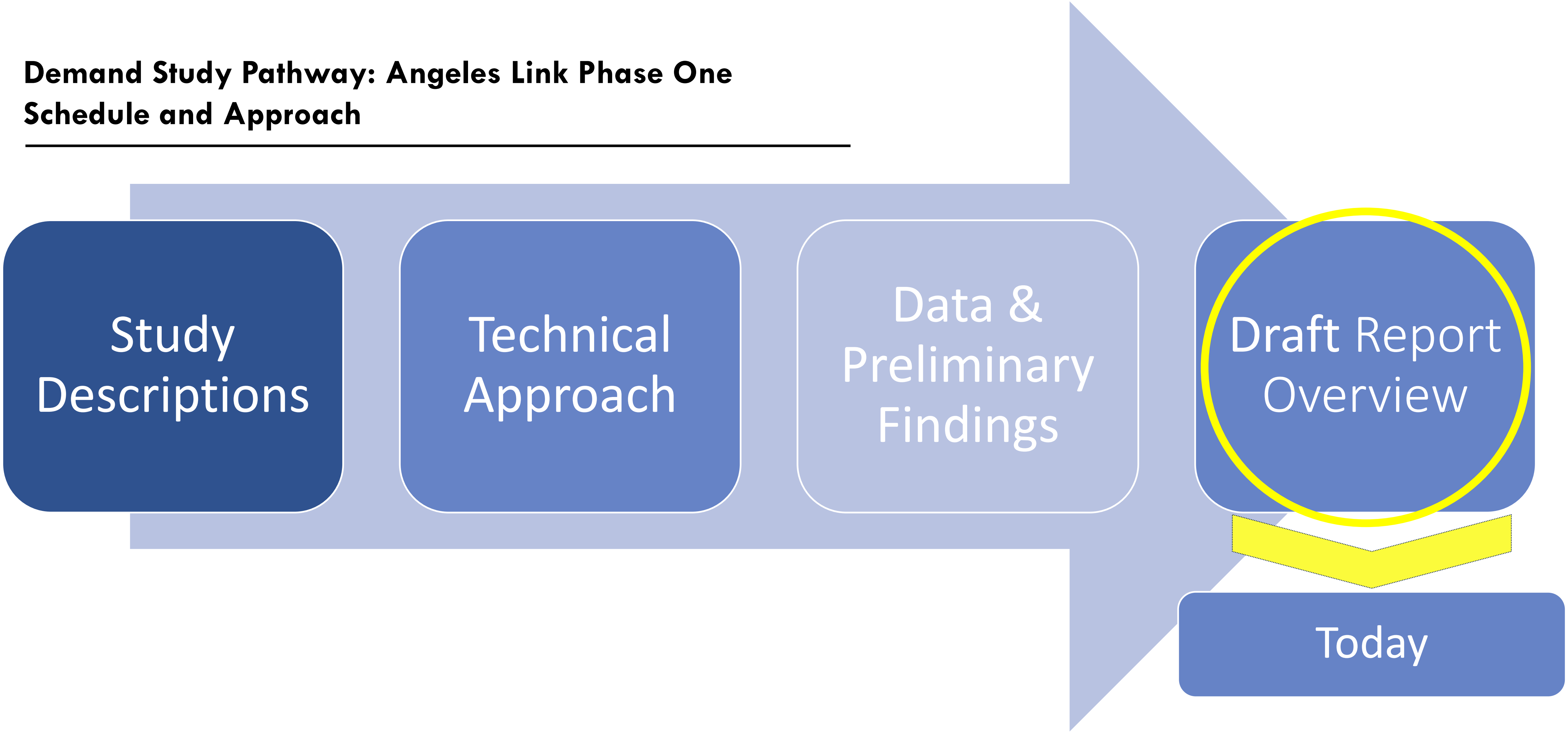
DEMAND STUDY: INTRODUCTION AND AGENDA

Demand Study Pathway: Angeles Link Phase One Schedule and Approach



PRELIMINARY Schedule and Approach to Angeles Link Phase One Study Stakeholder Feedback (Dec 2023 Update)

PHASE 1	2023							2024							
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG

Phase 1 Study Descriptions

- ✓ Q2 PAG/CBO Quarterly Meetings to Discuss Purpose and Need, Alternatives Study/Feedback
- ✓ Distribute Remaining Study Descriptions to Stakeholders
- ✓ Mid-July – Virtual feedback gathering sessions
- ✓ End of July – PAG/CBO Final feedback due

Phase 1 Study Technical Approach

- ✓ Distribute Phase 1 Technical Approach Summaries to Stakeholders
- ✓ Q3 PAG/CBO Quarterly Meetings to Discuss Technical Approach Summaries
- ✓ Additional Technical Approach Stakeholder Feedback Gathering Sessions
- ✓ PAG/CBO Final Feedback to Technical Approach Summaries Due

Phase 1 Data and Preliminary Findings

- ✓ Q4 PAG/CBO Meetings to Preview GHG and NOx Preliminary Findings and Demand Study Draft Report Overview
- ✓ Distribute Phase 1 Preliminary Findings/Data to Stakeholders
- ✓ Additional Preliminary Findings/Data Stakeholder Gathering Sessions Feedback Gathering Session
- ✓ Q1 PAG/CBO Meetings
- ✓ PAG/CBO Preliminary Findings/Data Feedback Due

Phase 1 Study Draft Reports

- ✓ Distribute Phase 1 Study **Draft Reports**
- ✓ Q2 PAG/CBO Meetings
- Virtual Feedback Gathering Session ✓
- PAG/CBO Feedback Due on Draft Reports ✓

Phase 1 Study Final Reports

- Issue **Final Reports** ✓

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**allows 2 additional weeks due to holidays*

Text in red denotes adjustments required

OVERVIEW: DEMAND STUDY DRAFT REPORT

ANGELES
LINK

YURI FREEDMAN
Senior Director
Business Development

RECAP: KEY CONSIDERATIONS ON DEMAND SCOPE AND AREAS FOR ANALYSIS

- The **Demand Study** examines potential hydrogen demand from 2025-2045 in Mobility, Power Generation, and Industrial sectors

- Four primary factors were used to determine future hydrogen adoption across sectors:
  - Policy & Legislation
  - Technology Feasibility
  - Commercial Availability
  - Business Readiness

- Model conservatively omits variables such as future electric load growth that could significantly increase future hydrogen demand

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RECAP: DEMAND MODEL APPROACH AND METHODOLOGY

» Predicts a transition from current fuels to hydrogen based on sector-specific assessments

» Approach includes validation through interviews and aligning with market growth projections

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement

- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

DRAFT DEMAND REPORT OVERVIEW: MOBILITY SECTOR HYDROGEN DEMAND RESULTS

- » Clean renewable hydrogen demand in the mobility sector is expected to be in the range between 1.0 and 1.7 M TPY by 2045
- » Key driver for mobility sector demand is the Advanced Clean Fleets regulation
- » Operational characteristics such as long-range requirements, heavy load requirements, long duty-cycles, and fast fueling requirements lead to heavy duty applications being prime candidates for hydrogen adoption over alternative low-carbon technologies
- » CARB's proposed 2023 Low Carbon Fuel Standard (LCFS) amendments would also create incentives for clean fuel production and refueling infrastructure, which could further accelerate Zero Emission Vehicle (ZEV) adoption and hydrogen demand

Potential mobility sector hydrogen demand in SoCalGas service territory is expected to be between 1.0 and 1.7M TPY by 2045

SoCalGas

DRAFT DEMAND REPORT OVERVIEW: POWER GENERATION HYDROGEN DEMAND RESULTS

- Clean renewable hydrogen demand in the power generation sector is expected to be in the range between 0.7M and 2.7M TPY by 2045
- Key drivers include policy (SB 100 and SB 1020) and LADWP target of supplying 100% renewable energy by 2035
- Directionally aligned with CARB forecast that roughly 9 GW of incremental hydrogen capacity will be needed as an electricity resource by 2045
- As combustion technologies mature over time, hydrogen uptake is expected to grow as well

Potential mobility sector hydrogen demand in SoCalGas service territory is expected to be between 0.7 and 2.7M TPY by 2045

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DRAFT DEMAND REPORT OVERVIEW: INDUSTRIAL SECTOR HYDROGEN DEMAND RESULTS

- Demand volume in the industrial sector is expected to be in the range between 0.2M and 1.5M TPY by 2045
- Focused on subsectors of metals, food & beverage, stone, glass & cement, aerospace & defense, and refineries, and includes evaluation of on-site power cogeneration
- Key drivers included co-generation, refining, and fuel-switching
- Study does not consider expansion of production capabilities within CA, which could further drive demand

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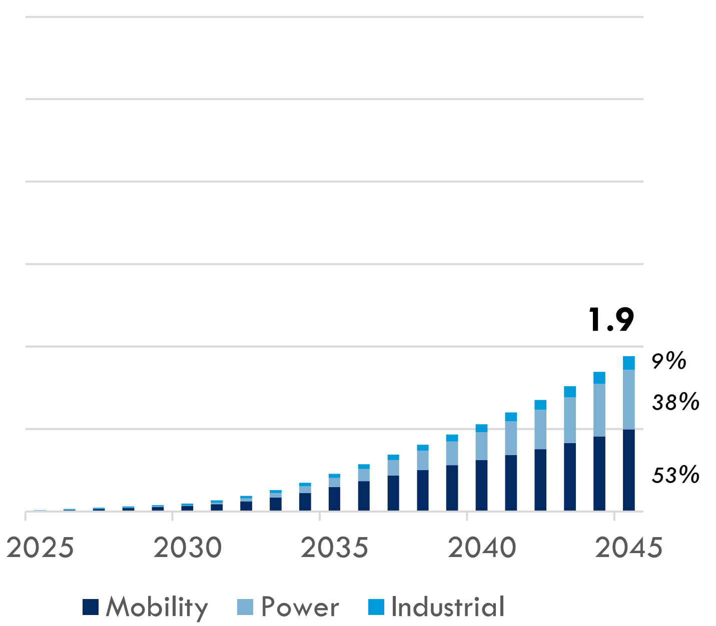
OVERVIEW OF PRELIMINARY TOTAL CLEAN RENEWABLE HYDROGEN DEMAND RESULTS

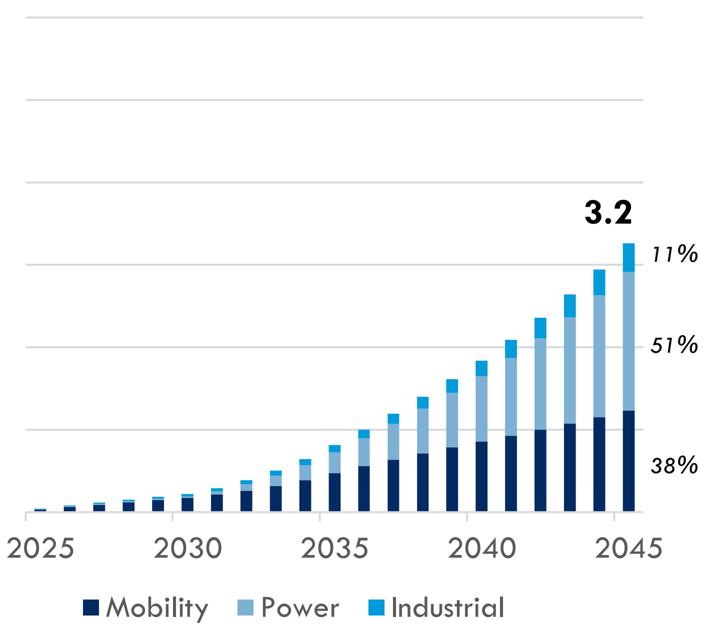
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory

Conservative



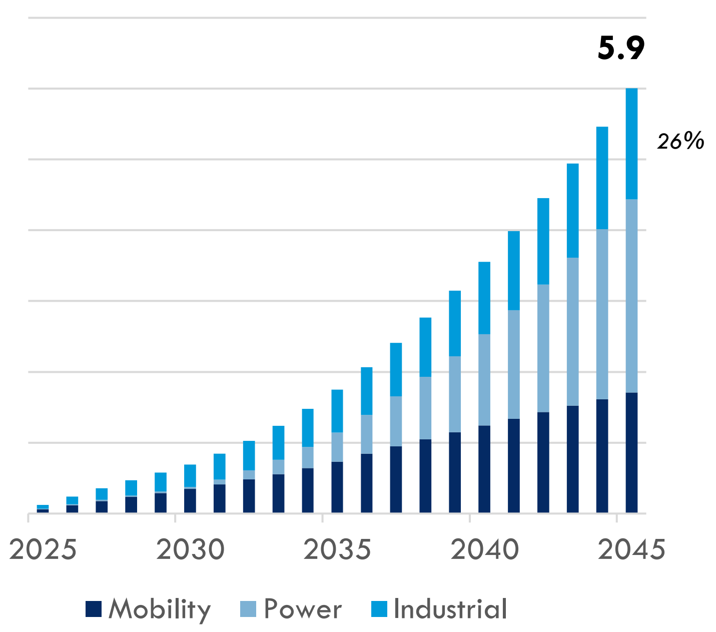
The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case

Moderate



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**

Ambitious



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

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MEMBER DISCUSSION:
OVERVIEW OF DEMAND STUDY DRAFT REPORT

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PREVIEW OF PRELIMINARY FINDINGS: GREENHOUSE GAS EMISSIONS EVALUATION

ANGELES LINK

DARRELL JOHNSON
SoCalGas Manager
Environmental Services

SoCalGas

RECAP: HIGH-LEVEL METHODOLOGY FOR GREENHOUSE GAS EMISSIONS

- Analyzes emissions changes for low, mid, high demand scenarios
- Mobility (medium and heavy duty) sectors evaluated for replacement of diesel and gasoline with hydrogen fuel cells
- Power generation and hard to electrify industrial sector for replacement of natural gas with hydrogen fueled combustion equipment
- Evaluates infrastructure including electrolysis and RNG SMR for production, as well as transmission and storage

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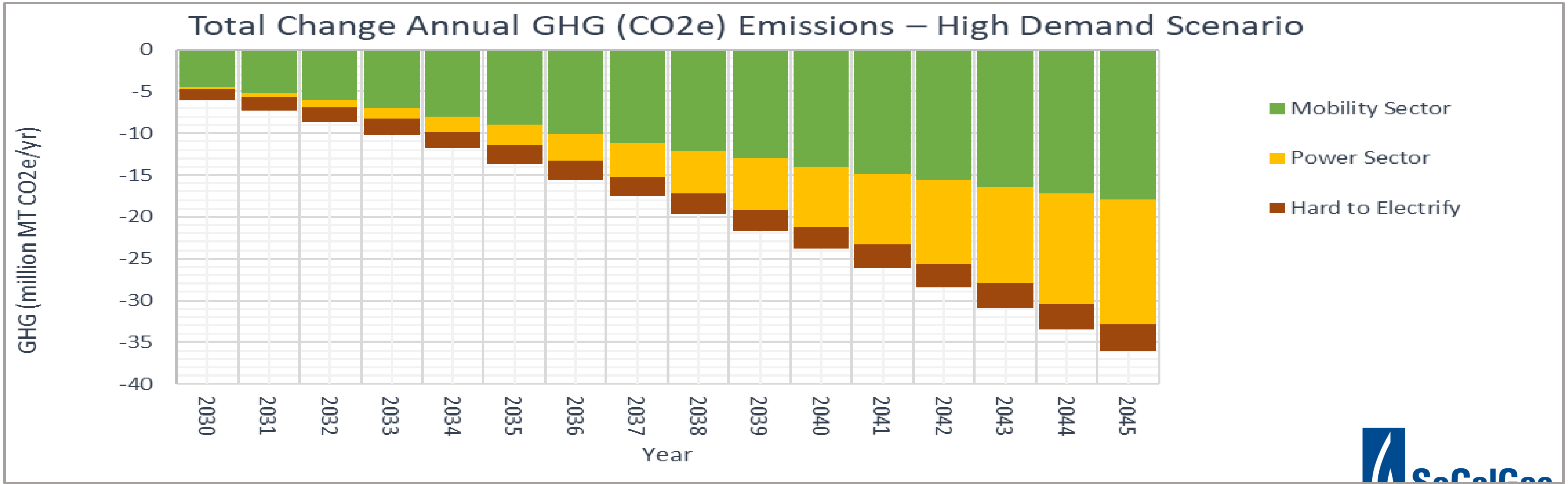
PREVIEW: OVERALL PRELIMINARY RESULTS FOR GREENHOUSE GAS EMISSIONS EVALUATION

» Predicts a significant decrease in GHG combustion emissions with increased hydrogen adoption
» Projects up to 36 million metric tons of CO2e removal per year in SoCalGas geographic area by 2045
» Mobility sector hydrogen fuel cell substitution eliminates 100% of GHG emissions
» Power generation and industrial sectors contribute 29.2% and 12.2% to overall GHG reductions, respectively



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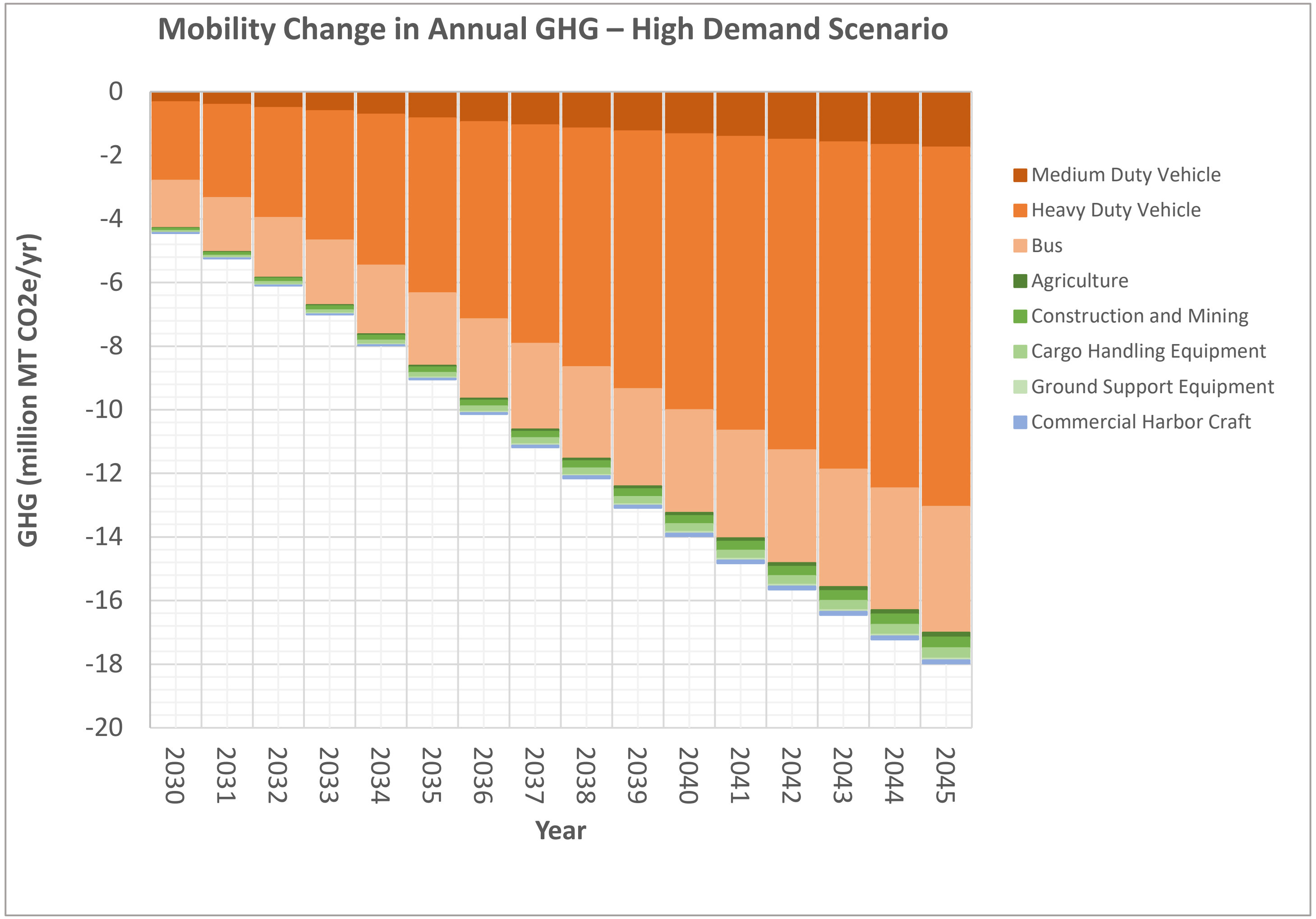
PREVIEW: PRELIMINARY RESULTS FOR MOBILITY SECTOR

ASSUMPTIONS

- Assumes vehicles convert to hydrogen fuel cells with zero emissions
- Utilizes displaced fuel data from the Demand study for various vehicle categories

KEY FINDINGS

- **Mobility is the largest end-user source of GHG reductions**, accounting for 59% of overall reductions with heavy-duty vehicles 61% of that
- Hydrogen fuel cell substitution results in **100% GHG reduction** in the mobility sector



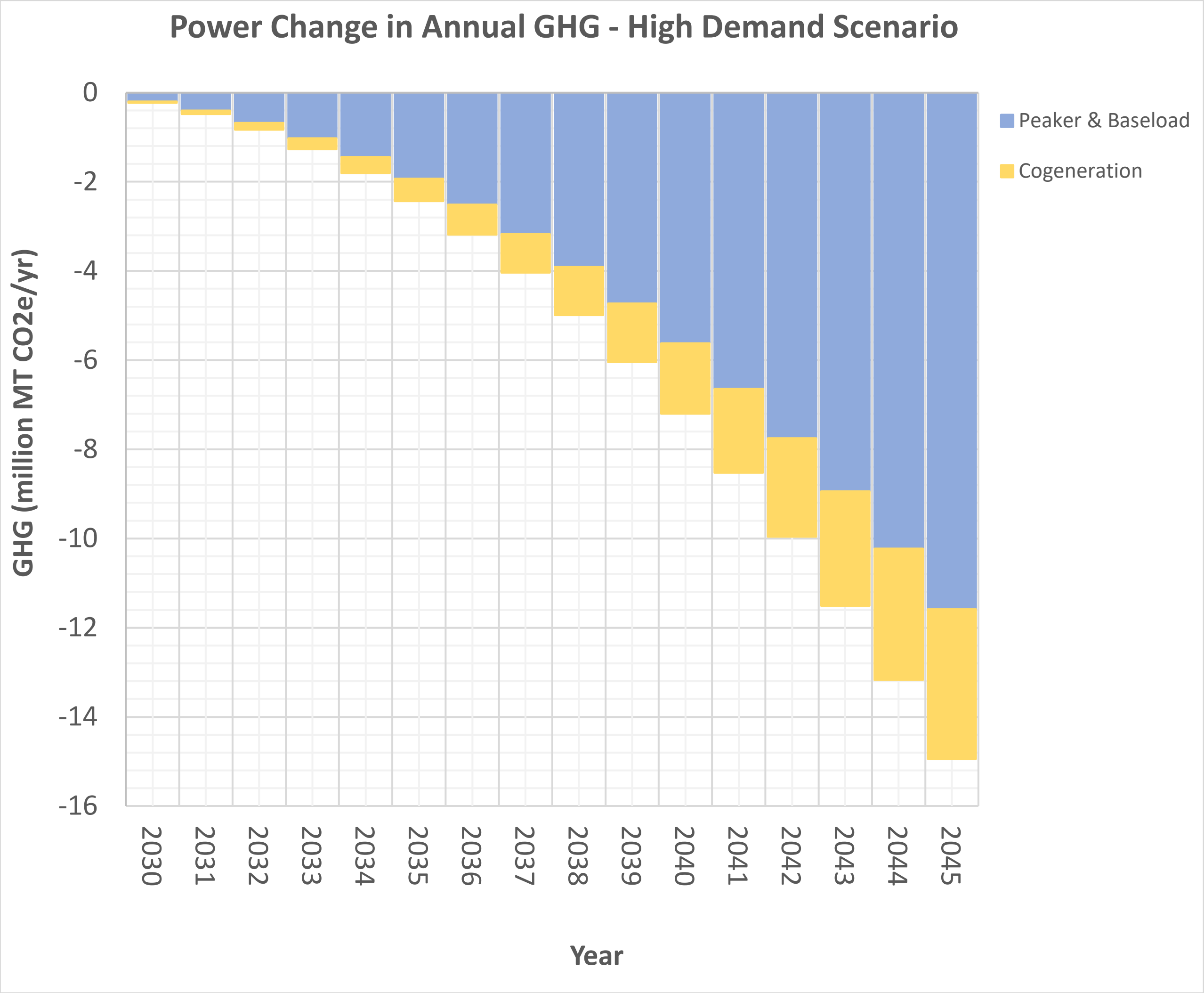
PREVIEW: PRELIMINARY RESULTS FOR POWER GENERATION SECTOR

ASSUMPTIONS

- Incorporates fuel consumption data from the Demand Study
- Focuses on hydrogen gradually replacing natural gas as a fuel source

KEY FINDINGS

- Hydrogen fuel substitution **reduces GHG emissions by 99.6%** in power generation
- Power generation accounts for **29% of overall GHG reductions**
- **Projected annual GHG reductions** for high demand scenario in 2045 equivalent to **electricity use of nearly 3 million homes for one year** (EPA calculator)
- **Hydrogen displaces natural gas** leading to significant GHG reductions



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PREVIEW: PRELIMINARY FINDINGS FOR HARD-TO-ELECTRIFY SECTOR

ASSUMPTIONS

» Applies fuel consumption data for from the Demand Study

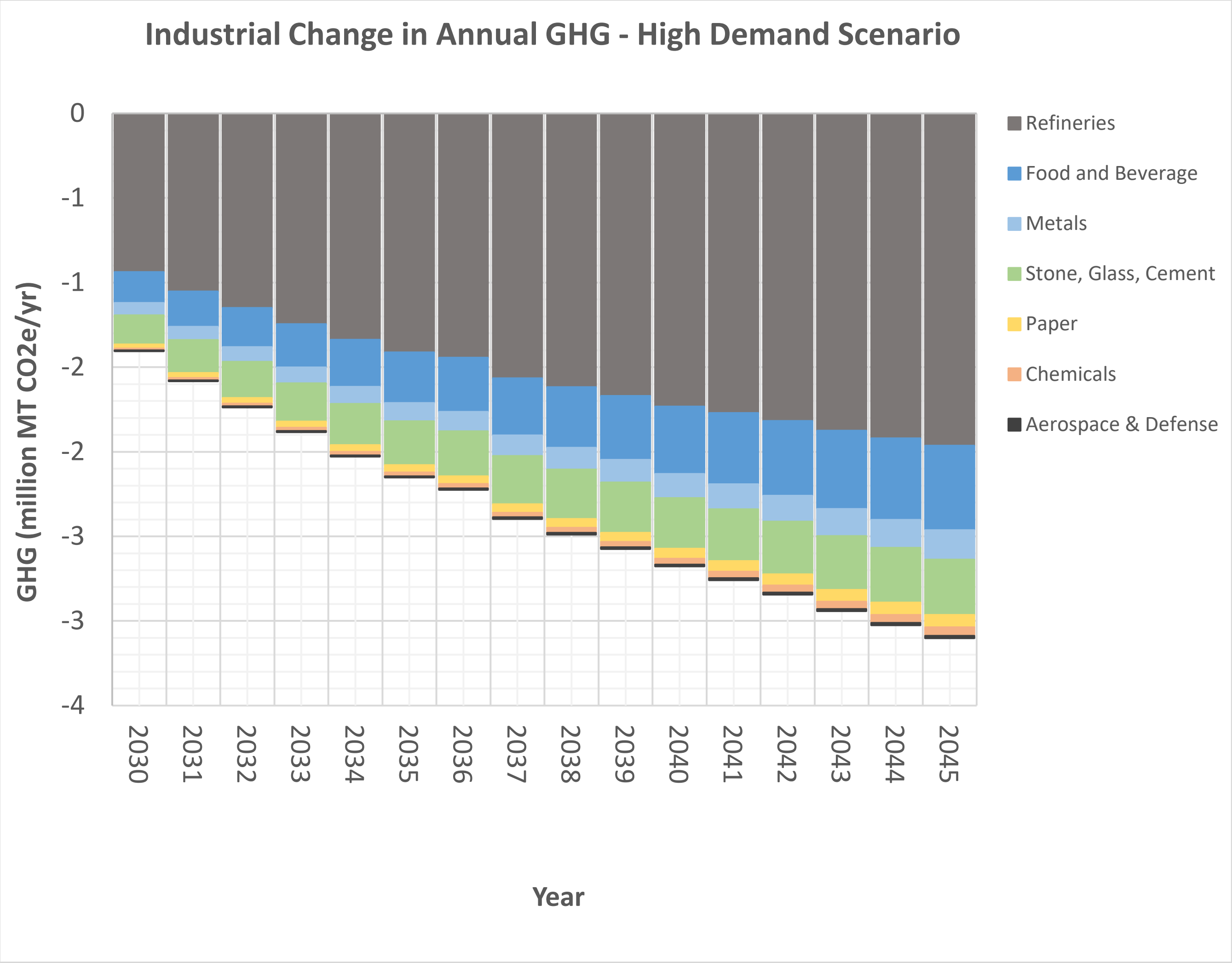
» Hydrogen is poised to replace natural gas in various industrial applications

KEY FINDINGS

» Hydrogen fuel substitution **reduces GHG by 99.6%** in hard-to-electrify industrial sectors

» Contributes **12.2% to overall GHG reductions**

» **Projected annual GHG reductions** for high demand scenario in 2045 equivalent to **electricity use of over 600,000 homes for one year** (EPA calculator)



PREVIEW: PRELIMINARY RESULTS FOR NEW INFRASTRUCTURE

- » **Infrastructure combustion emissions are negligible:** up to 0.2% of end-user reductions for GHG
- » **Production**
  - Zero GHG when use 100% electrolysis and/or biomass gasification
  - Some GHG when use 100% RNG SMR
- » **Storage and Transmission**
  - Electric driven compressors using renewable electricity do not have GHG emissions
  - Hydrogen fueled reciprocating engines & turbines driving compressors may have minor GHG emissions (N2O)

SoCalGas™

MEMBER DISCUSSION:
PREVIEW OF PRELIMINARY FINDINGS: GREENHOUSE GAS EMISSIONS EVALUATION

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

LUNCH (30 MINUTES)

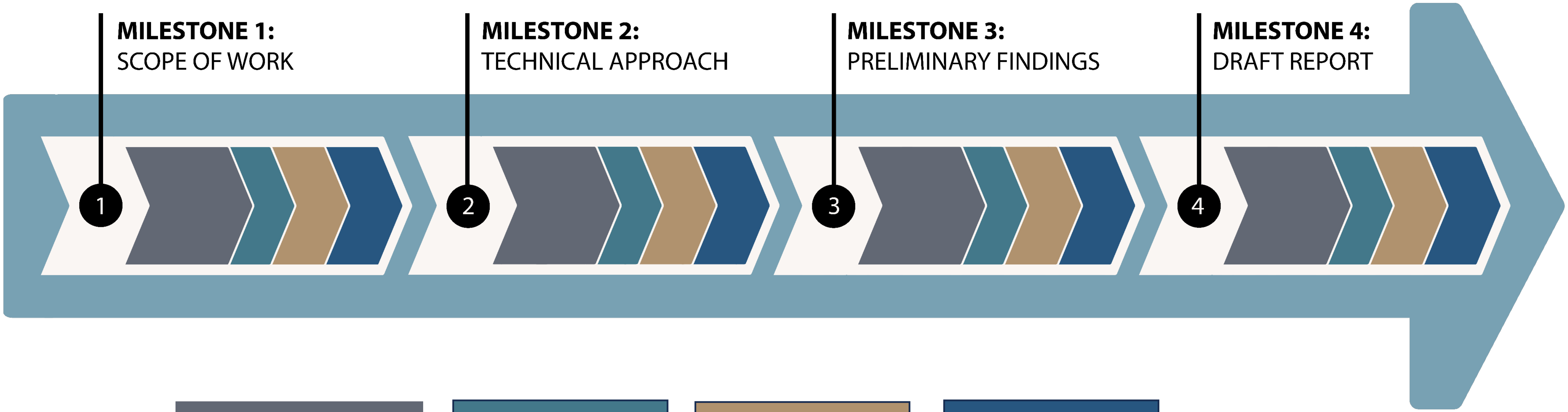
STAKEHOLDER COMMENT UPDATE

ANGELES
LINK

JILL TRACY
Angeles Link
Senior Director
Regulatory & Policy

SoCalGas

STAKEHOLDER COMMENT UPDATE



Stakeholder Meeting and Comment Period

Comments are Recorded

SoCalGas Drafts Response to Comments

Revisions Incorporated

SoCalGas

STAKEHOLDER COMMENT UPDATE

Comment Incorporated Into Applicable Phase One Study

Comment Addresses Issue or Topic Already Part of Applicable Phase One Study

Comment Response Categories

Comment May be Considered in Future Phases

Comment is Beyond Angeles Link Scope or Outside Milestone

SoCalGas

EXAMPLE OF COMMENTS INCORPORATED (TECHNICAL APPROACH)

- Greenhouse Gas Emissions Evaluation
  - Study will now include a table summarizing the existing information available from scientific research regarding estimates for Global Warming Potential (GWP) 100 and GWP 20 associated with hydrogen.

- Environmental & Social Justice Analysis
  - Study will now consider the *Equity Principles for Hydrogen- Environmental Justice Position on Green Hydrogen in California* issued on October 10, 2023.

MEMBER DISCUSSION:
OVERVIEW OF TECHNICAL APPROACH CHANGES PER STAKEHOLDER FEEDBACK

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

PREVIEW OF PRELIMINARY FINDINGS: NITROGEN OXIDE (NOx) & OTHER AIR EMSSIONS ASSESSMENT

ANGELES LINK

DARRELL JOHNSON
SoCalGas Manager
Environmental Services

SoCalGas

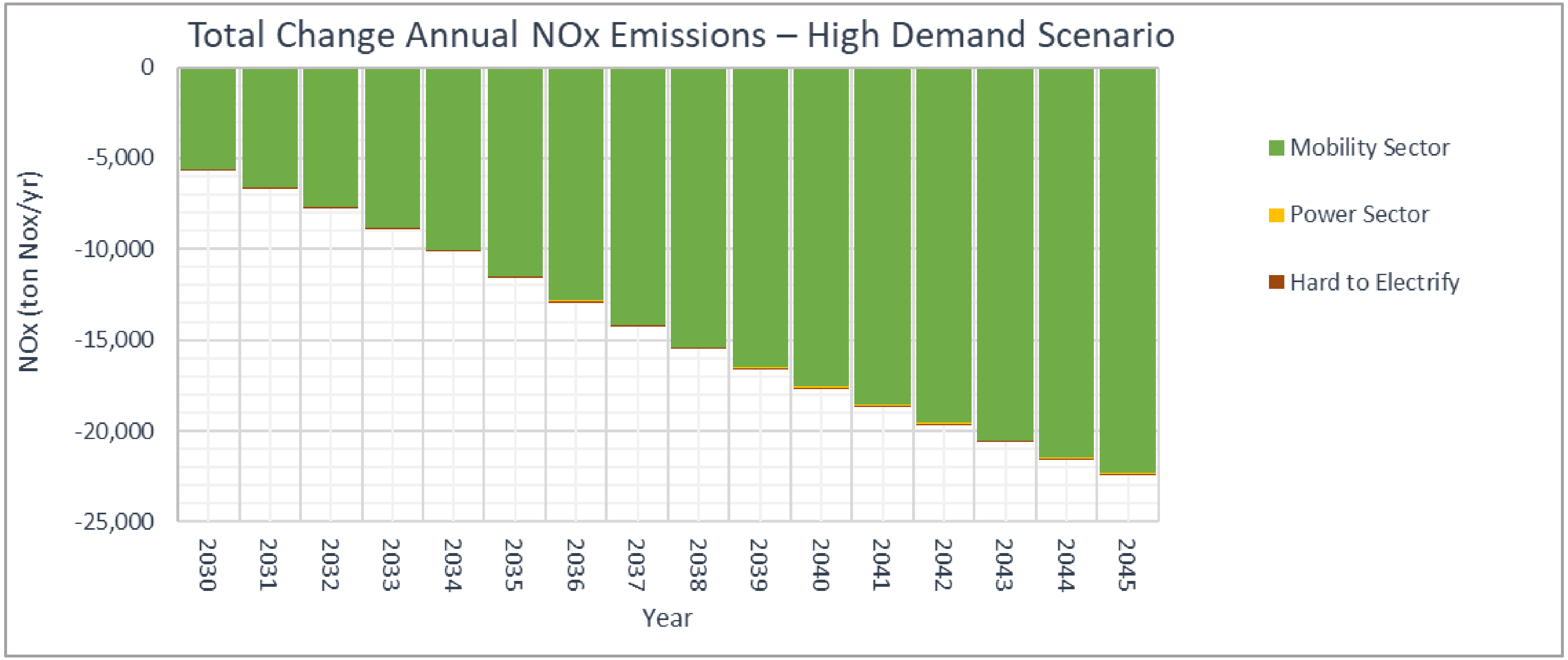
RECAP: HIGH-LEVEL METHODOLOGY FOR NO_X EMISSIONS EVALUATION

- Analyzes potential emissions changes for low, mid, high demand scenarios
- Mobility (medium and heavy duty) sector evaluated for potential replacement of diesel and gasoline with hydrogen fuel cells
- Power generation and hard to electrify industrial sector analyzed for potential replacement of natural gas with hydrogen fueled combustion equipment
- Evaluates infrastructure including electrolysis and RNG SMR for production, as well as transmission and storage

SoCalGas

PREVIEW: OVERALL PRELIMINARY RESULTS FOR NO_X EMISSIONS

- Overall NOx emissions associated with AL are expected to be reduced by over 20,000 tons per year by 2045
- Mobility NOx emissions are eliminated with hydrogen fuel cell substitution
- Industrial and Power Generation NOx permitted emissions are expected to stay the same or decrease
- Infrastructure NOx emissions are significantly smaller than end-user reductions



Projected Overall NOx Reductions in 2037 are up to Approximately 20% of South Coast AQMD's Forecasted NOx Emissions in 2037

PREVIEW: PRELIMINARY RESULTS FOR MOBILITY SECTOR

ASSUMPTIONS

» Assumes vehicles convert to hydrogen fuel cells with zero emissions

» Utilizes displaced fuel data from the Demand study for various vehicle categories

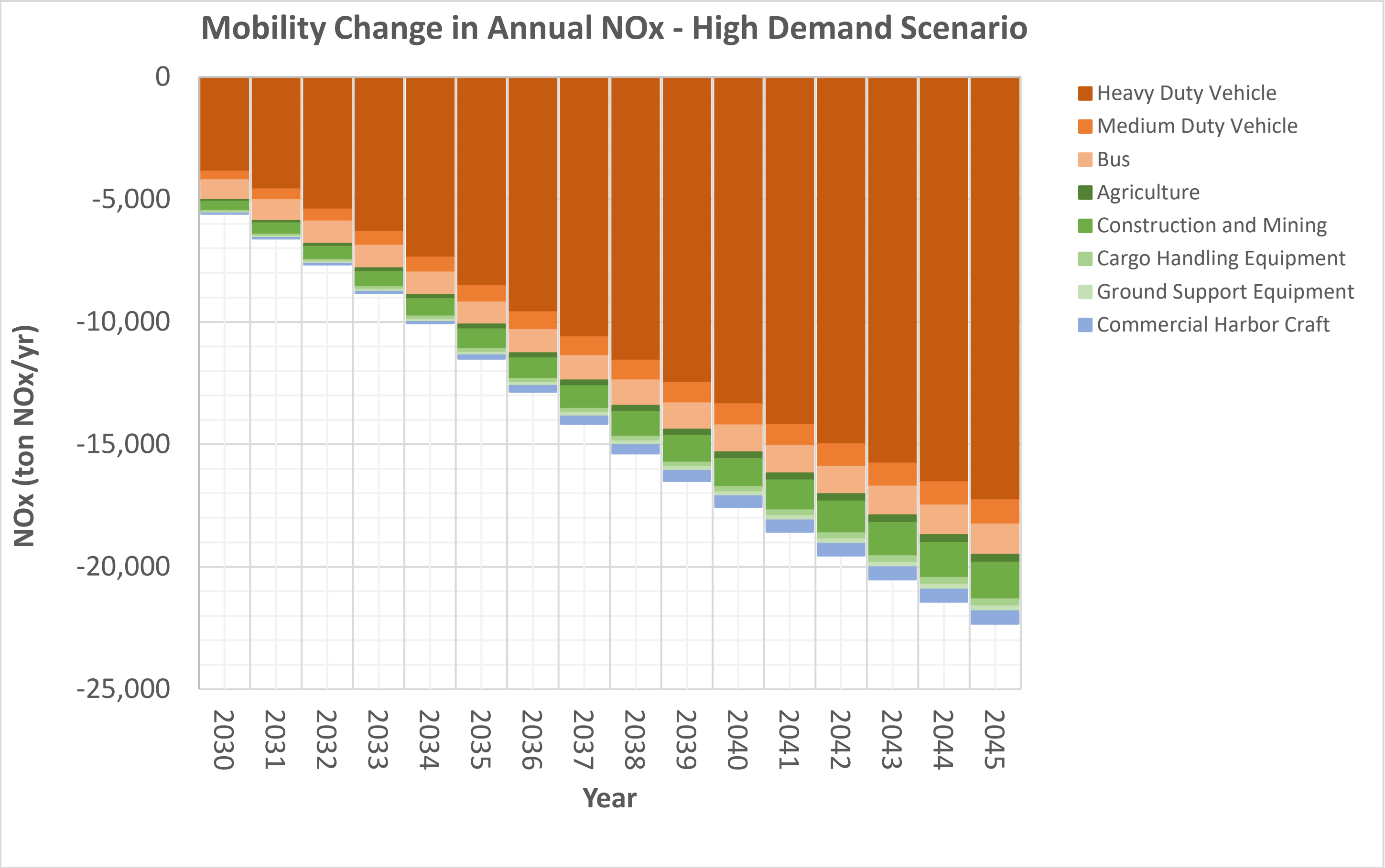
» Calculates NOx reductions as displaced fuel times the NOx fuel emission factor

KEY FINDINGS

» **Mobility is the main source of NOx reductions,** accounting for 99.5% of total reductions with heavy-duty vehicles accounting for 75% of that

» Hydrogen fuel cell substitution results in **100% NOx reduction** in the mobility sector

» Overall, hydrogen adoption in mobility **significantly lowers** NOx emissions



PREVIEW: PRELIMINARY RESULTS FOR POWER GENERATION SECTOR

ASSUMPTIONS

» Incorporates fuel consumption data from the Demand Study

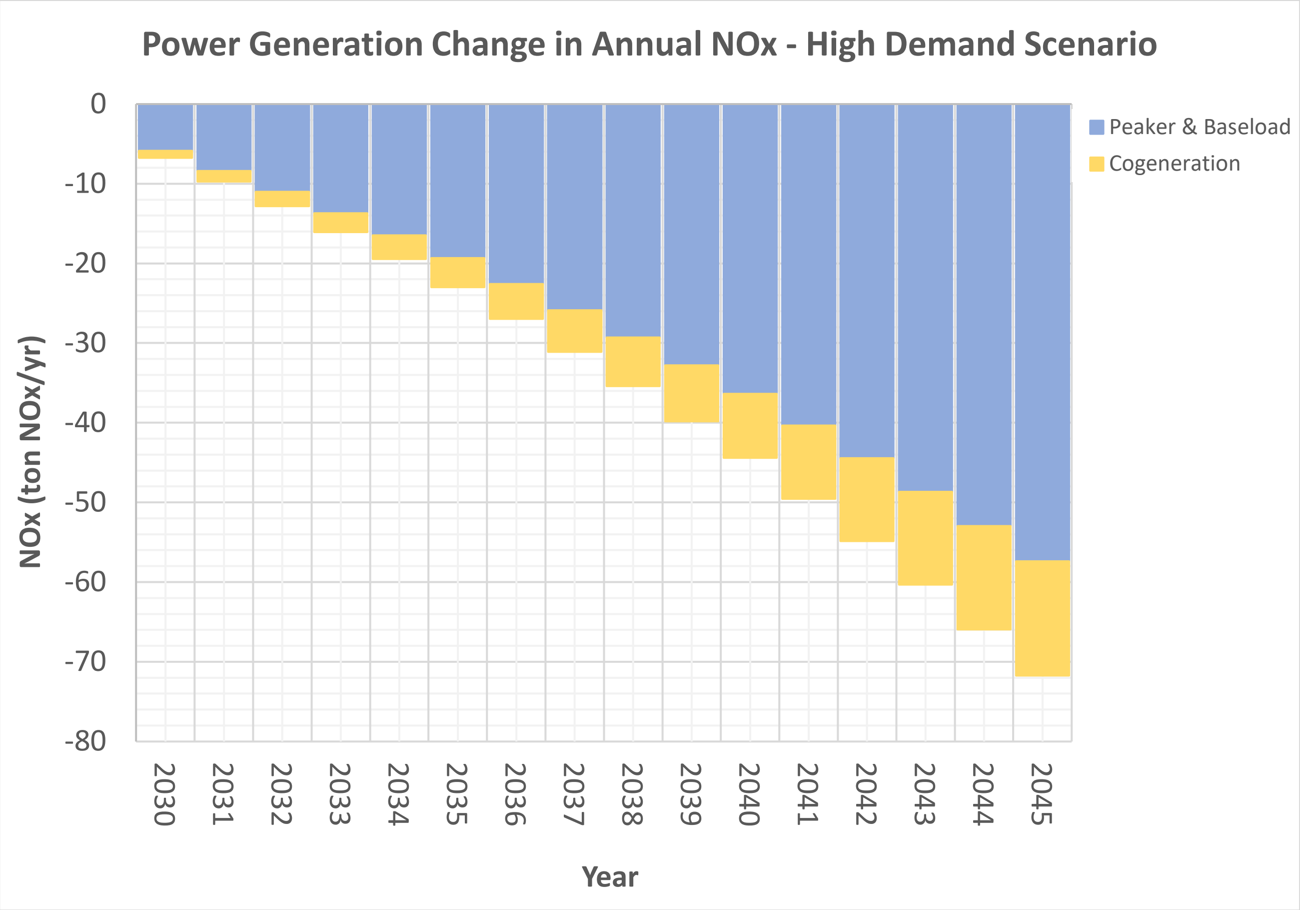
» Focuses on hydrogen gradually replacing natural gas as a fuel source

» NOx emission factors for natural gas combustion obtained from air District rules and then converted for hydrogen combustion

KEY FINDINGS

» NOx permitted emissions from power generation are **expected to stay the same or decrease**

» Power generation accounts for **0.25% of overall NOx reductions**



SoCalGas

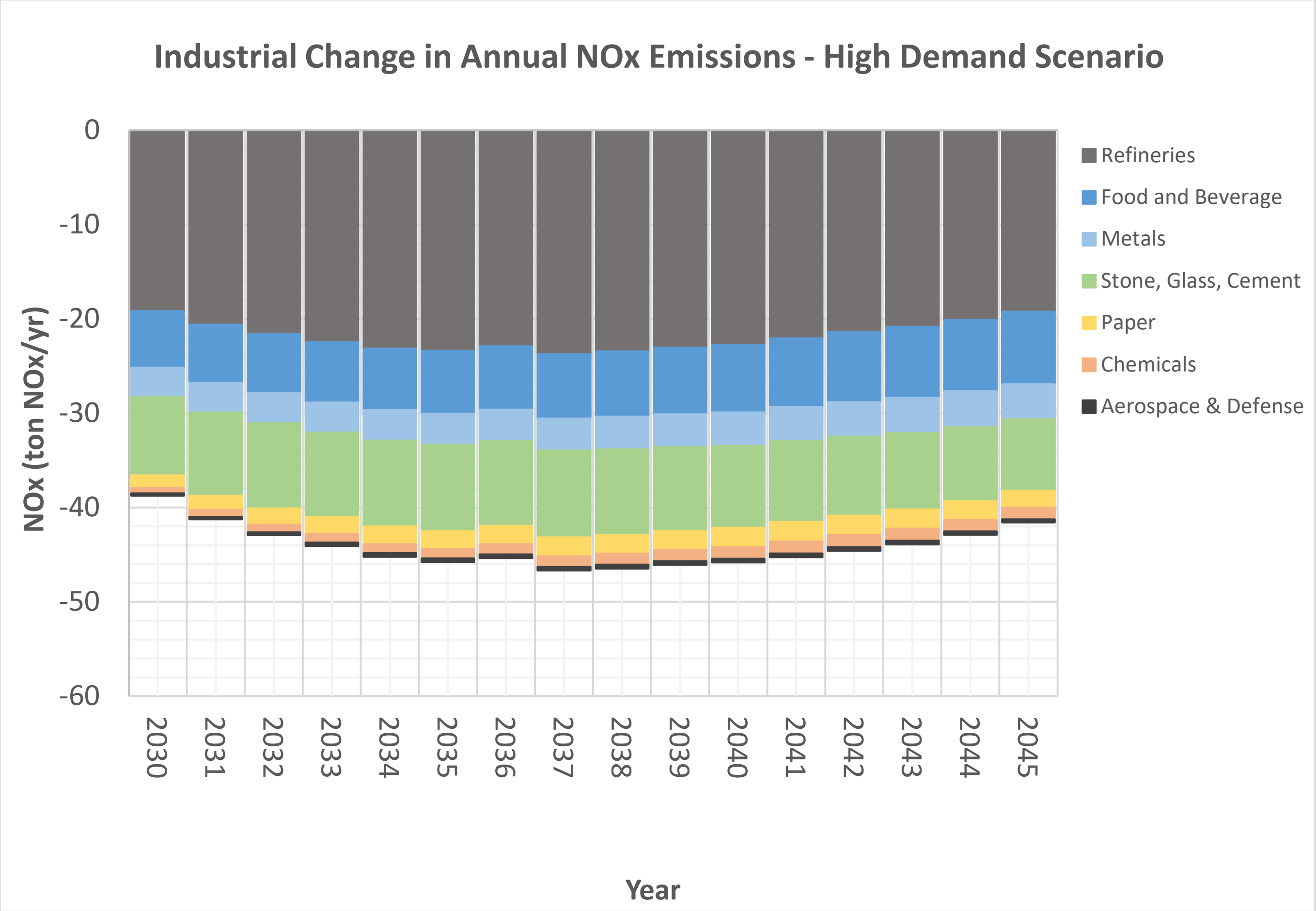
PREVIEW: PRELIMINARY RESULTS FOR HARD-TO-ELECTRIFY SECTOR

ASSUMPTIONS

- » Applies fuel consumption data for from the Demand Study
- » Hydrogen is poised to replace natural gas in various industrial applications
- » NOx emission factors for natural gas combustion obtained from air District rules and then converted for hydrogen combustion

KEY FINDINGS

- » NOx permitted emissions in industrial sectors are **expected to stay the same or decrease**
- » Industrial end-users contribute **0.31%** to the overall NOx reductions



SoCalGas

PREVIEW: PRELIMINARY RESULTS FOR NEW INFRASTRUCTURE

» **Infrastructure combustion emissions are negligible:** up to 4.7% of end-user reductions for NOx

» **Production**

- Zero NOx when use 100% electrolysis and/or biomass gasification
- Some NOx when use 100% RNG SMR

» **Storage and Transmission**

- Electric driven compressors do not have NOx emissions
- Hydrogen fueled reciprocating engines & turbines driving compressors may have some NOx emissions

SoCalGas

PREVIEW: PRELIMINARY RESULTS FOR OTHER AIR EMISSIONS

- Clean renewable hydrogen is a clean-burning, non-carbon containing fuel that eliminates diesel particulate matter (DPM) when replacing diesel
- Hydrogen usage does not produce direct volatile organic compound (VOC) emissions and may be entirely eliminated when replacing fossil fuels
- Hydrogen substitution significantly reduces DPM which can lead to adverse health impacts, and VOC emissions which contributes to smog formation
- Projected **DPM Reductions are up to 82%** of South Coast AQMD's forecasted PM2.5 Emissions in 2037
- Projected **VOC Reductions are up to 28%** of South Coast AQMD's forecasted VOC Emissions in 2037

SoCalGas

MEMBER DISCUSSION:
PREVIEW OF PRELIMINARY FINDINGS: NOx & OTHER AIR EMISSIONS ASSESSMENT

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

NEXT STEPS

- The feedback window on the GHG Emissions Evaluation and NOx and Other Air Emissions Assessment will be opened in the coming weeks in conjunction with the release of the preliminary findings for those studies
- Similarly, SoCalGas will begin accepting feedback on the Demand Study Draft Report upon its issuance and will communicate the comment period timeline when the draft report is posted
- Today's presentation and meeting recording will be available soon on the living library
- If your questions or comments were not answered today verbally, please submit them in writing at your next convenience
- Next meeting date/time will be shared as soon as it is available

THANK YOU FOR YOUR PARTICIPATION

HAPPY HOLIDAYS!

PREVIEW OF THE DEMAND STUDY DRAFT REPORT

Q4 MEETING
DECEMBER 13, 2023

SUMMARY

This study analyzes hydrogen demand from 2025 to 2045 across various sectors; mobility, power generation, and industrial sectors. The preliminary results of this study produced a strategic forecast exploring (3) different scenarios for hydrogen; conservative, moderate, and ambitious.

Hydrogen Demand is largely driven by policies and legislation for zero-emission targets, and technical suitability to operational requirements.

KEY FINDINGS

- **CONSERVATIVE SCENARIO:** Shows mobility as the primary demand driver**.**
- **MODERATE SCENARIO:** Sees a greater share in **power generation**.
- **AMBITIOUS SCENARIO:** Foresees substantial growth in the **power** and **industrial** sectors due to increased capacity usage and demand from refineries.

GUIDING QUESTIONS

1. What hydrogen impacts are the most valuable? Consider the following areas:
   a. Workforce
   b. Youth
   c. Health/Emissions
   d. Cost
2. What are the challenges of hydrogen demand in a community?
3. How could an increased demand for hydrogen affect a community?

KEY TAKEAWAYS

- Projected hydrogen demand in the mobility sector within the SoCalGas service area is estimated to range from **1.0** to **1.7 million metric tons** per year by **2045**.
- **Demand for hydrogen is influenced by the enactment of decarbonization policies and end-user operational needs, especially in the heavy-duty vehicle sector.**

PREVIEW OF GHG AND NOX EMISSIONS EVALUATION

SUMMARY

This presentation outlines anticipated Greenhouse Gas (GHG) and Nitrogen oxides (NOx) emissions reductions associated with Angeles Link, providing insights into each end-user sector's key components.

End-Users:
Sectors that will use hydrogen

Infrastructure:
How hydrogen is produced, stored, and delivered to end users

KEY FINDINGS

- **Mobility:** Hydrogen fuel cell substitution in **mobility** achieves a **100% reduction** in GHG and NOx emissions.
- **Industrial & Power Generation:** Hydrogen fuel substitution in power generation results in a **99.6% reduction** in GHG emissions, and will not increase permitted NOx emissions.
- **Infrastructure:** GHG emissions are **negligible** when compared to overall reductions and NOx emissions are **significantly smaller** than end-user reductions.
- **Demand:** As hydrogen demand **increases**, end-user GHG significantly **decreases**.

ANGELES LINK

PREVIEW OF GHG AND NOX EMISSIONS EVALUATION

Q4 MEETING
DECEMBER 13, 2023

GUIDING QUESTIONS

1. How can SoCalGas achieve transparency in sharing emissions information related to Angeles Link?
2. What are some ways current levels of emissions impact health? Local businesses? The workforce? Youth?
3. What factors should SoCalGas consider when evaluating emissions?
4. Are emissions an area of concern for your community? Why or why not?

KEY TAKEAWAYS

- Carbon dioxide emissions are the largest contributor to global warming.
- There is no carbon in hydrogen.
- **Technological advancements** + **achieving economies of scale** = **hydrogen playing a more significant role in reducing emissions.**

APPENDIX 8 – LINK TO PAG AND CBOSG MEETING RECORDINGS

PAG Recordings

July 18th, 2023 - Angeles Link PAG 07.18.23 Meeting Recording (vimeo.com)

July 20th, 2023 - Angeles Link 07.20.23 PAG Meeting Recording (vimeo.com)

August 29th, 2023 - PAG August Workshop Recording (vimeo.com)

September 28th, 2023 - PAG Quarterly Meeting #3 (vimeo.com)

CBOSG Recordings

July 19th, 2023 - CBOSG 7/19/23 Workshop #1 (vimeo.com)

July 21st, 2023 - CBOSG - 7/21/23 Workshop #2 (vimeo.com)

August 28th, 2023 - CBOSG 8/28/23 Virtual Workshop (vimeo.com)

September 26th, 2023 - SoCalGas Angeles Link CBOSG Quarterly Meeting #3 - 9/26/23 (vimeo.com)

APPENDIX 9 - SUMMARY OF CBO STAKEHOLDER MEETINGS, INCLUDING SURVEY QUESTION RESPONSES, OTHER FEEDBACK DURING Q4 MEETINGS, AND POLLING RESULTS

SoCalGas - Angeles Link
Community-Based Organization Stakeholder Group (CBOSG)
October Workshop Meeting Summary

10/19/23 CBOSG Workshop (9:30AM – 12:00PM)

Energy Resource Center, Downey CA

I. Attendee Report

- 3 in-person attendees; 12 virtual attendees; 15 total.

Please refer to Appendix A for a complete list of attendees.

II. Purpose

- ARCHES Update: Acknowledge the $1.2 billion award to California by the U.S. Department of Energy as a regional clean hydrogen hub.
- Review and receive feedback from CBOSG members on the Phase One Project Alternatives and Options, Preliminary Routing, and Workforce Development and Training Technical Approaches.
- Hear from subject matter experts leading presented studies.
- Discuss meeting schedule and next steps.

III. Presentation Highlights and Feedback Themes

- **Project Options & Alternatives Technical Approach:** SoCalGas emphasized the project's purpose, focusing on meeting the state's decarbonization goals, improving air quality, enhancing energy reliability and resiliency, and providing cost-effective energy. The study evaluates alternatives within three categories: non-hydrogen alternatives, non-pipeline alternatives for hydrogen delivery, and multiple pipeline routing options.
    - Feedback Themes:
        - Question emphasizing the need to consider criteria for evaluating alternative energy sources and whether those criteria align with state policy.
        - Concerns over transporting hydrogen energy if methane is used in the transport process.
        - Questions regarding heavy-duty transportation uses for both hydrogen in pure form and hydrogen fuel cells.
        - Clarification that power generators have also adopted their own climate goals for reaching zero emissions in accordance with the state's goals.
- **Pipeline Routing Technical Approach:** SoCalGas is conducting a multi-phase routing study, with the first phase involving data collection, system evaluation, and high-level route assessment based on factors like production, demand, and existing infrastructure. They emphasize the importance of collaborative feedback and community input throughout this dynamic process and distinguish between the first and second phases of the study. The speaker introduced a four-step approach that includes the use of the Pivot software platform for mapping, which can incorporate data from various sources, including community and environmental justice concerns.

    - Feedback themes:
        - Questions regarding the exact geographic location(s) of the project.
        - Acknowledgement of community disparities and importance of considering a wide range of factors, including environmental impacts, the human factor, and water resources.

        - Importance of recognizing the historical adverse impacts on communities of color.
        - Recommendation to have a workshop on safety and emergency response plans for nearby communities near hydrogen pipelines that are impacted by earthquakes and other natural disasters.
- **Workforce Planning and Training Evaluation Technical Approach:** SoCalGas presented its goal to evaluate and determine the size of the workforce needed to complete the project and inform the workforce about this new industry and its requirements. The presentation highlighted the importance of workforce training and planning for transitioning into the hydrogen industry, emphasizing safety, building awareness, and the need for quality and relevant education programs in collaboration with various stakeholders.
    - Feedback Themes:
        - Concerns about the effectiveness of project labor agreements (PLAs) and the need for a more inclusive approach for workforce development.
        - Suggestions for collaborative efforts between community organizations, like their own, and SoCalGas could help raise awareness and develop effective programs in advance.
        - Conversation about including more stakeholders from the California Community Colleges. CBOs were encouraged to initiate and suggest partnership opportunities with SoCalGas to support programs that cover hydrogen energy.

IV. Next Steps for CBOSG

- Next Quarterly meeting will be in December at Greater Zion Church (2408 N Wilmington Ave, Compton); Meeting agenda and supporting materials will be available soon.
- All October Workshop resources are now available in the Living Library.
- Feedback on the technical approaches for the following topics is due on Friday, November 3: Project Options and Alternatives, Preliminary Routing/Configuration Analysis/Right-of-Way Study, and Workforce Planning and Training Development. All Technical Approach Summaries are available in the Living Library.
- To continue to send all comment and feedback to ALP1_Study_CBO_Feedback@insigniaenv.com.

Appendix A

CBOSG October Workshop Attendee Roster

#	First Name	Last Name	Affiliation
CBOSGG Members			
1	Jessy	Shelton	California Greenworks
2	Marcia	Hanscom	Ballona Wetlands Institute
3	Marc	Carrel	Breathe Southern California
4	Dr. Ciriaco	Pinedo	Mexican American Opportunity Foundation
5	Rashad	Trapp	Reimagine LA Foundation
6	Robert	van de Heok	Defend Ballona Wetlands
7	Andrea	Vega	Food & Water Watch
8	Jill	Buck	Go Green Initiative
9	Kristin	Fukushima	Little Tokyo Community Council
10	Luis	R Pena	Los Angeles Indigenous Peoples Alliance*
11	Shantal	Orea Torres	Parents, Educators/Teachers, and Students in Action
12	Alex	Jasset	Physicians for Social Responsibility LA
13	Enrique	Aranda	Soledad Enrichment Action*
14	Luis	Melliz	Soledad Enrichment Action*
15	Thelmy	Alvarez	Watts Labor Community Action Committee
Non-CBOSG Members			
16	Christopher	Arroyo	California Public Utilities Commission
17	Nancy	Verduzco	Arellano Associates
18	Sohrab	Mikanik	Arellano Associates*
19	Stephanie	Espinoza	Arellano Associates*
20	Chester	Britt	Arellano Associates*
21	Armen	Keochekian	Insignia Environmental
22	Julie	Roshala	Insignia Environmental
23	Rick	Garcia	Lee Andrews Group
24	Alyssa	Martinez	Lee Andrews Group*
25	Alma	Marquez	Lee Andrews Group*
26	Andy	Carrasco	SoCalGas
27	Chanice	Allen	SoCalGas
28	Emily	Grant	SoCalGas*
29	Edith	Moreno	SoCalGas*
30	Sebastian	Garza	SoCalGas*
31	Neil	Navin	SoCalGas*
32	Amy	Kitson	SoCalGas*
33	Katrina	Reagan	SoCalGas*
34	Douglas	Chow	SoCalGas*
35	Jill	Tracy	SoCalGas*
36	Hector	Moreno	SoCalGas*
37	Glenn	LaFevers	SoCalGas*
38	Yuri	Freedman	SoCalGas*

*Attended in-person

SoCalGas - Angeles Link
Community-Based Organization Stakeholder Group (CBOSG)
Q4 December Meeting Summary

12/13/23 CBOSG Q4 Meeting (12:30PM – 4:00PM)

Greater Zion Church Family, Compton CA

I. Attendee Report

- 5 in-person attendees; 7 virtual attendees; 12 total.

Please refer to Appendix A for a complete list of attendees.

II. Purpose

- Preview the Phase One Greenhouse Gas Emissions Evaluation and Nitrogen Oxide & Other Air Emissions Assessment Preliminary Findings and Demand Study Draft Report and receive feedback from CBOSG members.
- Hear from subject matter experts leading presented studies.
- Give CBOSG members the opportunity to breakout in small groups to discuss the impact of air emissions in their communities and how SoCalGas can share emissions information related to Angeles Link.
- Examine stakeholder comments received thus far.

III. Presentation Highlights and Feedback Themes

- **Preview of Preliminary Findings: Greenhouse Gas Emissions and Nitrogen Oxide & Other Air Emissions Assessment:** Darrell Johnson, Manager of Environmental Services, reviewed the methodology of the study, which involves the analysis of emission changes in low, mid, and high-demand- scenarios of hydrogen fuel as set forth in the Demand Study. The study measured the impact of GHG, NOX, and other air emissions from substituting hydrogen fuel for diesel and gasoline. The sectors studied in the analysis were mobility (medium and heavy-duty vehicles), power generation, and hard-to-electrify industrial sectors.
- **Air Emissions and Our Community Breakout Session Activity:** In-person and virtual CBOSG attendees were divided into small groups to initiate a discussion and answer guiding questions related to air emission impacts on their communities and how SoCalGas can share emissions information related to Angeles Link.
    - <u>Feedback Themes:</u>
        - How can SoCalGas achieve transparency in sharing emissions information related to Angeles Link?
            - Provide more forums and opportunities for discussion.
            - Make information more accessible to the public beyond CBOs by utilizing a variety of communication media channels (TV, radio, social media, tabling at community events), and providing information in multiple languages.
            - Have a third-party report emissions.
            - Conduct consistent reporting and establish trust with communities.
        - What are some ways current levels of emissions impact health? Local businesses? The workforce? The youth?
            - Health disparities in specific LA neighborhoods, e.g. communities in Compton in the 60-70th percentile for asthma.

        - Local impacts from fossil fuel leaks and gas storage facilities.
        - Outdoor workers facing negative health impacts.
        - Respiratory health impacts on youth.
    - What factors should SoCalGas consider when evaluating emissions (GHG and NOx emissions)?
        - Evaluate before and after positive/negative impacts to the communities where hydrogen centers will be built.
        - Provide a cost benefit analysis.
        - Utilize the U.S. EPA EJ screening mapping tool.
        - Study and report on localized impacts by ZIP code.
    - Are emissions an area of concern for your community? Why or why not?
        - Emissions are an increasing concern in communities.
        - GHG is understood to have a correlation to climate change while NOx is understood to have negative health impacts.
        - Emissions are increasingly aligning with other issues and challenges such as housing and food insecurity. SoCalGas should consider bridging some of these issues in conversations to discuss how they can transform communities.
        - The community of West LA is concerned about the El Segundo facility, currently emitting NOx but is understood to be transitioning to hydrogen.

- **Preview of Demand Study Draft Report:** Yuri Freedman, Senior Director of Business Development, presented a preview of the Demand Study Draft Report which analyzes hydrogen demand in the SoCalGas service territory from 2025 to 2045 across mobility, power generation, and industrial sectors. The analysis considers factors such as policy and legislation, technology deployment, commercial availability, and business readiness. The combined total demand across all sectors ranged from 1.9 to 6 million tons per year in a conservative to ambitious scenario. The findings were based on a comprehensive analysis, model refinement, and input from industry experts.
    - <u>Feedback themes:</u>
        - Discussion about how demand will be affected by the transition to hydrogen energy considering that the current major demand comes from refineries.
        - Participants asked questions about the gradual approach to transitioning to hydrogen energy and the climate emergency.
        - Discussion about workforce development, emphasizing equity, and inquiries about the role of organizations in supporting SoCalGas and others to ensure an equitable process. Comment highlighted the significance of partnerships with entities like community colleges and community-based organizations.
        - CBOSG members underscored the importance of building trust within communities and nonprofits and the need to address past patterns of injustice and expressing a desire for nonprofit agencies to be considered as partners alongside organized labor.
        - Call for open dialogue with communities to address fears related to the combustibility of hydrogen, underlining the significance of prioritizing safety in these discussions.
        - Suggestion for SoCalGas to consider allocating donations to such projects as part of their contributions to the community. The Western Flyer Educational Foundation project was noted as an example, highlighting the importance of supporting initiatives that combine education, science, and environmental consciousness.

- **Guest Speaker: The Future of Hydrogen:** David Park, the Industry Affairs Director of the Hydrogen Fuel Cell Partnership, detailed the status and efforts to transition towards hydrogen fuel in both the California and national economy. D. Park highlighted the current and projected state of hydrogen fuel cells in transportation, and discussed production, cost, and overall efficiencies for both commercial and freight use. D. Park closed his presentation by emphasizing the emergence of hydrogen as a growing economy in California.
    - Discussion Themes:
        - Discussion about the already established hydrogen production hubs both locally and across the U.S., and the possibility for more hubs in states like Colorado.
        - Concerns about water evaporation producing visibility problems for transportation were discussed. D. Park shared that water vapor from hydrogen vehicles will be similar to the current excess of water vapor produced from fossil fuel combustion vehicles.
        - Current gasoline storage facilities would be decommissioned on the transition to hydrogen fuel because hydrogen is transported as a liquid and stored above ground whereas gasoline is stored as a compressed gas.
        - Clarification on the possibility of using ammonia as a hydrogen carrier in marine vessels and not for commercial applications.
        - Conversation about the current codes and regulations established for permitting stationing of hydrogen.
- **Stakeholder Comment Update:** Jill Tracy, Senior Director of Regulatory and Policy for Angeles Link, discussed the process for reviewing and responding to stakeholder comments. J. Tracy detailed four categories that comments fall into: incorporated comments into studies, already addressed comments, comments that are within the preliminary phase of the study, and comments that are beyond the scope of the study or phase.
- **President Maryam Brown's Closing Remarks**: Maryam Brown, SoCalGas President, delivered closing remarks emphasizing that engagement and collaboration with CBOs and local communities is vital to the Angeles Link project and other SoCalGas initiatives. She also encouraged in-person participation in meetings, which allows for greater dialogue and identification of problems and/or solutions.

IV. Next Steps for CBOSG

- The Q4 December Meeting presentation slides and recording are now available in the Living Library.
- The feedback window on the GHG Emissions Evaluation and NOx and Other Air Emissions Assessment will be opened in the coming weeks in conjunction with the release of the preliminary findings for those studies.
- Similarly, SoCalGas will begin accepting feedback on the Demand Study Draft Report upon its issuance and will communicate the comment period timeline when the draft report is posted.
- Any questions or comments can be directed to Emily Grant at alstakeholder@socalgas.com or Alma Marquez at almarquez@leeandrewsgroup.com.
- Next meeting date/time will be shared as soon as it is available.

Appendix A

CBOSG Q4 December Meeting Attendee Roster

#	First Name	Last Name	Affiliation
CBOSG Members			
1	Lourdes	Caracoza	Alma Family Services
2	Marcia	Hanscom	Ballona Wetlands Institute
3	Ricardo	Mendoza	Coalition for Responsible Community Development*
4	Robert	van de Hoek	Defend Ballona Wetlands
5	Jill	Buck	Go Green Initiative
6	Chidi	Olunkwa	Greater Zion Church Family*
7	Olivia	Fike	PESA (Parents, Educators/Teachers & Students in Action)
8	Faith	Myhra	Protect Playa Now
9	Rashad	Rucker-Trapp	Reimagine LA Foundation*
10	Enrique	Aranda	Soledad Enrichment Action*
11	Andrea	Leon-Grossmann	Vote Solar
12	Thelmy	Alvarez	Watts Labor Community Action Committee*
Non-CBOSG Members			
13	Chester	Britt	Arellano Associates*
14	Stevie	Espinoza	Arellano Associates*
15	Nancy	Verduzco	Arellano Associates*
16	Sohrab	Mikanik	Arellano Associates
17	Sasha	Cole	California Public Utilities Commission
18	Christopher	Arroyo	California Public Utilities Commission
19	David	Park	Hydrogen Fuel Cell Partnership*
20	Armen	Keochekian	Insignia Environmental
21	Julie	Roshala	Insignia Environmental
22	Anniken	Lydon	Insignia Environmental
23	Rick	Garcia	Lee Andrews Group
24	Alma	Marquez	Lee Andrews Group*
25	Alyssa	Martinez	Lee Andrews Group*
26	Isaac	Martinez	Lee Andrews Group
27	Antonia	Issaevitch	Lee Andrews Group*
28	Edna	Degollado	Lee Andrews Group*
29	Maryam	Brown	SoCalGas*
30	Douglas	Chow	SoCalGas
31	Emily	Grant	SoCalGas*
32	Jill	Tracy	SoCalGas*
33	Edith	Moreno	SoCalGas*
34	Frank	Lopez	SoCalGas*
35	Andy	Carrasco	SoCalGas*
36	Darrell	Johnson	SoCalGas*
37	Amy	Kitson	SoCalGas*
38	Chanice	Allen	SoCalGas*
39	Yuri	Freedman	SoCalGas*

40	Theresa	Dao	SoCalGas*
41	Olga	Quinones	SoCalGas*

*Attended in-person

APPENDIX 10 - SUMMARY OF PAG MEETINGS, INCLUDING SURVEY QUESTION RESPONSES, OTHER FEEDBACK OBTAINED DURING Q4 MEETINGS, AND POLLING RESULTS

SoCalGas Angeles Link
Planning Advisory Group (PAG)
October Workshop Summary

10/18 PAG Workshop (9:00AM-12:00PM)
Energy Resource Center, Downey, CA & Zoom

I. Attendee Report

- 10/18: 5 in-person & 20 virtual attendees.

Please refer to Attachments A for a complete list of attendees.

II. Purpose

- ARCHES Application Update: Acknowledge the $1.2 billion award to California by the U.S. Department of Energy as a regional clean hydrogen hub
- Provide information and solicit input from PAG members on the following topics:
    - Production Planning & Assessment Technical Approach
    - Pipeline Routing Technical Approach
    - Pivvot Platform
    - Pipeline Sizing & Design Technical Approach
- Hear from subject matter experts leading presented studies
- Discuss meeting schedule and next steps

III. Presentation Highlights and Feedback Themes

- **Production Planning & Assessment Technical Approach:** SoCalGas focused on the technical approach to hydrogen production planning in California. The presentation detailed three primary hydrogen production pathways and discussed the various renewable power sources including solar, wind, and biomass, and their respective technical characteristics, including asset life, construction years, and costs. The presentation also covered power storage methods like lithium-ion batteries, pump storage, and compressed air energy storage, evaluating their feasibility, scalability, and storage durations.
    - Feedback Themes:
        - Support for zero-emissions hydrogen production
        - Question regarding feasibility of production profiles for developers.
        - Concerns about the accuracy of the generation profile. Interest in the considerations of the profile, such as the daily and seasonal generations of the storage elements, to determine which production profile is more feasible.
        - Emphasis on the need for alternate renewable energy sources.
        - Question about the impact of demand studies on production planning and the likelihood of hydrogen production being grid-connected or behind the meter in the first decade.

        - Support for exploring renewable pathways for hydrogen production and emphasized the need for a technology-agnostic approach.
        - Reiteration of interest in exploration of alternate non-pipeline hydrogen energy sources, such as electrification.
        - Concerns about different types of hydrogen production, I.e., biomethane and electrolysis, meeting the air quality modeling standards.
        - Reiteration of moving forward with hydrogen swiftly, while maintaining as close to zero emissions production as possible.
        - Interest in research on production by third parties and the interaction between the third party and all studies.
- **Pipeline Routing Technical Approach:** SoCalGas is conducting a multi-phase routing study, with the first phase involving data collection, system evaluation, and high-level route assessment based on factors like production, demand, and existing infrastructure. The presentation emphasized the importance of collaborative feedback and community input throughout this dynamic process and distinguished between the first and second phases of the study.
    - Feedback Themes:
        - Request for clarification on the specific zones and routes of the pipeline route.
        - Request for more details on the underlying assumptions and criteria behind the zone designations to better understand the plan.
        - Comment on the lack of a statutory framework for federal regulation of interstate hydrogen pipelines and suggested focusing on intrastate systems.
        - Desire for a public-focused and more in-depth explanations of connection, collection, and central zones for routing.
        - Interest in potential pipeline routing originating outside of California.
        - Question about the approach towards pipeline investments and whether they include dedicated customer lines or infrastructure for blending into natural gas pipelines.
        - Inquiry about the scale of potential hydrogen production in the area.
        - Inquiries regarding who will be conducting the exact routing identification assessments and emphasis of the importance of boot-on-the-ground research and collaboration with local districts.
- **Pivvot Platform:** The speaker introduced a four-step approach that includes the use of the Pivot software platform for mapping, which can incorporate data from various sources, including community and environmental justice concerns.
    - Feedback Themes:
        - General support for the tool.
        - Interest in the data specifics of the program.
        - Question regarding whether the tool was accessible to the public.
        - Inquiry about the capabilities of the platform and whether it could be used for locating/marking during pipeline maintenance or construction.
        - Concerns about the tool's limitations and potential biases due to limitations in data, especially regarding community and environmental data.

- **Pipeline Sizing & Design Technical Approach:** The presentation focused on the pipeline's operational aspects. The presentation emphasized the project's current phase of mapping potential corridors based on production, storage, and demand, with the goal of creating a resilient, efficient, and environmentally harmonious pipeline system that integrates seamlessly with other networks and adapts to long-term operational challenges.
  - Feedback Themes:
    - Interest in the proposed pipe materials and the yield strength of the design.
    - Emphasis on the need for new policies and procedures for pipeline materials handling and maintenance.
    - Discussion about safety oversight and the use of SCADA (Supervisory Control and Data Acquisition) for real-time monitoring of the pipeline network.
    - Interest in a universal versus municipality-based permitting process and permitting reform.
    - Request for clarification on SoCalGas's plans for hydrogen production, considering their request for funding in the General Rate Case for steam methane reform and electrolysis production.
    - Concerns about the demand forecasts for hydrogen and inquiry on how changes in demand might affect the pipeline design. Suggestion to explore non-pipeline alternatives for hydrogen delivery, particularly production at the point of use.
    - Emphasis on the integration of all studies within the sizing and design study.
    - Question on projected workforce forecast.
    - Interest in whether there is a way to produce hydrogen at the point of use, to reduce the need for pipelines.

IV. Next Steps for PAG

- Next Quarterly meeting will be in December at the Energy Resource Center (9240 Firestone Blvd., Downey)
- All October Workshop resources are now available in the Living Library.
- Feedback on the technical approaches for the following topics is due on Friday, November 3: Production Planning & Assessment Technical Approach, Pipeline Routing Technical Approach and Pipeline Sizing & Design Technical Approach. All Technical Approach Summaries are available in the Living Library.
- To continue to send all comment and feedback to ALP1_Study_PAG_Feedback@insigniaenv.com.

Attachment A

PAG October 18 Workshop Attendee Roster

#	First Name	Last Name	Affiliation
		PAG Members	
1	Maddie	Munson	Agricultural Energy Consumers Association
2	Lorraine	Paskett	Air Products*
3	Miles	Heller	Air Products
4	Rizaldo	Aldas	California Energy Commission
5	Katrina	Fritz	California Hydrogen Business Council
6	Arthur	Fisher	California Public Utilities Commission
7	Christopher	Arroyo	California Public Utilities Commission
8	Matthew	Taul	California Public Utilities Commission
9	Jack	Chang	California Public Utilities Commission
10	Tyson	Siegele	Clean Energy Strategies representing the Utility Consumers' Action Network
11	Sara	Gersen	Earth Justice
12	Joon Hun	Seong	Environmental Defense Fund
13	Nick	Connell	Green Hydrogen Coalition
14	Sara	Fitzsimon	Independent Energy Producers Association
15	Sal	DiConstanzo	International Longshore and Warehouse Union Local 13*
16	Sophia	Dubrovich	International Longshore and Warehouse Union Local 13
17	Aaron	Guthrey	Los Angeles Department of Water and Power
18	Nermina	Rucic	Los Angeles Department of Water and Power
19	Jesse	Vismonte	Los Angeles Department of Water and Power
20	Pete	Budden	Natural Resources Defense Council
21	Maryam	Hajbabaei	South Coast AQMD
22	Sam	Cao	South Coast AQMD
23	Norman	Pedersen	Southern California Generation Coalition*
24	Ernest	Shaw	Utility Workers Union of America 483*
25	Robin	Downs	Utility Workers Union of America 483*
		Non-PAG Members	
26	Chester	Britt	Arellano Associates*
27	Stevie	Espinoza	Arellano Associates*
28	Nancy	Verduzco	Arellano Associates*
29	Marybel	Batjer	California Strategies*
30	Armen	Keochekian	Insignia Environmental
31	Julie	Roshala	Insignia Environmental
32	Armen	Keochekian	Insignia Environmental
33	Alma	Marquez	Lee Andrews Group*
34	Frank	Lopez	SoCalGas*
35	Douglas	Chow	SoCalGas*
36	Amy	Kitson	SoCalGas*
37	Katrina	Regan	SoCalGas*
38	Yuri	Freedman	SoCalGas*

39	Jill	Tracy	SoCalGas*
40	Hector	Moreno	SoCalGas

*attended in-person

SoCalGas Angeles Link
Planning Advisory Group (PAG)
PAG Q4 Quarterly Meeting Summary

12/15 PAG Q4 Quarterly Meeting (10:00AM-2:00PM)
Energy Resource Center, Downey, CA & Zoom

I. Attendee Report

- 12/15: 8 in-person & 17 virtual attendees.

Please refer to Attachments A for a complete list of attendees.

II. Purpose

- Provide an update on ARHCES and acknowledge that information will be shared with the group when possible.
- Provide information and solicit input from PAG members on the following topics:
  - Preview of Demand Study Draft Report
  - Preview of Preliminary Findings: Greenhouse Gas Emissions Evaluation
  - Preview of Preliminary Findings: NOx and Other Air Emissions
  - Stakeholder Comment Update
  -

III. Presentation Highlights and Feedback Themes

- **Preview of Demand Study Draft Report:** The presentation focused on a study examining the potential hydrogen demand in SoCalGas service territory from 2025 to 2045 across three key sectors: mobility, power generation, and industrial. The study considered four primary factors to determine future hydrogen adoption: policy and legislation, technology feasibility, commercial availability, and business readiness. The presentation highlighted the importance of model building, refinement, and validation through interviews with experts.
  - Feedback Themes:
    - Request for clarification on which power generation technologies are being used.
    - Caution regarding the logistics and strategy for supplying hydrogen as a fuel input to clean power resources.
    - Emphasis on the need to focus on hydrogen distribution and end-use demand.
    - Question on mobility sector, what part of the demand study was researched.
    - Question on power generation and the integration of clean firm power resources. What power generation technologies are we using? Combustion in fuel cells, adapting existing turbines, hydrogen on standby, on-site hydrogen production, etc.?

- ▪
- ▪ Question on whether there are federal standards for hydrogen demand.
- ▪ Question regarding the number of pipes that will be needed for this effort, compared to the level of gas already being delivered today on an energy basis.
- ▪ Comment that the preview findings are consistent with the ARCHES study.
- ▪ Request for presentation slides to be provided before the meeting.
- ▪ Questions on whether there were differences in the outputs model or methodology sources from the August and December presentations.
- ▪ Note on discrepancies between SoCalGas findings and other studies regarding the mobility and power sectors.
- ▪ Comment that recent studies, which include infrastructure costs in their analysis, show that in some cases, fuel cell plus hydrogen can be cheaper than battery plus electric vehicle charging, especially in the heavy-duty sector.
- ▪
- ▪ The question of hydrogen delivery costs was raised, including how much demand from various sectors will determine costs, and whether SoCalGas' modeling considered the expiration of the 45V tax credits into cost.
- ▪ Comment about the uncertainty regarding the assumed high price point and underlying fuel costs in the study. Request for sensitivity analysis on the price forecasts used in the study to understand customer acceptance and viability.
- ▪ Question on how the ports are captured in the mobility portion of the study.
- ▪ Request for "Ambitious" chart on slide 17 to include the percentages for Mobility and Power.
- ▪ Emphasis that statewide power generators are not required to switch to cleaner systems, and such a change would align more with voluntary rather than mandatory transitions.
- ▪ Question whether the demand study is considering the volumetric potential and economic viability of the power sector for conversion.

- **Preview of Preliminary Findings: Greenhouse Gas Emissions Evaluation:** The presentation provided a high-level overview of the greenhouse gas emissions study using hydrogen fuel in three sectors: mobility, power generation, and hard-to-electrify industries. The methodology involved low, medium, and high scenarios from the Demand Study focusing on replacing diesel, gasoline, and natural gas with hydrogen. Preliminary findings to the Angeles Link throughput values were presented as an assessment update.
  - o <u>Feedback Themes:</u>
    - ▪ Comment that the EPA calculator is outdated with regard to consideration of leakage. r
    - ▪ Encouragement to include hydrogen leakage in the study which has indirect greenhouse gas impacts.
    - ▪ Emphasis on the importance of considering hydrogen leakage during transport and at the combustion site, noting that no fuel conversion is 100% efficient. Additional focus on the need for proper infrastructure and fittings to prevent environmental benefits from being negated.

    - Comment expressing concerns about the assumption that hydrogen production pathways will have zero or near-zero emissions. Comment regarding the importance of clarity in presenting assumptions when citing ambitious greenhouse gas production numbers.
    - Question on whether the study has considered non-combustion greenhouse gas emissions.
    - Suggestion was made to have additional assessment in categories of end-use conversions that include not just N2O as a GHG, but also secondary effects of anticipated leakage.

- **Stakeholder Comment Update:** The presentation focused on updating stakeholders about integrating their feedback into various milestones of feasibility studies, emphasizing the importance of transparency and ongoing collaboration.
  - Feedback Themes:
    - Appreciation for the color-coded tracking system to make it visually easier to understand.
- **Preview of Preliminary Findings: NOx and Other Air Emissions:** The presentation provided an overview of the preliminary findings from the study in the mobility, power generation and hard-to-electrify sectors based upon demand scenarios from Demand Study. Preliminary findings to the Angeles Link throughput scenarios were presented as an assessment update. Preliminary findings for new infrastructure emissions were also shared.
  - Feedback Themes:
    - Expressed uncertainty about the assumption of 100% use of fuel cells being premature or overly optimistic.
    - Clarification on whether NOx reduction strategies were specifically for the power sector and the expected degree of NOx reduction in the power sector if such improvements are implemented.
    - Comment that this highlights the need to balance trade-offs between optimizing for greenhouse gases and NOx emissions.
    - Question on the assumption of maintaining current efficiency levels when switching from natural gas to hydrogen.
    - Recommendation to consider non-combustion technologies like fuel cells for power generation.
    - Suggestion to conduct a sensitivity analysis to explore the impact of scaling up power generation using non-combustion technologies.
    - Inquiry on whether there are plans to investigate the difference between current emissions and permitted emissions to better understand the potential for increases in NOx emissions under existing permit constraints.
    - Request for clarification on the breakdown of NOx emissions reductions within the power sector.
    - Inquiry if the presented reduction in NOx emissions is due to decreased natural gas generation and an overall lower power output when transitioning to hydrogen.

- Comment that there is an anticipation of a reduction in NOx emissions from power generation, partly due to mandates from the South Coast Air Quality Management District to lower NOx for regional compliance.
- Comments regarding the economic and policy uncertainties surrounding the fuel switch from natural gas to hydrogen and request for acknowledging these open questions in the demand study.
- Suggestion for SoCalGas to consider the future of cogeneration units in its planning and differentiate between cogeneration and non-cogeneration power generation in studies to highlight their distinct impacts.
- Advocated for alternative energy delivery methods to avoid market monopolization and maintain flexibility.

Attachment A

PAG December 15 Meeting Attendee Roster

#	First Name	Last Name	Affiliation
		PAG Members	
1	Miles	Heller	Air Products
2	Lorraine	Paskett	Air Products
3	Rizaldo	Aldas	California Energy Commission*
4	Katrina	Fritz	California Hydrogen Business Council
5	Christopher	Arroyo	California Public Utilities Commission
6	Sasha	Cole	California Public Utilities Commission
7	Matthew	Taul	California Public Utilities Commission*
8	Arthur (Iain)	Fisher	California Public Utilities Commission*
9	Tyson	Siegele	Clean Energy Strategies representing the Utility Consumers' Action Network
10	Sara	Gersen	Earth Justice
11	Michael	Colvin	Environmental Defense Fund*
12	Hope	Fasching	Green Hydrogen Coalition*
13	Matthew	Schrap	Harbor Trucking Association
14	Sara	Fitzsimon	Independent Energy Producers Association
15	Sal	DiConstanzo	International Longshore and Warehouse Union Local 13
16	Nathaniel	Williams	Local Union 250
17	Hector	Carbajal	Local Union 250
18	Jesse	Vismonte	Los Angeles Department of Water and Power
19	Aaron	Guthrey	Los Angeles Department of Water and Power
20	Nermina	Rucic	Los Angeles Department of Water and Power
21	Pete	Budden	Natural Resources Defense Council

22	Sam	Cao	South Coast AQMD
23	Charley	Wilson	Southern CA Water Coalition*
24	Norman	Pedersen	Southern California Generation Coalition*
25	Ernest	Shaw	Utility Workers Union of America 483*
Non-PAG Members			
26	Chester	Britt	Arellano Associates*
27	Stevie	Espinoza	Arellano Associates*
28	Nancy	Verduzco	Arellano Associates
29	Keven	Michele	Arellano Associates*
30	Marybel	Batjer	California Strategies
31	Armen	Keochekian	Insignia Environmental
32	Julie	Roshala	Insignia Environmental
33	Alma	Marquez	Lee Andrews Group*
34	Alyssa	Martinez	Lee Andrews Group*
35	Yuri	Freedman	SoCalGas*
36	Neil	Navin	SoCalGas*
37	Darrell	Johnson	SoCalGas*
38	Emily	Grant	SoCalGas*
39	Jill	Tracy	SoCalGas*
40	Andy	Carrasco	SoCalGas
41	Frank	Lopez	SoCalGas
42	Pearl	Hsu	SoCalGas

*attended in-person