Company: Southern California Gas Company (U 904 G)
Proceeding: Hydrogen Blending Demonstration Projects
Application: A.22-09-006
Witness: B. Waymire
Chapter: 10

PREPARED REBUTTAL TESTIMONY OF

BLAINE WAYMIRE

ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

September 29, 2025

Executive Summary

I hereby submit this prepared rebuttal testimony in response to intervenor critiques of Southern California Gas Company's (SoCalGas) proposed hydrogen blending demonstration projects in Orange Cove and at University California, Irvine (UC Irvine or UCI). These projects were developed in alignment with CPUC Decision D.22-12-057, which calls for real-world demonstrations to inform the development of a statewide hydrogen injection standard. The testimony emphasizes that the proceeding is not intended to debate the policy of hydrogen blending, but rather to evaluate the technical, safety, and community engagement aspects of the proposed pilots.

The Orange Cove project is designed as a closed system with a single gas feed, allowing for uniform hydrogen dilution. SoCalGas plans to validate this occurrence with strategically placed measurement devices and third-party oversight. Both projects will use clean renewable hydrogen generated via solar-powered electrolysis, with systems sized specifically for operational demand. The company has cataloged and reviewed the pipeline materials involved with the proposed demonstration projects to better understand any impacts to the pipeline system and will implement engineering safeguards where necessary.

Safety protocols include enhanced leak detection, monthly and quarterly surveys, odorant efficacy testing, and continuous monitoring at hydrogen production sites. SoCalGas has proposed robust stakeholder engagement and community outreach for both projects, particularly in Orange Cove, a disadvantaged community. Benefits that could accrue to the community if the demonstrations are approved include use of solar and battery infrastructure which may be given to the City at the conclusion of the project, awareness of appliance upgrade programs for qualifying customers, and enhanced safety monitoring. The company also addresses concerns about hydrogen embrittlement, appliance performance, and NOx emissions, citing research that supports the safety and environmental viability of the percentage hydrogen blends being proposed.

The pilots are designed to provide localized operational data on key topics addressed by prior studies, such as the UC Riverside Hydrogen Impact Study. They will validate research under California-specific conditions, including appliance emissions and pipeline behavior. Baseline metrics will be established before hydrogen injection, and success will be measured by

completion of the proposed demonstrations, the completion of a final report that contains data collected in alignment with the Data Collection Plan, and continued engagement within the project communities. The pilots are prudent investments that offer ratepayer benefits, including data to inform future standards for hydrogen use in natural gas pipeline infrastructure and infrastructure improvements.

In conclusion, the CPUC should approve the demonstration projects because they meet regulatory requirements, prioritize safety, engage communities, and would contribute meaningfully to advancing California's decarbonization goals.

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I. INTRODUCTION

My prepared written rebuttal testimony responds to intervenor testimony addressing topics that are scoped into the proceeding pursuant to the Assigned Commissioner's Scoping Memo and Ruling dated June 12, 2025, i.e., those that pertain to the projects SoCalGas proposed in the Amended Application in this proceeding, pursuant to the Decision Directing Biomethane Reporting and Directing Pilot Projects to Further Evaluate and Establish Pipeline Injection Standards for Clean Renewable Hydrogen, Decision (D.) 22-12-057 (Decision).

The demonstrations proposed in the Amended Application in this proceeding are pursuant to the Commission's consistent directives to the Joint Utilities over the years in the *Order Instituting Rulemaking to Adopt Biomethane Standards and Requirements, Pipeline Open Access Rules, and Related Enforcement Provisions*, Rulemaking (R.) 13-02-008 (Biomethane Rulemaking) to support the Commission's development of an injection standard for the blending of renewable gases, including hydrogen, into the existing natural gas system.

With respect to renewable hydrogen specifically, in the July 5, 2018 Assigned Commissioner's Scoping Memo and Ruling in the Biomethane Proceeding, Commissioner Clifford Rechtschaffen noted, "[i]n accordance with Section 399.24 and with Executive Order B-48-18 issued on January 26, 2018, it is my future intention to consider issues within this, or a successor proceeding, that pertain to the safe, cost-effective development of other renewable gases, such as renewable hydrogen."[1]

Thereafter, on November 21, 2021, in the Assigned Commissioner's Scoping Memo and Ruling Opening Phase 4 of Rulemaking 13-02-008, Commissioner Rechtschaffen recounted the reasons why "[t]his proceeding will provide the opportunity to expand hydrogen use to offset the use of fossil fuels by establishing standards and interconnection protocols for injecting renewable hydrogen into natural gas pipelines,"[2] including that "California has been advancing the

[1] R.13-02-008, Assigned Commissioner's Phase 3 Scoping Memo and Ruling at 7 (March 13, 2023).

[2] R.13-02-008, Assigned Commissioner's Scoping Memo and Ruling Opening Phase 4 of Rulemaking 13-02-008 (November 21, 2019) (Phase 4 Scoping Ruling) at 1.

deployment of hydrogen throughout the state as a zero-emissions fuel."[3] Since that time, the 2022 CARB Scoping Plan, which serves as the state's comprehensive strategy for achieving its greenhouse gas emissions reduction goals, echoed the role that renewable hydrogen could play in decarbonization.[4]

The Phase 4 Scoping Ruling also acknowledged, consistent with SoCalGas's and SDG&E's recommendation at the time, that "more technical expertise is needed to determine the maximum safe level of hydrogen blend in pipelines" and, accordingly, ordered Energy Division to "arrange, and oversee an independent technical study to address the potential impacts of increased hydrogen concentration in California's natural gas storage and delivery system"[5]— which resulted in the UC Riverside Study.

In the Decision, the Commission found, among other things, that: Senate Bill "1075 requires the evaluation of the role of green hydrogen in achieving California's climate objectives;"[6] "[t]o address knowledge gaps in several areas, the UC Riverside Study emphasizes the need to conduct real world demonstrations of hydrogen blending under safe and controlled conditions;"[7] "[t]he UC Riverside Study provides support for pursuing hydrogen blending as part of a decarbonization strategy, while at the same time, outlining thoughtful and prudent steps before establishing a system wide injection standard;"[8] and "[a]dditional testing through pilot hydrogen blending projects is needed, as discussed in this decision, to continue the process that began in D.14-02-034 to establish safe injection standards for all identified constituents of concern using best scientific data."[9] The Decision further states that "[b]roader policy issues

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[3] *Id.* at 6.

[4] California Air Resources Board, *2022 Scoping Plan for Achieving Carbon Neutrality* (December 2022) at 78 ("Injecting up to 20 percent hydrogen into the existing natural gas system is being explored as a transitional strategy to reduce the carbon intensity of gas used in buildings and industry.").

[5] R.13-02-008, Phase 4 Scoping Ruling at 13. The Joint IOUs were also ordered to submit an application that included, among other things, a preliminary renewable hydrogen injection standard; however, the Joint IOUs did not believe they had sufficient information at the time to do so. The subsequent UC Riverside Study and Compendium Report have provided additional information since that time.

[6] D.22-12-057 at 54 (Finding of Fact (FOF) 3).

[7] *Id.* at 56 (FOF 14).

[8] *Id.* at 57 (FOF 19).

[9] *Id.* at 59 (FOF 36).

related to long term gas planning, including the potential role of clean renewable hydrogen, are being addressed in R.20-01-007 (as well as other agency processes, including implementation of SB 1075)"[10] and "SB 1075 (Skinner, 2022) requires CARB, in conjunction with the CPUC and the CEC, to provide policy recommendations on the use of hydrogen to help achieve California's climate, clean energy, and clean air objectives."[11] Accordingly, the Decision concludes "[t]he Commission should direct the Joint Utilities to file a joint application for testing of hydrogen blended into natural gas concentrations above the existing trigger level in increasing increments from 0.1 to five and five to twenty percent"[12] and "[t]he Joint Utilities should propose hydrogen blending pilot projects, taking into account the findings and recommendations of the UC Riverside Study, existing and ongoing hydrogen research, development, and demonstration activities, and stakeholder feedback as well as all guidance set forth in this decision."[13] Based on the foregoing, the Decision orders, "[w]ithin two years from the issuance of this decision, [Joint Utilities] shall file a new application or amend an existing application in an appropriate proceeding proposing pilot programs to test hydrogen blending in natural gas at concentrations above the existing trigger level…" consistent with the requirements set forth in the Decision.[14]

The Joint IOUs filed such an application consistent with the Decision, i.e., the Amended Application in this proceeding. The Scoping Memo, consistent with both the Phase 4 Scoping Ruling and the Decision, recognizes that the purpose of this proceeding is not to challenge the policy of hydrogen blending, but rather to identify demonstrations that could further inform the development of a proposed renewable hydrogen injection standard. Accordingly, it does not scope into this proceeding the question of whether blending hydrogen into the natural gas system should be conducted as a matter of policy.[15] Notably, the Scoping Memo states that the issues identified to be within the scope of this proceeding are based on the record of the proceeding to date, including but not limited to "the extensive briefing associated with the [Motion to Dismiss]" filed by certain intervenors, which included, among others, arguments regarding the

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[10] *Id.* at 59 (FOF 39).

[11] *Id.* at 60 (FOF 45).

[12] *Id.* at 60 (Conclusion of Law (COL) 4).

[13] *Id*. 61 (COL 7).

[14] *Id.* at 69-70 (OP 7).

[15] *See* Assigned Commissioner's Scoping Memo and Ruling (June 12, 2025) at 11-13.

policy of blending hydrogen into the natural gas system—the same testimony that is offered extensively in intervenor testimony.[16] It is evident that the policy, and the role of clean renewable hydrogen in California, is driven by the Legislature, CARB, the CEC, and this Commission. While there may be proceedings in the future where parties may comment on hydrogen blending into the natural gas system as a matter of policy, this is not that proceeding.[17]

Accordingly, SoCalGas does not address intervenor testimony challenging hydrogen blending as a matter of policy; it is outside the scope of this proceeding and SoCalGas will, at the appropriate time, object to introducing proffered evidence on such extraneous topics into the record in this proceeding.

II. Scoping Issue 1: Do the pilots conform to regulatory requirements?

a. How does each pilot comply with specific requirements set forth in Public Utilities Code and D.22-12-057?

b. If there are any exemptions or waivers being requested for any pilot project, are there sufficient justification?

c. Does each pilot project align with broader state energy and climate goals? If so, how?

A. Scoping Issue 1a: SoCalGas's Proposed Demonstration Projects Comply with D.22-12-057

1. SoCalGas's Proposed Project in Orange Cove Adequately Consider Dilution Rate of Hydrogen Blends (OP7a)

Leadership Counsel for Justice and Accountability (LCJA) indicates that SoCalGas's Orange Cove Project does not adequately consider dilution rate of the hydrogen blend across the distribution system.[18] They note that a gas measurement analyzer unit located at the blending skid and select points throughout the system does not provide assurance or verification that the blended gas will remain uniform and well mixed.[19] However, because the system is isolated,

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[16] *See* Assigned Commissioner's Scoping Memo and Ruling (June 12, 2025) at 5-6.

[17] The Phase 4 Scoping Ruling additionally identifies that "both potential environmental benefits and potential impacts on ratepayers" will be considered in connection with "the Commission's determination of an appropriate standard for injection of hydrogen." R.13-02-008, Phase 4 Scoping Ruling at 8-9.

[18] Prepared Direct Testimony of Clayton Bodell on behalf of Leadership Counsel for Justice & Accountability and Orange Cove United (jointly, OCU/LCJA) (hereinafter "Exhibit (Ex.) OCU/LCJA 2") at 1.

[19] *Id.*

with only one feed into the system, the gas flowing into the system will be blended to the designated percentage via a blending skid.[20] The gas measurement analyzer will measure and confirm the hydrogen blend percentage as it leaves the blending skid. Once entering the system, the blended gas will not be introduced into other streams of natural gas entering the system, as there is only one feed into the system, as indicated earlier. Because there are several end users throughout the Orange Cove community, the gas is continuously flowing and does not stay stagnant within the system. Once under flow, the gas mixture will experience turbulent flow, which is the most common flow regime experienced in the natural gas distribution system. Internal research suggests turbulent flow will keep the natural gas/hydrogen blend uniformly mixed. As outlined in testimony, a detailed data collection plan, which includes specific monitoring points in the system, will be developed alongside an independent third party upon application approval.[21] This will advise the appropriate location and number of such measurement devices. Lastly, this very topic is one of the objectives of the demonstration--to verify whether there are changes to dilution rates throughout various points in a gas distribution system as the gas travels more broadly. Research and engineering principles suggest that this phenomenon would not occur, and this demonstration aims to validate this notion.

2. Both of SoCalGas's Proposed Demonstration Projects Would Use Clean Renewable Hydrogen

Most intervenors correctly acknowledge that SoCalGas's Orange Cove Project proposes to use clean renewable hydrogen, as defined in D.22-12-057.[22] Sierra Club, however, questions whether the Orange Cove project will use clean renewable hydrogen on the notion that the electrolyzer would be connected to the electric grid, which, according to Sierra Club, may contain fossil resources as a feedstock. This is a misguided assumption. Chapter 2 testimony clarifies that the solar array is interconnected to the electric grid for the purposes of over

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[20] Prepared Direct Testimony of Blaine Waymire on behalf of SoCalGas (SoCalGas's Hydrogen Blending Demonstration - Open System Project), Chapter 2 (hereinafter "Joint Utilities Chapter (Ch.) 2") at 3.

[21] Joint Utilities Ch. 2 (SoCalGas, Waymire) at 14, 19.

[22] Public Advocates Office (Cal Advocates) Prepared Testimony on Application of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company, and Southwest Gas Corporation to Establish Hydrogen Blending Demonstration Projects (hereinafter "Cal Advocates Testimony") at 1-8; Rebuttal Testimony of Robert Freehling on behalf of Wild Tree Foundation (WTF) (hereinafter "Ex. WTF-01") at 9.

production, i.e., if the solar array produces more electricity than is needed to operate the electrolyzer, that excess will be contributed to the electric grid. From this perspective, the electrolyzer is not intended to utilize electricity from the grid. SoCalGas has preliminarily designed the solar array to cover the entirety of the load of the electrolyzer, and all associated auxiliary equipment, including compression, storage, blending, and controllers. Therefore, and particularly when coupled with the battery storage system, SoCalGas fully expects the electricity produced from the solar array will exceed the electricity consumed by the electrolyzer.

Sierra Club and Wild Tree Foundation (WTF) further question whether SoCalGas's proposed project on the campus of University of California, Irvine (UC Irvine or UCI) would utilize clean renewable hydrogen.[23] This position is based on the notion that the solar array and electrolyzer will be interconnected to UC Irvine's campus microgrid, which includes a combustion turbine. This is another misguided assumption. SoCalGas has carefully sized the proposed solar array so that its electrical production would offset the load of the proposed electrolyzer. Each component will be individually metered so that the renewable energy production is validated against the electrolyzer's consumption. For example, preliminary calculations indicate that the solar array will produce 467.5 MWh of energy over the 18-month period, which more than offsets the energy use of the electrolyzer. The electrolyzer and auxiliary equipment combined are calculated to consume approximately 458 MWh over 18 months. In this case, UC Irvine's microgrid is acting as an energy storage medium for the production of the solar array. SoCalGas will individually meter the solar array production and electrolyzer electricity and water consumption. Lastly, while SoCalGas pursued clean renewable hydrogen use for its proposed demonstration projects, clean renewable hydrogen use was not a decision requirement regardless of intervener's stance on the projects' hydrogen source.[24]

3. SoCalGas Has Documented Key Components of Its Proposed Demonstration Projects to Better Understand Long Term Safety of the Gas Pipeline System. (OP7a)

LCJA asserts that SoCalGas has not ensured long term safety of the gas pipeline system

[23] Prepared Testimony of Sara Gersen on behalf of Sierra Club on the Joint Amended Application to Establish Hydrogen Blending Demonstration Projects (hereinafter "Ex. SC-01") at 196; Ex. WTF-01 (Freehling) at 9.

[24] Joint Opposition of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company, and Southwest Gas Corporation to Joint Motion to Dismiss at 16.

because they have not catalogued and disclosed the materials and components of the pipeline infrastructure involved in the demonstration projects.[25]

SoCalGas has performed an initial analysis of the existing pipeline materials in the area, which are catalogued as follows:

UCI

Approximate total length of existing polyethylene pipe by year installed, to the 100th decimal of mileage.

Table 1: Existing PE Pipe Involved For Proposed Project at UC Irvine

Installation Year	Total Mileage
1999	0.52
2003	0.51
2005	0.01
2019	0.02

Orange Cove[26]

Approximate total length of existing steel pipe by year installed, to the 100th decimal of mileage.

Table 2: Existing Steel Pipe Involved For Proposed Project in Orange Cove

Installation Year	Total Mileage
1946	7.68
1947	1.19
1948	0.73
1949	0.31
1950	0.13
1951	0.04
1952	0.17
1954	0.07

[25] Ex. OCU/LCJA 2 (Bodell) at 3.

[26] *See* Sierra Club Data Request 6 (SIERRA CLUB DR-06) Response 8, *available at:* https://www.socalgas.com/sites/default/files/2025-06/A.22-09-006_Sierra_Club_DR-06_Response_%20Final.pdf.

1955	0.03
1956	0.06
1958	0.03
1959	0.01
1960	0.04
1961	0.18
1962	0.11
1963	0.08
1964	0.52
1965	0.07
1966	0.04
1967	0.05
1969	0.16
1971	0.02
1972	0.08
1978	<0.00
1984	<0.00
1999	<0.00
2006	0.01
2014	<0.00
2017	0.38

Approximate total length of existing PE plastic pipe by year installed, to the 100th decimal of mileage; includes non-Aldyl-A plastic pipe installed after 1992.

Table 3: Existing PE Pipe Involved For Proposed Project in Orange Cove

Installation Year	Total Mileage
1993	0.75
1994	0.08
1995	0.51
1997	0.29
1999	0.08
2000	0.97
2002	0.29
2005	0.82
2006	0.70
2007	1.15
2008	0.65
2009	<0.00
2013	0.05

2014	0.08
2015	0.36
2017	0.01
2022	0.12

Approximate total length of existing Aldyl-A pipe by year installed, to the 100th decimal of mileage; includes plastic pipe installed from late 1960s to 1992.

Table 4: Existing Aldyl-A Pipe Involved For Proposed Project in Orange Cove

Installation Year	Total Mileage
1973	0.19
1975	0.16
1976	0.04
1980	0.03
1981	0.05
1982	0.05
1983	0.24
1984	0.37
1986	0.09
1987	0.03
1990	0.04
1991	0.36

SoCalGas has a strong foundation and understanding of the materials in its distribution system, and extensive knowledge on impacts to components with hydrogen blends up to 20%. As such, SoCalGas will develop appropriate engineering solutions and mitigation strategies, if necessary, for system components that may require additional safeguards when hydrogen blends are introduced.

4. SoCalGas's Orange Cove Project Conforms to the Definition of a "Closed System"

Several intervenors assert that SoCalGas's proposed project in Orange Cove violates decision requirements because it is "not in a closed system" nor in a "mock up of a real world system."[27] As explained in the Joint Utilities' opposition to the motion to dismiss, the proposed project is indeed a closed system.[28] The project area is served by a single natural gas feed into

[27] Ex. SC-01 (Gersen) at 69; Cal Advocates Testimony at 1-2.

[28] Joint Opposition of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company, and Southwest Gas Corporation to Motion to Dismiss (July 30, 2024) at 12.

the system, where one singular regulator station regulates a high pressure supply line down to a medium pressure distribution system. Due to the pressure differential across the regulator station, and the singular feed into this portion of the distribution system, this area is closed off to the broader natural gas pipeline system. Further, part of the project design will incorporate back flow prevention measures so that hydrogen blends would not be able to flow back into other portions of the broader natural gas pipeline system. These features render it an isolated or "closed system" as contemplated by the Decision. The proposed project in Orange Cove is titled the "Open System Project" not because it *is* an open system, but rather because it is intended to demonstrate how blending could work in the natural gas distribution system as a whole, i.e., in an open system. A demonstration without end uses for distribution system projects like Orange Cove and UC Irvine would not result in key data collection pieces, such as appliance emissions and performance. Lastly, witnesses from Sierra Club contend that "it is questionable that pilots testing such a limited amount of pipelines and equipment will provide sufficient data to extrapolate to the entire gas system"[29] while also indicating that "Performing research in a small closed system or mock-up would reduce the potential scale of risks to public health and safety, utility infrastructure, and customer property."[30] It appears that no matter the size of the scale of the demonstration, that either scenario will not be satisfactory to some intervenors.[31]

5. SoCalGas Proposes Robust Leak Detection Protocols, Which Will Be Coordinated with an Independent Third Party (OP7k)

SoCalGas has proposed various leak detection protocols for each of its proposed demonstration projects, which includes continuous monitoring of the hydrogen production and blending facilities, use of odorant (while validating odorant efficacy), and distribution pipeline and meter surveys. The proposed distribution pipeline and meter leak surveys would be

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[29] Prepared Testimony of Rick Brown on behalf of Sierra Club on the Joint Amended Application to Establish Hydrogen Blending Demonstration Projects (hereinafter "Ex. SC-02") at 13.

[30] Ex. SC-01 (Gersen) at 69.

[31] This is emblematic of a broader, consistent issue in intervenor testimony: parties criticize the proposed projects, but they offer no constructive solutions to make the projects better designed to serve the purpose that was ordered in the Decision—namely, to propose demonstration projects that ultimately would enable proposal by the Joint IOUs of a hydrogen blending injection standard. This proceeding does not concern discretionary projects where intervenors can merely poke holes in the project to demonstrate a lack of prudence; these projects were proposed at the direct request of this Commission. If intervenors expect to contribute substantially to this proceeding and any resulting decision, they, too, should be responsive to the directive that led to this proceeding.

conducted on a monthly basis for the project at UC Irvine, and on a quarterly basis for the project in Orange Cove. While intervenors summarize these plans as insufficient, claiming that methods for odorant testing are not disclosed,[32] base line leak rates are not measured,[33] leak detection equipment is not disclosed and may not be compatible with hydrogen blends,[34] and that the proposed frequency is insufficient to maintain safety.[35] SoCalGas respectfully responds that the proposed approach reflects a thoughtful and safety focused strategy. The protocols, as described in more detail below, are designed to align with the objectives of the Decision to incorporate best practices for monitoring and mitigation in real-world conditions.

Odorant Testing Methods

As outlined in Chapter 1 and Chapter 2 testimony, SoCalGas proposes to perform odorant sampling on a monthly basis to confirm that hydrogen does not affect the efficacy of the current natural gas odorant.[36] SoCalGas intends to utilize existing practices for confirming odorant efficacy in natural gas for these processes, which may include use of an odorometer or a physical sniff test. A number of research studies and demonstration projects alike have shown that common odorants that are used in California's system are compatible with hydrogen blends up to 20%.[37] This includes tetrahydrothiophene (THT) which is used alongside tert-butyl mercaptan (TBM) in California's existing gas system.[38] Further, SoCalGas evaluates the odorant efficacy of a 20% hydrogen blend at its Hydrogen Innovation Experience[39] and has found no impact to odorant efficacy. All data collection plans, including means for testing odorant efficacy, will be

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[32] Ex. OCU/LCJA 2 (Bodell) at 6.

[33] *Id.* at 4.

[34] *Id.* at 4-5 .

[35] Cal Advocates Testimony at 1-6, Ex. OCU/LCJA 2 (Bodell) at 8; Ex. SC-02 (Brown) at 12

[36] Corrected Revised Prepared Direct Testimony of Blaine Waymire on behalf of SoCalGas (SoCalGas's Hydrogen Blending Demonstration - Closed System Project), Chapter 1R (hereinafter, "Joint Utilities Ch. 1R") at 13; *see also* Joint Utilities Ch. 2 (SoCalGas, Waymire) at 12.

[37] Hydrogen Blending Compendium Report Literature Review at 8, *available at*: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

[38] *Id.*, Chapter Summary 19

[39] *See* SoCalGas's [H2] Innovation Experience, *available at:* https://www.socalgas.com/sustainability/hydrogen/h2home.

coordinated with an independent third party.[40] An objective of the demonstration is to validate these findings in the field.

Baseline Leak Rates

LCJA contends that because the baseline leak rate of the Orange Cove system is not disclosed, there is not adequate validation for the performance of the system with hydrogen blends.[41] Intervenors also contend that the natural gas system inherently has leaks, and thus starting from a baseline of "zero leaks" is not representative of the California Gas pipeline infrastructure.[42] At the same time, intervenor witnesses also contend that there is a concern for safety if leakage were present.[43] These notions are not only contradictory, but they ignore SoCalGas's proposal to establish a baseline of zero leaks through upfront leak surveys, and repair any identified leaks if present prior to the introduction of hydrogen into the system.[44] The intent of the demonstration is to validate what research has suggested under California operating conditions--that a pipeline that is leak tight for natural gas would be leak tight for a hydrogen blend. This conclusion is drawn from the findings that hydrogen does not leak preferentially in a hydrogen blend scenario.[45] Investigating leak rates of hydrogen blends versus natural gas is difficult to perform in situ with underground pipelines, and has been preliminarily investigated in the CPUC's Hydrogen Impacts Study.[46] For the purposes of safety and proper data collection, SoCalGas plans to start with a baseline leak rate of zero before beginning the demonstration project.

Leak Detection Equipment

Intervenors contend that SoCalGas has not addressed specific equipment, and their

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[40] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 15; Joint Utilities Ch. 2 (SoCalGas, Waymire) at 14.

[41] Ex. OCU/LCJA 2 (Bodell) at 4

[42] Ex. SC-02 (Brown) at 10

[43] Ex. OCU/LCJA 2 (Bodell) at 4

[44] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 11; Joint Utilities Ch. 2 (SoCalGas, Waymire) at 11.

[45] Source: W. J. Jasionowski and H. D. Huangt, *Gas Distribution Equipment in Hydrogen Service – Phase II*, 5 J. Energy 298, 298–301 (1981) (finding that "Hydrogen in the gas blends does not leak preferentially over methane") (*Jasionowski et al.*, 1981).

[46] CPUC, *Hydrogen Blending Impacts Study* (July 18, 2022), *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF.

capability to detect leakage.[47] Preliminary equipment to be evaluated for purposes of detecting hydrogen/natural gas blends are disclosed in Exhibit 1A and Exhibit 2A, of Chapters 1 and 2 of direct testimony, respectively[48]:

Table 5. Leak Survey Technologies and Frequency

Demo Project	Examples of Leak Survey Technologies to Explore	Leak Survey Frequency
UC Irvine	• Portable gas detectors • Fiber optic technology • Ground vehicle • Mass balance method	• Pipeline: monthly • Pipe connections to appliances: monthly or by customer call
Orange Cove	• Portable gas detectors • Ground vehicle • Aerial detectors	• Pipeline: quarterly • Pipe connections to appliances: by customer call

SoCalGas will select final leak survey technologies and specific models in collaboration with an independent third party upon authorization of the proposed demonstration projects.[49] The notion that existing leak survey equipment may not be compatible with hydrogen blends[50] is unfounded. SoCalGas has certified some of its own natural gas leak detection equipment that is currently in use in the field for use with hydrogen blends up to 20%. Several manufacturers of natural gas leak detection equipment are also actively working on updating equipment for use with hydrogen blends, or cross sensing for both natural gas and hydrogen.[51] SoCalGas will utilize equipment proven to detect the appropriate hydrogen blend percentage (0-5% or 5-20%) in their respective demonstration project for accuracy, field validation, and safety.

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47 Ex. OCU/LCJA 2 (Bodell) at 8

48 Joint Utilities Ch. 1R (SoCalGas, Waymire), Exhibit 1A; Joint Utilities Ch. 2 (SoCalGas, Waymire), Exhibit 2A.

49 Joint Utilities Ch. 1R (SoCalGas, Waymire) at 24.

50 Ex. OCU/LCJA 2 (Bodell) at 1-5.

51 Detcon's Model 700 series include a dedicated hydrogen sensor (DM-700-H2) and combustible sensors that detect H_2 while Dräger's X-am 5000 is available in a hydrogen-specific configuration with a hydrogen-compensated CO sensor. *See Teledyne Gas & Flame Detection – Detcon Model 700 Series Gas Detector* (Brochure GF30186E-EN), https://www.teledynegasandflamedetection.com/en-us/Products/docs/fixedgas-700series-model700-brochure-english.pdf; *see also* Dräger, *X-am 5000 Datasheet* (GasDetectorsUSA), https://www.gasdetectorsusa.com/gdusa/download/Draeger_X-AM_5000_Datasheet.pdf.

For leak detection surrounding the hydrogen production, storage, and blending facility, SoCalGas will employ 24/7 continuous monitoring.[52] Hydrogen leak detection devices are commercially available and will be selected during system design. Final specifications – including equipment type, model, location, and alarm thresholds – will be defined during detailed engineering prior to demonstration start. Further, SoCalGas proposed to perform in-depth hazard analyses for the hydrogen production, storage, and blending facilities.[53] These hazard analyses will inform leak detection equipment needs, equipment location, and alarm trigger thresholds for pure hydrogen. All safety plans, including leak detection plans for the hydrogen production, storage, and blending facilities will also be reviewed and coordinated with an independent third party.

Leak Detection Frequency and Practices

Intervenors contend that the proposed leak detection frequencies and practices proposed for each demonstration project are insufficient, with some calling for the inclusion of continuous monitoring.[54] LCJA points out that federal minimum leak survey and detection requirements would not meet the rigor intended by the UC Riverside study.[55] There is no merit to these concerns. First and foremost, SoCalGas is proposing *more frequent* leak surveys than required by Title 49 Code of Federal Regulations (CFR) Part 192.723[56], which sets leak survey standards for natural gas. Leak surveys for SoCalGas's pipeline system and its components are proposed to occur monthly for the UCI demonstration and quarterly for the Orange Cove demonstration.[57] This is in excess of the requirements of the Federal Code. Further, as mentioned above, SoCalGas will evaluate leak survey equipment that has been approved to be utilized with hydrogen blends, and will coordinate with an independent third party on equipment selection.

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[52] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 16; Joint Utilities Ch. 2 (SoCalGas, Waymire) at 16.

[53] *See* SoCalGas Response to Appendix B of Assigned Commissioner's Scoping Memo and Ruling (August 11, 2025) at 15, 31.

[54] Cal Advocates Testimony 1-6, Ex. OCU/LCJA 2 (Bodell) at 8, Ex. SC-02 (Brown) at 12

[55] Ex. OCU/LCJA 2 (Bodell) at 5

[56] 49 CFR § 192.723: Distribution System: Leakage Surveys, which identifies federal leak survey requirements, *available at:* https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-192/subpart-M/section-192.723.

[57] Joint Utilities Ch. 1R (SoCalGas, Waymire), Exhibit 1A; Joint Utilities Ch. 2 (SoCalGas, Waymire), Exhibit 2A.

Further, SoCalGas has not ruled out continuous monitoring for its proposed project at UC Irvine. As noted in Exhibit 1A, one of the leak detection technologies in consideration is fiber optic. Fiber optic leak detection uses light signals to measure temperature, strain, and acoustic events along a fiber-optic (FO) cable near or attached to a pipeline, which would allow for continuous leak monitoring.[58] This technology could feasibly be utilized in the UC Irvine project, as new pipelines are being installed, and thus fiber optic cabling could be incorporated easily when installing the new pipeline. However, this technology would not be feasible for the Orange Cove project, as it would require digging up all existing pipelines throughout the community. Regardless, in either scenario, SoCalGas still intends to perform traditional forms of leak inspection on a monthly and quarterly basis, respectively, to validate and verify traditional leak inspection practices and equipment in the field. As previously noted, no final leak inspection technology has been chosen, as final plans will be coordinated during detailed engineering design phases and with an independent third party. Coordinating safety and data collection plans with an independent third party provides an extra layer of mitigation and industry input to maximize safety and collection of relevant data.

6. SoCalGas Has Performed Robust Stakeholder Engagement to Date, and Intends to Do So Continuing into Subsequent Project Phases (OP 7h)

Rebuttal testimony on stakeholder engagement activities can be found in Chapter 11, Prepared Rebuttal Testimony of Chris Gilbride.

7. SoCalGas's Orange Cove Project Is Proposed to Provide Community Benefits, Not Risks

SoCalGas recognized that Orange Cove is a disadvantaged community well before Sierra Club or LCJA noted it in their testimony.[59] Several Intervenors claim that the proposed demonstration project in Orange Cove violates D.22-12-057's order to evaluate impacts to disadvantaged communities, further citing harm or risks to the community. These risks are

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[58] DNV, *Leak detection using Distributed Fibre-Optic Sensing (DFOS)*, *available at:* https://www.dnv.com/article/leak-detection-using-distributed-fibre-optic-sensing/

[59] *Id.* at 68, *see also* Prepared Opening Testimony of Ryan Sinclair on behalf of OCU/LCJA on the Application of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company and Southwest Gas Corporation to Establish Hydrogen Blending Demonstration Project (hereinafter, "Ex. OCU/LCJA 3") at 2.

summarized as: impacts to vintage pipeline materials, impacts to end use equipment, and the potential to increase nitrogen oxides (NOx) in the community.[60]

Impacts to Materials

Intervenors insinuate that adding hydrogen to natural gas will make the gas infrastructure more prone to leaks, pointing to the fact that hydrogen is a smaller molecule and thus has more of a propensity to leak than natural gas.[61] This notion fails to acknowledge that, when blended, hydrogen natural gas blends do not automatically cause leaks due to the presence of the smaller molecule. In fact, research has shown that hydrogen does not preferentially leak once blended (i.e., the hydrogen does not separate from the natural gas for the purpose of leaking; an analogy may help illustrate: once cream is blended into coffee, the cream does not separate from the coffee).[62] Therefore, where there is no natural gas leak, hydrogen, too, is not expected to leak in the amounts proposed to be blended by SoCalGas (up to 5% for Orange Cove and up to 20% for UCI).

Similarly, the impacts of potential embrittlement, including accelerated fatigue crack growth, are not expected under the conditions of the proposed demonstrations, which involve low blends of hydrogen and low pressure/stress. Literature is clear that the presence of hydrogen has the potential to embrittle steel pipeline materials. However, that same research indicates that pressure, stress, and hydrogen blend percentage greatly drive the impacts from embrittlement.[63] The ratio of the hydrogen blend percentage and the pressure inside the pipe is referred to as the "partial pressure" of hydrogen. Partial pressure refers to the pressure exerted by a gas alone (in this case hydrogen) in a mixture of gases, essentially representing its contribution to the total

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[60] Ex. SC-01 (Gersen) at 68-72, Ex. OCU/LCJA 3 (Sinclair) at 5; Prepared Direct Testimony of Michael Colvin on the Application of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company and Southwest Gas Corporation to Establish Hydrogen Blending Demonstration Project on behalf of Environmental Defense Fund (hereinafter, "Ex. EDF-01") at 9-10.

[61] Ex. SC-01 (Gersen) 1; Ex. EDF-01 (Colvin) at 5.

[62] Source: W. J. Jasionowski and H. D. Huangt, *Gas Distribution Equipment in Hydrogen Service – Phase II*, 5 J. Energy 298, 298–301 (1981) (finding that "Hydrogen in the gas blends does not leak preferentially over methane") (*Jasionowski et al.*, 1981); *see also* Hormaza Mejia, et. al, *Hydrogen Leaks at the same rate as natural gas in typical low-pressure gas infrastructure* (finding H2 does not preferentially leak from typical faulty low-pressure NG piping infrastructure when mixed with NG); available at: https://www.sciencedirect.com/science/article/abs/pii/S0360319919347275.

[63] R.13-02-008, Hydrogen Blending Compendium Report, Chapter Summary at 1-4, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

pressure of the mixture.[64] A phenomenon called accelerated fatigue crack growth can result from embrittlement. This is the propagation or advancement of cracks in a material when a material is repeatedly loaded and unloaded (under stress or stain) and cracks initiate or grow progressively under that repeated stress or strain.[65] As noted in testimony from EDF, embrittlement, when coupled with stress, can lead to an accelerated fatigue crack growth rate, which over time can lead to the potential for leakage from cracks in the pipeline material.[66] Medium pressure distribution pipelines[67] operate at much lower stress levels, with piping in residential areas at even much lower pressures, generally operating at less than 0.5 pounds per square inch (PSI).[68] Additionally, for the Orange Cove project, SoCalGas would only blend up to 5%, i.e., what the literature considers to be a very low concentration of hydrogen that would not contribute to accelerated fatigue crack growth. For example, many medium pressure pipelines operate in a 45 PSI range. With a 5% hydrogen blend, the partial pressure of the hydrogen on that pipeline is only 2.5 PSI.[69] In a residential setting, delivery pressure is generally 8" Water Column (or approximately 0.3 PSI) the partial pressure impact to pipes within a customer's home is approximately 0.015 PSI. The Hydrogen Blending Compendium Report notes, "Fatigue crack growth rate can be accelerated even at small partial pressures of hydrogen such as 1 bar (14.5 psi); however, it generally increases with increasing hydrogen concentration and it is more pronounced at higher stress levels."[70] Therefore, pipeline operations with partial pressures of hydrogen as low as those expected with a 5% hydrogen blend in the medium pressure

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64 Khan Academy, *Dalton's Law of Partial Pressure, available at:* https://www.khanacademy.org/science/ap-chemistry/gases-and-kinetic-molecular-theory-ap/ideal-gas-laws-ap/a/daltons-law-of-partial-pressure.

65 R.13-02-008, Hydrogen Blending Compendium Report, Chapter Summary at 2, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

66 Ex. EDF-01 (Colvin) at 6.

67 Joint Utilities Ch. 1R (SoCalGas, Waymire) at 1, (Medium Pressure Distribution for these purposes is defined as 60 pounds per square inch gauge or lower).

68 *See* SoCalGas Rule No. 20 (The standard delivery pressure at the point of delivery is eight inches of water column), *available at:* https://tariffsprd.socalgas.com/view/tariff/?utilId=SCG&bookId=GAS&tarfKey=119.

69 Ptotal = PH2+PNG; at 5% hydrogen 95% Natural gas, 45 PSI= 0.05 PH2 + 0.95 PNG, PH2 = 0.05*45 PSI = 2.25 PSI, PNG = 0.95*45 PSI = 42.75 PSI

70 Hydrogen Blending Compendium Report, Literature Review at 4, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

distribution system are unlikely to have an impact on accelerating fatigue crack growth. Further, literature identifies cyclic loading as another driver for increased fatigue crack growth rates.[71] Meanwhile, distribution pipeline systems do not typically cycle pressures like transmission pipeline systems do. Given these characteristics, the impact to medium pressure distribution and residential house lines is minimal.

EDF indicates that hydrogen has a higher potential to permeate through polymer materials than natural gas, referencing reports that consider impacts of hydrogen volume *approximately 1 billion times* that of the demonstrations.[72] UC Riverside's Hydrogen Impacts Study discusses this phenomenon further. Hydrogen/natural gas blends may permeate through polymer pipeline material faster than traditional natural gas, but research has indicated it is not to a degree in which safety should be of concern.[73] SoCalGas's initial plans calculated to produce approximately 3,500 kilograms (Kg) of clean hydrogen over the course of 18 months for its UCI project and 13,000 KG of clean hydrogen over 18 months for its Orange Cove Project. In contrast, reports cited by EDF consider climate impacts from hydrogen on a global potential for hydrogen demand on the scale of 100 *teragrams* (Tg) to 3,000 Tg.[74] With the relatively small amount of hydrogen used in this demonstration project, and the low rate of permeation noted in literature, it is unlikely that the small amount of hydrogen blend lost through permeation could lead to an environmental impact and negatively impact a community. Further, San Diego Gas & Electric (SDG&E)'s proposed project will further explore permeation rates of hydrogen blends in polyethylene materials commonly used in California's distribution system.

Sierra Club and LCJA note concerns with use of Aldyl-A pipeline materials in the proposed demonstration project in Orange Cove due to the material's susceptibility to brittle-like cracking.[75] LCJA notes that the impacts of hydrogen blends on Aldyl-A pipeline materials have

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[71] Hydrogen Blending Compendium Report, Chapter Summary at 4; *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

[72] Ex. EDF-01 (Colvin) at 5-6.

[73] American Gas Association; *Impacts of Hydrogen Blending on Gas Piping Materials* at 8*; available at: https*://www.aga.org/wp-content/uploads/2023/08/Impacts-of-Hydrogen-Blending-on-Gas-Piping-Ma_.pdf.

[74] Ocko, I. B. and Hamburg, S. P. Climate consequences of hydrogen emissions. Atmos. Chem. Phys. 2022; 22: 9349–9368. Figure 6. *Available at:* https://doi.org/10.5194/acp-22-9349-2022.

[75] Ex. SC-02 (Brown) at 14; Ex. OCU/LCJA 2 (Bodell) at 3.

not been studied, then resorts to conjecture, making an assumption that hydrogen blends might make the propensity for this material to leak more prevalent. One cannot assume negative impacts from hydrogen blends on a material that has not yet been reviewed in literature. Even if Aldyl-A has higher propensity for permeation, as noted by LCJA[76], permeation rates are so low that it will not be enough to cause a safety concern or environmental harm, particularly at 5% hydrogen blends or less. As mentioned above, the entire system, including segments containing Aldyl-A, will be operating at very low stress levels, and thus, the introduction of a hydrogen blend up to 5% is not expected to pose additional risk with Aldyl-A material. Further, SoCalGas conducts annual leak surveys as part of its asset maintenance and protection program. The Orange Cove community is included in this program.

Regardless, SoCalGas will perform leak surveys of the pipeline system to confirm it is free of leakage and perform material repair or replacement needed on SoCalGas's system prior to injecting hydrogen.[77]

End Use Equipment

Several intervenors express concerns over the vintage of customer appliances in Orange Cove, and how hydrogen blends may cause them to fail.[78] However, research has extensively shown that common appliances can operate on hydrogen blends up to 20% without impacts to safety.[79] There is no evidence to suggest that blending hydrogen at 5% would negatively impact the safety or operability of common appliances. This is in part true because the characteristics of a hydrogen/natural gas blend with 5% hydrogen are very similar to that of traditional natural gas.

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[76] Ex. OCU/LCJA 2 (Bodell) at 3.

[77] Joint Utilities Ch. 2 (SoCalGas, Waymire) at 11.

[78] Ex. OCU/LCJA 3 (Sinclair) at 8; Ex. SC-01 (Gersen) at 69-70.

[79] Hydrogen Blending Impacts Study at 8, *available at* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF; Hydrogen Blending Compendium Report, Chapter Summary at 14, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

Most notably, The Wobbe index[80] of a 5% hydrogen blend (1,332) closely aligns with that of standard natural gas (1,347), supporting interchangeability and consistent appliance performance. See characteristic comparison below:

Table 6: Natural Gas Properties vs. 5% Hydrogen Blend

Property	Natural Gas	5% Blend
Flammability Range (vol% in air)	5-15	4.8-17
Higher Heating Value (BTU/scf)	1,010	985
Lower Heating Value (BTU/scf)	909	887
WOBBE	1,347	1,332

Further, CSA Group, a leading certification body in North America, confirms that existing product certifications remain valid with natural gas blends of up to 5% hydrogen.[81] This certification clarified that natural gas containing up to and including 5% hydrogen falls within the scope of the Z21/83 standards using Test Gas A, which is the test standard for appliance certification. LCJA provides photos of Orange Cove residents' appliances.[82] As SoCalGas outlined in response to the Scoping Memo's Appendix B questions, SoCalGas intends to conduct outreach to Orange Cove customers to encourage participation in existing customer assistance and energy efficiency programs prior to and during the demonstration so aging and/or faulty

[80] The Wobbe Index (WI) is the main indicator of the interchangeability of fuel gases such as natural gas LPG and Town Gas and is frequently defined in the specifications of gas supply and transport utilities. *See* ChemEurope, *Wobbe Index, available at:* https://www.chemeurope.com/en/encyclopedia/Wobbe_index.html.

[81] ASGE, *CSA Group Revised Position on Certifying Hydrogen & Natural Gas Products in Canada and the US – Recognizes Acceptability of Natural Gas Containing Up to and Including 5% of Hydrogen* (December 12, 2022), *available at:* https://asge-national.org/agaupdate-20230428/.

[82] Prepared Opening Testimony of Jamie Zweifler-Katz on behalf of Orange Cove United and Leadership Counsel for Justice and Accountability on the Application of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company and Southwest Gas Corporation to Establish Hydrogen Blending Demonstration Project (hereinafter "Ex. OCU/LCJA 4"), Exhibit B.

appliances identified can be replaced with safe, functional, and more energy efficient ones.[83] These types of programs are intended to address replacement of these very types of appliance, and are available separate from the proposed hydrogen blending demonstration. Further information on outreach for customer assistance programs can be found in Chapter 11 Testimony of Chris Gilbride.

NOx Emissions

Several intervenors note that hydrogen blending has the potential to negatively impact NOx emissions, which could unduly burden an already underserved and environmentally burdened community due to impacts to health.[84] LCJA further details the supposed state of health in the community,[85] while also providing research on potential NOx impacts.

As noted in LCJA Testimony Exhibit 1, one key function in the formation of thermal NOx is flame temperature.[86] The exhibit further notes several factors beyond the degree of hydrogen blend can impact flame temperature, including burner geometry and the degree of air-fuel pre-mixing.[87] These factors are indeed important considerations when considering potential impacts to NOx emissions . California, particularly the South Coast Air Quality Management District and San Joaquin Valley Air Pollution Control District, have very strict emissions limits for stationary combustion equipment, most notably for NOx emissions.[88] These strict limits have created the need and a market for low-NOx burners in combustion equipment, including common appliances. Low-NOx burners control emissions by modifying the combustion process to lower peak flame temperature, usually by closely optimizing the air and fuel ratio in the

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[83] *See* SoCalGas Response to Appendix B of Assigned Commissioner's Scoping Memo and Ruling (August 11, 2025) at 11.

[84] Prepared Direct Testimony of Professor Alastair Charles Lewis on behalf of OCU/LCJA (hereinafter, "Ex. OCU/LCJA 1") at 3-5; Ex. OCU/LCJA 3 (Sinclair) at 5-6; Ex. SC-01 (Gersen) at 72; Direct Testimony of Tyson Siegele on Hydrogen Blending Application 22-09-006 on behalf of Utility Consumers' Action Network (UCAN) (hereinafter, Ex. UCAN-01) at 15.

[85] Ex. OCU/LCJA 4 (Zweifler-Katz), Exhibit B; Ex. OCU/LCJA 3 (Sinclair) at 5.

[86] Ex. OCU/LCJA 1 (Lewis), Exhibit 1: Potential air pollution impacts arising from blending hydrogen into natural gas for domestic heating and cooking: an initial physical science review at 6.

[87] *Id.* at 7

[88] South Coast Air Quality Management District, *2022 Air Quality Management Plan Executive Summary* at ES-2; *available at:* https://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/03-es.pdf.

combustion chamber. When considering residential and commercial appliances, these burner types are generally referred to as "pre-mix" burner conditions. Because of the prevalence of pre-mix burner conditions in common residential and commercial appliances in California, research suggests that hydrogen blends up to 20% will actually create a reduction or steady state presence of NOx rather than an increase in standard appliances.[89]

Hydrogen blending into natural gas is expected to either reduce or sustain consistent NOx emissions primarily due to changes in combustion characteristics. Since hydrogen requires less oxygen to combust than methane, burning hydrogen-rich fuels under the same air flow conditions results in a leaner mixture with more excess oxygen.[90] This excess air lowers the flame temperature, which in turn suppresses thermal NOx formation, a major source of NOx in high-temperature combustion. These are all important considerations, particularly in larger industrial equipment where burner conditions may be more customized, which may need modifications to remain within NOx limits. However, NOx emissions from standard appliances are not expected to increase. Lastly, SoCalGas intends to perform emissions monitoring in end-use appliances, which will be determined based on a comprehensive customer survey.[91] The customer survey will help determine how many customers will allow us to perform emissions monitoring in their home, and what frequency of checks might be appropriate. The final data collection plan will also be coordinated with an independent third party.[92] This data collection will look to validate findings on NOx emissions and better understand the impacts on emissions from appliances under conditions locally in California during the live operating conditions.

Benefits

Notwithstanding the claims of intervenors, the proposed project in Orange Cove actually provides benefits to a Disadvantaged Community--communities like these are often overlooked when siting clean energy projects like this. The proposed project in Orange Cove intends to

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89 MDPI, *Impact of Hydrogen/Natural Gas Blends on Partially Premixed Combustion Equipment: NOx Emission and Operational Performance* (2022), *available at:* https://www.mdpi.com/1996-1073/15/5/1706 (*Glanville, et. al.,* 2022).

90 *See* DOE, *Does the use of hydrogen produce air pollutants such as nitrogen oxides?*, *available at:* https://www.energy.gov/eere/fuelcells/does-use-hydrogen-produce-air-pollutants-such-nitrogen-oxides.

91 Joint Utilities Ch. 2 (SoCalGas, Waymire) at 13.

92 *Id.* at 24.

install solar panels and a battery energy storage system for the creation of clean renewable hydrogen, which will then be blended into the existing natural gas system serving the approximately 2,000 meters in the community.[93] The solar array and battery energy storage system are proposed to be turned over to the city at the conclusion of the project, unless the Commission determines that the blending facility should remain in place for its useful life.[94] Blending clean renewable hydrogen into the Orange Cove community will produce benefits in the form of reduced carbon dioxide (CO2) emissions during the project's operation, and reduced Carbon Monoxide (CO) emissions where combustion end use equipment is present.[95] Research indicates there should not be adverse impacts to NOx emissions, but NOx emissions will be monitored, as noted above, nevertheless. A new solar array and battery energy storage system in the community offers the potential for renewable electricity assets sited locally to help reduce emissions from the electric sector, and provide potentially enhanced reliability through localized electricity generation. The project brings benefits in the form of clean energy investments in a disadvantaged community, in alignment with the CPUC's Environmental Social Justice (ESJ) Action Plan.[96] This one-of-a-kind demonstration project will also bring visitors and recognition to the community, as energy professionals will want to see the demonstration site.

Lastly, the community will see benefits in the realm of safety and efficiency. There will be proactive home inspections to help verify customer appliances are operating safely. During this time, technicians may tune appliances so that they are operating more efficiently as well. SoCalGas will be actively promoting its energy efficiency and customer assistance programs to help replace outdated or inefficient appliances with new, energy efficient ones. LCJA notes that some of the homes surveyed have not been weatherized.[97] SoCalGas's Energy Savings Assistance Program (ESA Program) offers no-cost weatherization services to customers who

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[93] *Id.*, n.3.

[94] *Id.* at 15.

[95] Ex. OCU/LCJA 1 (Lewis), Exhibit 1: Potential air pollution impacts arising from blending hydrogen into natural gas for domestic heating and cooking: an initial physical science review at 1.

[96] Goal #2 of the ESJ Action Plan is to Increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health, *see* CPUC's ESJ Action Plan, *available at:* https://epicpartnership.org/resources/Strat_Goal_Kickoff_Amanda_Krantz_CPUC.pdf.

[97] Ex. OCU/LCJA 4 (Zweifler-Katz), Exhibit B.

qualify.[98] Moreover, SoCalGas will have enhanced leak monitoring in the community due to the proposed demonstration project,[99] which will help promote overall safety in the community.

B. Scoping Issue 1.C: Does each pilot project align with broader state energy and climate goals? If so, how?: SoCalGas's Proposed Demonstration Projects Align with Broader State Energy and Climate Goals

SoCalGas's proposed demonstration projects align with broader state energy and climate goals, and will serve to inform a safe, reliable and affordable energy transition under a variety of scenarios. Indeed, SoCalGas/the Joint Utilities were directed to file this demonstration project application-- the foremost indication these projects are categorically aligned with the state's needs. Additionally, this direction from the Commission informed this Amended Application such that it was unnecessary to further deliberate this alignment, and the scope of this proceeding as set forth in the Scoping Memo reflects that. Notably, whether it is good policy to blend hydrogen into the natural gas system—at whatever percentage the Commission may deem appropriate—is not an issue scoped into this proceeding. The question specifically inquires about the alignment of state energy and climate goals with "each pilot," not hydrogen blending on a wholesale basis.

However, with respect to the consistency of the proposed projects with state energy and climate goals, it is important to note that the intent of this proceeding is not limited to informing hydrogen blending as a singular solution to decarbonize the existing gas system, nor is the intent of this proceeding to immediately scale this solution at the expense of other potential solutions such as building electrification. If such immediate scaling of this solution were at issue in this proceeding, it may be more relevant to introduce an alternatives analysis as some parties (e.g., Sierra Club, UCAN, EDF) offer as the reason to reject these projects. However, even then, it is SoCalGas's expectation—and consistent with the CARB Scoping Plan--that a multitude of diverse solutions will be necessary for California to succeed at decarbonizing while maintaining a robust economy and a safe, reliable, and affordable energy system. Therefore, it is imprudent to pit these solutions against one another in this narrowly scoped proceeding, and especially to

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[98] Statewide Energy Education and Resource Guide, *Energy Assistance Program* at 2, *available at* https://www.socalgas.com/billing-payment/assistance-programs/energy-savings-assistance-program. (Several measures listed are referred to broadly as "weatherization" measures").

[99] Joint Utilities Ch. 2 (SoCalGas, Waymire) at 20.

prematurely curtail support for opportunities to understand and validate the characteristics of emerging solutions, such as hydrogen blending, based on speculation.

It is also important to consider that hydrogen blending can enable a suite of options for the state, and its application is not limited to addressing the same challenges as [fuel substitution/appliance electrification] or even renewable natural gas. The state's existing natural gas system offers significant energy transportation and storage capacity today, and enabling hydrogen blending in the natural gas system can provide value to the overall economy by helping to manage and balance the hydrogen energy system and marketplace. In fact, the CARB Scoping Plan recognizes 20% blending of hydrogen into the natural gas system in its set of solutions to reach carbon neutrality by 2045. Falsely equating hydrogen blending and other building decarbonization solutions as tradeoffs or speculating that solutions like building electrification are and will always be universally superior to hydrogen blending rendering it useless are inappropriate and do not form a reasonable, accurate, or complete rationale to dismiss or otherwise limit hydrogen blending demonstration activities that were specifically ordered to be proposed by the Commission.

III. Scoping Issue #2: Are the Pilots Useful and Well Designed?

- ***a.*** ***What specific knowledge gap does each pilot project address that isn't covered in the Hydrogen Blending*** **Impact Report and Hydrogen Blending Compendium Report? How would the findings of each pilot project complement the research summarized in those reports**
- ***b.*** ***How will the knowledge, contributed by each project, be useful to utility operators and state policy makers?***
- ***c.*** ***How is success defined and measured for*** **each pilot project? How will pilot project's progress toward project success and desired outcome be reported to the Commission?**
- ***d.*** ***What alternative approaches or experimental sites were considered for studying the specific problem being addressed by each pilot project? Why was the specific site and experimental design chosen among the alternatives considered*****?**
- ***e.*** ***How will the ultimate findings from these pilot projects be document, validated, and shared with stakeholders and the Commission?***
- ***f.*** ***What would be needed to move from a pilot project to full implementation if the pilot project was successful?***

A. Scoping Issue 2.a SoCalGas's Projects Are Intended to Be Representative of the Statewide Gas Pipeline System, Especially When Paired with the Other Demonstrations Proposed in A.22-09-006

Intervenors assert that SoCalGas's proposed project at UC Irvine is neither useful nor well-designed based on the length of pipeline and material associated with the demonstration. These arguments are summarized as follows: the steel involved is newly installed rather than vintage,[100] and no Aldyl-A is present.[101]

New Steel Pipeline

When scoping the proposed demonstration projects at UC Irvine, SoCalGas worked with its end-use partner to determine an ideal demonstration site. The proposal to blend to the Anteater Recreation Center (ARC) was closely coordinated with UCI facilities personnel and was selected based on the facility's consistent gas load, location, ability to isolate from other campus buildings and residences, pipeline components, and end use equipment.[102] No SoCalGas steel pipeline materials were present in that area. In order to make a mixed material demonstration project, SoCalGas scoped in new steel infrastructure. The new steel infrastructure is representative of approximately the last decade of steel pipeline infrastructure and will be representative of other steel infrastructure moving forward. Utilizing new steel pipe material also provides a clean baseline for long-term monitoring of hydrogen effects, corrosion rates, and mechanical integrity.

Aldyl-A

Intervenors further argue that SoCalGas's proposed demonstration project at UCI is not well designed because it does not evaluate Aldyl-A. SoCalGas is demonstrating Aldyl-A in the proposed Orange Cove project, which will demonstrate blending up to 5%. Aldyl-A is a vintage plastic pipe material manufactured by DuPont, and there are programs through Distribution

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[100] Ex. WTF-01 (Freehling) at 15; Cal Advocates Testimony at 3-4; Ex. SC-02 (Brown) at 15.

[101] Ex. SC-02 (Brown) at 15.

[102] *See* Data Request CAL ADVOCATES-SCG-A2209006-001, *available at:* https://www.socalgas.com/sites/default/files/2025-08/Cal_Advocates-SCG-A2209006-001_UCI-7-21-25_FINAL.pdf.

Integrity Management Projects (DIMP) to actively replace Aldyl-A material over time.[103] Nonetheless, SoCalGas will likely perform system analyses before hydrogen is injected into its distribution system, much like it does with biomethane with the adoption of the Standard Renewable Gas Interconnection Tariff.[104]

Regarding SoCalGas's proposed project in Orange Cove, intervenors argue just the opposite--that the project is not well designed because it *includes* Aldyl-A, and thus may pose a safety risk.[105] Obviously this is inconsistent with the argument that the UCI project is not representative of the statewide gas pipeline system because it does not include Aldyl-A. One cannot call for it to be included in one project and then call for it to be unsafe to be used in a different project (albeit at a lower blend percentage).

B. Scoping Issue 2. B, C: SoCalGas's Projects Intend to Verify a Base Case of Existing Research in a Localized Setting, and Provide Key Operational Insights

Intervenors claim that the demonstration projects will not provide any additional information to fill knowledge gaps that are not already provided by UC Riverside's Hydrogen Impacts Study, the Hydrogen Blending Compendium Report, or through data considered by hydrogen blends performed in other jurisdictions.[106]

First and foremost, UC Riverside's recommendation in both its Hydrogen Impact Study and subsequent Literature Review in the Hydrogen Blending Compendium Report highlight a need for demonstration projects that can simulate the conditions and environments of California's natural gas infrastructure to validate existing research in a real world setting.[107] Intervenors point to vast research on NOx emissions, and how they have been well studied;

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[103] D.24-12-074 at 248-249.

[104] *See* SoCalGas Rule 45: Standard Renewable Gas Interconnection at Sheet 39-40, *available at:* https://tariffsprd.socalgas.com/view/tariff/?utilId=SCG&bookId=GAS&tarfKey=600 ("[T]he Utility will evaluate requests for safely blending into the pipeline to determine whether injection of any new or modified supply source can be safely injected into the Utility's pipeline system").

[105] Ex. SC-01 (Gersen) at 69.

[106] Cal Advocates Testimony at 4, Ex. OCU/LCJA 2 (Bodell) at 8; Prepared Testimony of Ariel Strauss on behalf of Small Business Utility Advocates (SUBA) (hereinafter "Ex. SBUA-01") at 8.

[107] Hydrogen Blending Impacts Study at 5, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF, Hydrogen Blending Compendium Report, Literature Review at 3, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

however, as noted above, California has specific air quality limits which create a need for specific burner conditions in end use equipment, which in turn means that the research intervenors cite may not be applicable here. The purpose of the proposed projects is to validate the research findings on California-specific equipment in live operations. LCJA further notes that the demonstration projects aim to measure leakage of hydrogen/natural gas blends for purposes of safety mitigation rather than the potential greenhouse gas impact.[108] Again, as noted above, the purpose of the demonstration is to validate material compatibility and operability of the natural gas pipeline system with a baseline of zero leaks. From this perspective, SoCalGas's proposed demonstration projects aim to provide key insights on hydrogen impact to pipelines and components (i.e., did it cause a leak to form that wasn't previously there) and procedures for leak surveys with hydrogen blends. Further, quantifying hydrogen leakage *in situ* (particularly in buried pipelines) and in an expanded pipeline area can be difficult and may be better done in laboratory settings or smaller scale demonstration projects, where component level leak rates can be analyzed and understood. Beyond leakage and end use emissions, the proposed projects are intended to measure various other operational characteristics of the California natural gas pipeline system with hydrogen blends including pressure, flow rates, heating value, and validating meter performance.[109] Lastly, Small Business Utility Advocates (SBUA) denotes that the proposed project at UC Irvine should not be funded, citing a superseded scope for the project, i.e., one that was supplied in a data request in October 2022--prior to filing of the Amended Application.[110] The scope of the project described in SBUA's testimony, including the buildings and use equipment, does not reflect the current scope for the proposed project at UC Irvine.

C. Scoping Issues 2.c, 2.e SoCalGas Intends to Establish Baseline Metrics to Produce Relevant Data

Several intervenors argue that the projects are not well designed because there is no definition of success or established baseline for performance.[111]

[108] Ex. OCU/LCJA 1 (Lewis) at 5.

[109] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 13; Joint Utilities Ch. 2 (SoCalGas, Waymire) at 13.

[110] Ex. SBUA-01 (Strauss) at 7-8.

[111] Ex. OCU/LCJA 2 (Bodell) at 4, 11, 14, Ex. UCAN-01 (Siegele) at 40, WTF-01 (Freehling) at 2.

Baseline Performance

SoCalGas does intend to establish baselines to measure for both the pipeline system and end-use equipment. However, it is too early to establish those baseline standards, i.e., without authority to proceed with the demonstration. As mentioned above, for each proposed project, SoCalGas will baseline the pipeline area with natural gas prior to the introduction of hydrogen.[112] Leak surveys will be performed to verify the system is leak tight, and any necessary material repair or replacement will be performed prior to injection of any hydrogen blends.[113] This is intended to create a baseline of no detectable leaks, against which SoCalGas then will be able to measure in the event a leak is identified. SoCalGas also intends to baseline end-use equipment through proposed inspections prior to the demonstration. In the case of Orange Cove, personnel will perform inspections of the relevant end-use equipment in customer homes and businesses for those customers who accept a courtesy inspection.[114] At UC Irvine, all end use equipment will be inspected in the Anteater Recreation Center prior to introduction of hydrogen. This will allow SoCalGas to obtain a baseline of the condition of end-use equipment prior to the demonstration. In the case of Orange Cove, this baseline and inspection period will provide an opportunity to address problem appliances through Customer Programs or with technicians troubleshooting appliances. Similarly, SoCalGas would be able to address any operational anomalies with end use equipment at UC Irvine with UC Irvine staff. As discussed throughout, a finalized data collection plan will be coordinated with an independent third party. SoCalGas will work accordingly with selected independent research organizations to provide necessary data and coordinate results that can be published for independent evaluation. A report will be published and made available to the general public.[115]

Definition of Success

SoCalGas provided a response on the definition of success in Data Request responses to Cal-Advocates.

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[112] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 11; Joint Utilities Ch. 2 (SoCalGas, Waymire) at 11.

[113] *Id.*

[114] Joint Utilities Ch. 2 (SoCalGas, Waymire) at 13.

[115] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 15; Joint Utilities Ch. 2 (SoCalGas, Waymire) at 15.

For the proposed project at UC Irvine:[116]

SoCalGas defines success of the Closed System Project as (1) completion of the proposed demonstration, which is intended to fill knowledge gaps; (2) completion of a final report that contains data collected in alignment with the Data Collection Plan; and (3) continued stakeholder engagement activities within the UC Irvine Community throughout the duration of the project. Success will be measured in the following ways:

- Completion of the proposed demonstration project;
- Completion of the final report containing data collected from the demonstration project;
- Implementation of the American Petroleum Institute's Recommended Practice 1173 (API RP 1173) Pipeline Safety Management System (PSMS) Plan-Do-Check-Act approach throughout the project life cycle;
- Continued community engagement throughout the demonstration project cycle, including engagement with first responders;
- Construction, commissioning, and operation of the demonstration equipment;
- Hands-on experience for workforce and end-users;
- Completion of the data collection plan, which includes scoping a plan with an independent third party, and collection of data in alignment with the approved plan; and
- Sharing contributions from a real-world demonstration project to help advise the creation of a statewide hydrogen injection standard.[117]

For the proposed project in Orange Cove:

SoCalGas defines success of the Orange Cove demonstration project as: (1) completion of the proposed demonstration, which is intended to validate existing research in a real-world

[116] *See* Data Request CAL ADVOCATES-SCG-A2209006-001, *available at:* https://www.socalgas.com/sites/default/files/2025-08/Cal_Advocates-SCG-A2209006-001_UCI-7-21-25_FINAL.pdf.

[117] *See* Data Request CAL ADVOCATES-SCG-A2209006-002, *available at:* https://www.socalgas.com/sites/default/files/2025-08/Cal_Advocates-SCG-A2209006-002%20Orange_Cove-7-21-25_FINAL.pdf.

California setting; (2) completion of a final report that contains data collected in alignment with the Data Collection Plan; and (3) continued stakeholder engagement within the Orange Cove Community throughout the duration of the project. Success will be measured in the following ways:

- Completion of the proposed demonstration project;
- Completion of the final report containing data collected from the demonstration project;
- Implementation of the American Petroleum Institute's Recommended Practice 1173 (API RP 1173) Pipeline Safety Management System (PSMS) Plan-Do-CheckAct approach throughout the project life cycle;
- Continued community engagement throughout the demonstration project cycle, including engagement with first responders;
- Construction, commissioning, and operation of the demonstration equipment;
- Hands-on experience for workforce and end-users;
- Completion of the data collection plan, which includes scoping a plan with an independent third party, and collection of data, in alignment with the approved plan; and
- Sharing contributions from a real-world demonstration project to help advise the creation of a statewide hydrogen injection standard.

IV. Scoping Issue #3 Are the Pilots Prudent?

a. ***What* is the detailed cost breakdown for each pilot project, including equipment, monitoring, safety system, and administration?**

b. ***What specific benefits will gas ratepayers receive from investment in these pilot projects?***

c. ***What cost-sharing arrangements have been made or pursued with potential non-ratepayer beneficiaries of this research?***

d. ***How will cost overruns be handled?***

A. Scoping Issue 3.b: SoCalGas's Projects Intend to Provide Ratepayer Benefits

Cal Advocates contends that benefits to ratepayers will not be realized through the proposed demonstration projects, stating there are no incremental knowledge gaps being

filled.[118] SoCalGas addresses the claim of projects being duplicative of other efforts such as the Compendium Report or other hydrogen blending demonstration in section III.D.

SoCalGas contends that there will be ratepayer benefits from the proposed installation of renewable energy assets. Particularly, for the project in Orange Cove, the investment in a solar array that will later be turned over to the community serves as investment in localized renewable energy assets in a Disadvantaged Community. As contemplated by the Decision, the largest ratepayer benefit is likely to come in the form of data gathering that, in the future, can help to inform a proposal for an injection standard for clean renewable hydrogen into the natural gas infrastructure.

SoCalGas acknowledges the importance of understanding the lifecycle greenhouse gas (GHG) emissions associated with hydrogen production and use. However, SoCalGas respectfully disagrees with Cal Advocates' recommendation that all pilot projects be required to conduct full lifecycle analyses (LCA) at this stage. Cal Advocates states, "The commission should require the utilities to gather all hydrogen and greenhouse gas emissions data relevant to their pilot projects and conduct lifecycle analyses estimating the resulting climate impact."[119]

While LCA can be a valuable tool in evaluating long-term climate impacts, it is a broad and complex methodology that often requires extensive data inputs, modeling assumptions, and third-party validation. These analyses can be time- and resource-intensive, and their scope may extend beyond the operational boundaries of a demonstration-scale project. Typically, LCA for GHGs are not required for demonstration projects, as demonstration projects are not intended to operate for the entirety of the useful life of the equipment involved. Imposing such a requirement uniquely on hydrogen blending pilots may introduce unnecessary cost and complexity at this early stage of technology validation.

V. Scoping Issue #4 Are the Pilot Projects Safe?

a. ***What*** **comprehensive risk assessment has been conducted (i) for each pilot project; (ii) for the specific hydrogen blend percentages attempted in each project; and (iii) for each segment of the California gas infrastructure for which the pilot project was designed?**

[118] Cal Advocates Testimony at 2-3, 3-1.

[119] *Id.* at 3-1.

b. Beyond monitoring, what automated safety systems and shutdown protocols are in place for each pilot project?

c. What baseline testing of infrastructure integrity has been and will be completed prior to pilot project implementation?

d. How have emergency response plans been updated specifically for hydrogen incidents at each pilot project?

***e. What specific outreach has been conducted with communities* potentially affected by each pilot project and how has informed consent been documented?**

f. How does each utility plan to monitor and assess hydrogen embrittlement of the gas components within its pilot projects?

A. Scoping Issues 4.a, 4.b, 4c: SoCalGas Has Proposed Comprehensive Risk Assessments and Robust Safety Systems for Its Demonstration Projects

LCJA contends that the proposed demonstration project in Orange Cove is not safe because SoCalGas has not disclosed the baseline Distribution Integrity Management Program (DIMP) results for the Orange Cove system and does not provide details for its proposed Comprehensive Risk Assessment.[120] However, SoCalGas does provide its baseline DIMP results for their medium pressure distribution system in response to Appendix B, which can be summarized as follows:[121] SoCalGas evaluates baseline risk for asset failure of its medium pressure system as outlined in the Risk Assessment Mitigation Phase (RAMP) report with an established threshold of annual probability greater than 6 x 10-6 of a serious incident.[122] The anticipated risk at the proposed hydrogen blending level of 0.1%-5% hydrogen by volume is extremely low, and the following research supports that conclusion:

- The U.S. Department of Energy (DOE) has determined that hydrogen is as safe as other fuels like natural gas.[123]

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[120] Ex. OCU/LCJA 2 (Bodell) at 12.

[121] *See* SoCalGas Response to Appendix B of Assigned Commissioner's Scoping Memo and Ruling (August 11, 2025) at 3-5.

[122] SoCalGas, *2025 RAMP Report* (May 15, 2025), *available at:* https://www.socalgas.com/sites/default/files/2025-05/SCG-RAMP-REPORT-final.pdf.

[123] DOE, *Hydrogen Safety*, *available at*: https://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/h2_safety_fsheet.pdf.

- The Hydrogen Impact Study, commissioned by the CPUC, summarized that hydrogen blends of up to 5% are generally safe.[124]
- The Hydrogen Blending Compendium Report (Compendium Report) found that common appliances can operate safely with blends up to 20% hydrogen.[125]
- The Canadian Standards Association (CSA) Group, a leading certification body in North America, confirms that existing product certifications remain valid with natural gas blends of up to 5% hydrogen.[126]

As such, SoCalGas did not pursue a Comprehensive Risk Assessment for the specific hydrogen blend proposed in this demonstration as the hydrogen blend percentage falls well within the thresholds supported by these safety research and certification standards. Further, SoCalGas has successfully performed demonstration projects with hydrogen blends,[127] providing industry knowledge on how to successfully roll out a larger scale hydrogen blending demonstration. Despite that low risk assessment, there are several measures that SoCalGas proposes to undertake to address safety and risk. These include but are not limited to:[128]

- Odorant sampling to confirm that blending hydrogen does not affect the efficacy of current natural gas odorant;
- Hydrogen safety education for residents, students and first responders;

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[124] CPUC, *Hydrogen Blending Impacts Study* (July 18, 2022) at 4, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF.

[125] *Id*. at 8 *see also* R.13-02-008, Compendium Report; Hydrogen Blending Compendium Report, Literature Review at 65-66, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M556/K896/556896659.PDF.

[126] ASGE, *CSA Group Revised Position on Certifying Hydrogen & Natural Gas Products in Canada and the US – Recognizes Acceptability of Natural Gas Containing Up to and Including 5% of Hydrogen* (December 12, 2022), *available at:* https://asge-national.org/agaupdate-20230428/.

[127] UC Irvine, *In a national first, UCI injects renewable hydrogen into campus power supply* (December 6, 2016), *available at*: https://news.uci.edu/2016/12/06/in-a-national-first-uci-injects-renewable-hydrogen-into-campus-power-supply/; SoCalGas, *SoCalGas Among First in the Nation to Test Hydrogen Blending in Real-World Infrastructure and Appliances in Closed Loop System (September 30, 2021), available at:* https://www.socalgas.com/newsroom/press-release/socalgas-among-first-in-the-nation-to-test-hydrogen-blending-in-real-world; *see also* SoCalGas, *[H2] Innovation Experience*, *available at*: https://www.socalgas.com/sustainability/hydrogen/h2home.

[128] Joint Utilities Ch. 2 (SoCalGas, Waymire) at 13-17.

- Offering courtesy inspections of end-use customer equipment to confirm present behind-the meter equipment is free of leakage and is operational, both prior to the introduction of hydrogen and during the demonstration period;
- Conducting pre-, during, and post-implementation leak surveys;
- Installing automatic and remote shutdown capabilities for the hydrogen production and blending facility in case an alarm is triggered or a leak is detected; and
- Testing the operations of end use equipment.

Additionally, SoCalGas intends to develop an in-depth asset failure analysis for the hydrogen production and blending equipment within the demonstration project,[129] hire experienced third party engineering firms to conduct safety studies,[130] and integrate feedback from SoCalGas subject matter and third-party industry experts.[131] Upon authorization of the project, SoCalGas will create detailed engineering designs in accordance with existing codes and standards that promote safety such as NFPA 2 and ASME B31.8, and perform these safety studies to identify potential hazards and mitigation measures that can be included in the final design for this project. In addition to these safety and risk assessments, independent third parties will be engaged during the pre-commissioning process to review final design and commissioning safety protocols[132] with SoCalGas and appropriate first responders.

Though not explicitly raised by intervenors, SoCalGas does intend to take similar risk assessment procedures for its proposed project at UC Irvine, which similarly includes:

- Asset failure analysis for the hydrogen production and blending facility, situated adjacent to the ARC facility;

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[129] *Id.* at 5.

[130] This includes Hazard Identification (HAZID), Quantitative Risk Assessment (QRA), and Hazard and Operability Study (HAZOP).

[131] UCI, *Recommendations for the Proposed "Hydrogen Blending Demonstration Project @ UCI"* (February 14, 2024) at Exhibit H, *available at:* https://uci.edu/hydrogen/uci-h2-project-report.pdf.

[132] Pre-Startup Safety Review (PSSR).

- Independent third-party safety reviews for Process Hazard Analysis (HAZID, QRA, HAZOP) and Pre-Startup Safety Review (PSSR);
- Coordination with UCI and local fire authorities to develop site-specific emergency protocols; and
- Compliance with existing Codes and Standards intended to promote safety, such as NFPA 2 and ASME B31.8 to guide project design.

In addition, UCI's provost formed a committee of independent professors in the field of Material Science, Civil and Environmental Engineering, and Chemistry to review and vet SoCalGas's proposed project.[133] The recommendations from this committee were to move forward with the project and for UCI staff to create an administrative team to oversee the engineering design and build out of the demonstration project.[134] The professional opinion from these professors is that the proposed demonstration project could be executed safely in the ARC.[135]

1. SoCalGas Has Proposed Enhanced Leak Survey Frequencies

Intervenors contend that the frequency of leak surveys proposed for both of SoCalGas's proposed projects is insufficient for safety purposes, with some proposing continuous monitoring.[136] Frequency of leak survey implementation is addressed in section II.A.5 above.

Further, SoCalGas proposed monthly leak inspection for the project located at UC Irvine due to the hydrogen blend percentage ranging from 5-20%, and that the pipeline system was appropriately sized for a technician to perform traditional leak survey practices on a monthly basis. Conducting traditional leak surveys on a monthly basis is at least twelve times more frequent than required by 49 CFR 192.723[137] for natural gas. Odorant would still retain its efficacy with hydrogen blends up to 20%, so a major leak would still be detectable by scent.

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[133] UCI, *Recommendations for the Proposed "Hydrogen Blending Demonstration Project @ UCI"* (February 14, 2024), *available at:* https://uci.edu/hydrogen/uci-h2-project-report.pdf.

[134] *Id.*

[135] *Id.*

[136] Cal Advocates Testimony at 1-6, Ex. OCU/LCJA 2 (Bodell) at 8, Ex. SC-02 (Brown) at 12.

[137] 49 CFR § 192.723: Distribution System: Leakage Surveys, which identifies federal leak survey requirements, *available at:* https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-D/part-192/subpart-M/section-192.723.

Further, as mentioned above, SoCalGas is considering continuous monitoring of the newly installed pipeline assets via fiber optic technology. Even if continuous monitoring is selected, SoCalGas will still employ monthly leak detection surveys for purposes of validating and verifying traditional leak inspection practices and equipment in the field.

SoCalGas proposed quarterly leak surveys for its Orange Cove project because the hydrogen blend will ramp up from 0.1% to 5% in intervals throughout the course of the demonstration, with the first quarter of the project only blending up to 1% hydrogen by volume. Implementing traditional leak surveys on a quarterly basis is still at least four times more frequent than required by 49 CFR 192.723[138] for natural gas. Odorant would still retain its efficacy with hydrogen blends up to 20%, so a major leak would still be detectable by scent. Further, the Orange Cove infrastructure consists of over 100,000 feet of distribution pipeline. It would not be practical to request a technician to survey all 100,000 feet of pipe on a monthly basis. Further, SoCalGas currently operates and maintains Electronic Pressure Monitors (EPMs) at discrete points throughout its distribution system on pipeline and regulation assets, which can help detect fluctuations in pressure on a real-time basis. Continuous monitoring for leakage of the entire pipeline or all end-user appliances would not be practical or cost effective for a short-term temporary project in an entire community. Continuous monitoring of the pipeline system would require alternative technology, such as fiber optic leak detection. Like most medium-pressure distribution systems, pipelines in Orange Cover are underground. More than 100,000 feet of existing distribution pipe network would have to be excavated to install fiber optic leak detection along all pipelines in Orange Cove, which would substantially increase the costs of the project. Existing research identifies that hydrogen blends up to 5% would not impact safety,[139] which suggests leak detection protocols over and above existing protocols for natural gas are not necessary.

[138] *Id.*

[139] CPUC, *Hydrogen Blending Impacts Study* (July 18, 2022) at 4, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF.

B. Scoping Issue 4.d SoCalGas's Performance Standards for Leak Detection and Emergency Response will be Determined During Phase 1

Intervenors argue that SoCalGas does not identify its performance standard for leak detection or emergency response, including what tolerance will trigger equipment shut down or what specific leak detection equipment will be utilized.[140]

Details regarding leak detection equipment tolerance for equipment shut down is addressed in section II.A.5 above. To reiterate, final leak detection equipment types, models, locations, and trigger levels for pure hydrogen will be determined during the detailed engineering phase before the demonstration commences. Further, SoCalGas proposed to perform in-depth hazard analyses for the hydrogen production, storage, and blending facilities,[141] which will inform leak detection equipment needs, equipment location, and alarm trigger thresholds for pure hydrogen. All safety plans, including leak detection plans for the hydrogen production, storage, and blending facilities will also be reviewed and coordinated with an independent third party.

C. Scoping Issue 4.e: SoCalGas Has Performed Robust Stakeholder Outreach in Communities Where Pilot Projects Are Proposed

Stakeholder Engagement activities are addressed in the Chapter 11 Testimony of Chris Gilbride.

D. Scoping Issue 4.f Monitoring of Hydrogen Embrittlement

LCJA contends that SoCalGas has not communicated details for plans to monitor or assess the embrittlement of steel materials in the Orange Cove distribution system.[142] As stated in opening testimony, "the effect of hydrogen on materials will be continuously monitored through leak surveys at various points within the system. If any leaks are detected during leak surveys, the affected section of the pipeline or specific components may be isolated for further material testing to assess any potential impact of hydrogen on the material's integrity. If an opportunity arises to remove specific sections of the pipeline or components at the conclusion of the demonstration, further material testing may be conducted."[143] As discussed throughout, a

[140] Ex. OCU/LCJA 2 (Bodell) at 13.

[141] *See* SoCalGas Response to Appendix B of Assigned Commissioner's Scoping Memo and Ruling (August 11, 2025) at 15, 25.

[142] Ex. OCU/LCJA 2 (Bodell) at 13.

[143] Joint Utilities Ch. 2 (SoCalGas, Waymire), Exhibit 2A.

detailed data collection plan will be coordinated with an independent third party, which will also consider impacts to material.

VI. Scoping Issue #5: SoCalGas's Proposed Demonstration Projects Create Community Benefits a.

a. ***How were the pilot projects selected?***

b. ***What*** **measures ensure equitable distribution of risks and benefits for each project?**

c. ***How*** **were community stakeholders in each pilot project included in the planning process?**

d. ***What*** **ongoing community engagement is planned during implementation of each pilot project?**

e. ***What, if any are the impacts on environmental and social justice communities, including the extent to which these pilots*** **impact of achievement of any of the nine goals of the Commission's Environmental and Social Justice Action Plan.**

A. Scoping Issue 5.a How were the pilot projects selected?

LCJA contends that the choice to select the city of Orange Cove generates concern from a public health perspective, identifying the community as "low-income" and a "CALEPA-designated Disadvantaged community."[144] Intervenors do not, however, question how the pilot project was selected from a technical perspective. The distribution system included in the demonstration scope has one natural gas feed coming into it, which allows for full control of the hydrogen blend that it receives because there will be only one point of interconnection to the pipeline system.[145] The size and makeup of the system was identified as an ideal candidate due to the variety of pipeline materials and vintages it contains.[146] Other factors considered included constructability, community location, and customer facility type. Additionally, SoCalGas has served the Orange Cove community safely and reliably for 90 years.[147] City leadership

[144] Ex. OCU/LCJA 3 (Sinclair) at 2-3.

[145] Joint Utilities Ch. 2 (SoCalGas, Waymire) at 2.

[146] *Id.*

[147] Data Request Cal Advocates-SCG-A2209006-002, Question 1.e, *available at:* https://www.socalgas.com/sites/default/files/2025-08/Cal_Advocates-SCG-A2209006-002%20Orange_Cove-7-21-25_FINAL.pdf.

welcomed and supported the project concept in their community, making Orange Cove an ideal partner for a demonstration project supporting decarbonization.[148]

Intervenors do not challenge how the UC Irvine project site was selected. The proposal to blend to the ARC was closely coordinated with UCI facilities personnel and was selected based on the facility's consistent gas load, location, ability to isolate from other campus buildings and residences, pipeline components, and end use equipment.[149] Various sites for the hydrogen production, compression, storage, and blending equipment were considered. As indicated in subsequent testimony, the equipment site has moved from the police campus parking lot to a site just south of the ARC.[150]

B. Scoping Issue 5.b What Measures Ensure Equitable Distribution of Risks and Benefits of Each Project?

LCJA further identify risks for the proposed demonstration project based on the potential for increased NOx emissions, and its potential to impact public health.[151] Detailed responses on NOx emissions in the community are detailed in section II.A.7. LCJA and EDF further highlight a financial burden on a disadvantaged community containing older appliances, on the off chance that appliances need to be replaced or repaired due to the demonstration project.[152] Based on currently available research, appliance certification standards, and SoCalGas's internal assessments, SoCalGas is not aware of any appliances that cannot function with a 5% hydrogen blend.[153] Issues with gas appliances that arise during the demonstration will be addressed and documented on a case-by-case basis, in accordance with SoCalGas's existing processes and

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[148] *See* Joint Opposition of Southern California Gas Company, San Diego Gas & Electric Company, Pacific Gas and Electric Company, and Southwest Gas Corporation to Joint Motion to Dismiss (July 30, 2024) at Attachment A: Orange Cove City Council Resolution No. 2024-04, *available at:* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M537/K060/537060074.PDF.

[149] Data Request CAL ADVOCATES-SCG-A2209006-001, Question 1.e, *available at:* https://www.socalgas.com/sites/default/files/2025-08/Cal_Advocates-SCG-A2209006-001_UCI-7-21-25_FINAL.pdf.

[150] Joint Utilities Ch. 1R (SoCalGas, Waymire) at 5-7.

[151] Ex. OCU/LCJA 3 (Sinclair) at 5-6; Ex. EDF-01 (Colvin) at 10.

[152] Ex. OCU/LCJA 3 (Sinclair) at 7.

[153] This statement is based on currently available research, appliance certification standards, and SoCalGas's internal assessments. It does not constitute a warranty or guarantee of appliance performance. Actual appliance compatibility may vary depending on age, condition, and manufacturer specifications. SoCalGas will continue to monitor and evaluate appliance performance throughout the demonstration period.

procedures. Today, customers who experience appliance issues with traditional natural gas can call SoCalGas's dedicated customer service representatives to have a customer service technician troubleshoot their equipment.[154] A SoCalGas technician would be dispatched to the home or business and attempt to troubleshoot the issue. If equipment malfunction occurs during the demonstration, SoCalGas may opt to send the equipment to a lab for root cause analysis, though research, previous demonstration projects, and real circumstances in other jurisdictions currently implementing hydrogen blends indicate this scenario is unlikely. *See* Chapter 11, Rebuttal Testimony of Chris Gilbride for additional details regarding SoCalGas's customer outreach.

C. Scoping Issue 5.c: How were community stakeholders in each pilot project included in the planning process?

Stakeholder Engagement activities are addressed in the Chapter 11 Testimony of Chris Gilbride.

D. Scoping Issue 5.d What ongoing community engagement is planned during implementation of each pilot project?

Stakeholder Engagement activities are addressed in the Chapter 11 Testimony of Chris Gilbride

E. Scoping Issue 5.e What, if any are the impacts on environmental and social justice communities, including the extent to which these pilots impact achievement of any of the nine goals of the Commission's Environmental and Social Justice Action Plan.

Several Intervenors claim that the proposed demonstration project in Orange Cove has the potential to pose harm or risk to a disadvantaged community.[155] Posed risks and benefits to the Orange Cove community (a disadvantaged community) are detailed in section II.A.7.

VII. CONCLUSION

For the reasons stated herein, the Commission should approve SoCalGas's proposed hydrogen blending demonstration projects. The projects conform to the regulatory requirements set out in this proceeding, and will produce data to advise proposal of a statewide hydrogen

[154] As described in the prepared Direct Testimony of Blaine Waymire (Joint Utilities Ch. 2), SoCalGas will establish a dedicated means for customer contract specific to the proposed demonstration project. *See* Joint Utilities Ch. 2 (SoCalGas, Waymire) at 11.

[155] Ex. SC-01 (Gersen) at 68-72, Ex. OCU/LCJA 3 (Sinclair) at 5-8; Ex. EDF-01 (Colvin) 9-10.

injection standard.

This concludes my prepared rebuttal testimony.

VIII. QUALIFICATIONS

My name is Blaine Waymire. I am employed at SoCalGas as a Project Manager in the Gas Engineering and System Integrity organization. Currently, I lead the Hydrogen Engineering and Strategy Team's planning for live hydrogen blending demonstrations and regulatory applications. Prior to this, I have held positions within SoCalGas including Hydrogen Blending RD&D Project Manager, Sr. Distributed Energy Resources Advisor and Sr. Account Executive, with various research, engineering analysis, and regulatory responsibilities. I have been employed at SoCalGas since May 2012. I hold a Bachelor of Science degree in Mechanical Engineering from California State University, Long Beach. I am a licensed Professional Engineer in the State of California.

I have not previously testified before the Commission