

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**



FILED

05/04/26

04:59 PM

A2209006

Application of Southern California Gas
Company (U904G), San Diego Gas & Electric
Company (U902G), Pacific Gas and Electric
Company (U39G), and Southwest Gas
Corporation (U905G) to Establish Hydrogen
Blending Demonstration Projects.

A.22-09-006
(Filed September 8, 2022)

**OPENING BRIEF OF SAN DIEGO GAS & ELECTRIC COMPANY (U902G)
IN SUPPORT OF AMENDED APPLICATION TO ESTABLISH HYDROGEN
BLENDING DEMONSTRATION PROJECTS**

Roger A. Cerda
8330 Century Park Court, CP32D
San Diego, California 92123
Telephone: (858) 654-1781
Email: rcerda@sdge.com

Attorney for
SAN DIEGO GAS & ELECTRIC COMPANY

May 4, 2026

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	PROCEDURAL BACKGROUND	2
A.	The Biomethane Ruling.....	2
B.	The UC Riverside Study (July 2022)	4
C.	The Hydrogen Blending Compendium Report (February 2025)	5
III.	THE SDG&E PROJECT	6
A.	Project Overview	6
B.	Major Equipment List	7
C.	Hydrogen Blending Data Collection	8
D.	Post-Data Collection Activity	9
IV.	DISCUSSION OF ISSUES IN SCOPE	9
A.	Scoping Issue 1: Do the pilots conform to regulatory requirements?	9
1.	Scoping Issue 1a: How does each pilot comply with specific requirements set forth in Public Utilities Code and D.22-12-057?	9
2.	Scoping Issue 1b: If there are any exemptions or waivers being requested for any pilot project, are there sufficient justification?	17
3.	Scoping Issue 1c: Does each pilot project align with broader state energy and climate goals? If so, how?	18
B.	Scoping Issue 2: Are the pilots useful and well designed?	18
1.	Scoping Issue 2a: 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?	18
2.	Scoping Issue 2b: How will the additional knowledge, contributed by each project, be useful to utility operators and state policy makers?	20
3.	Scoping Issue 2c: 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?	21
4.	Scoping Issue 2d: 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?	22
5.	Scoping Issue 2e: How will the ultimate findings from these pilot projects be documented, validated, and shared with stakeholders and the Commission?	23
6.	Scoping Issue 2f: What would be needed to move from a pilot project to full implementation if the pilot project was successful?	24
C.	Scoping Issue 3: Are the pilots prudent?	24
1.	Scoping Issue 3a: What is the detailed cost breakdown for each pilot project, including equipment, monitoring, safety system, and administration?	24
2.	Scoping Issue 3b: What specific benefits will gas ratepayers receive from investment in these pilot projects?	25
3.	Scoping Issue 3c: What cost-sharing arrangements have been made or pursued with potential non-ratepayer beneficiaries of this research?	26
4.	Scoping Issue 3d: How will cost overruns be handled?	26
D.	Scoping Issue 4: Are the pilot projects safe?	27
1.	Scoping Issue 4a: 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?	27
2.	Scoping Issue 4b: Beyond monitoring, what automated safety systems and shutdown protocols are in place for each pilot project?	28
3.	Scoping Issue 4c: What baseline testing of infrastructure integrity has been and will be completed prior to pilot project implementation?	28
4.	Scoping Issue 4d: How have emergency response plans been updated specifically for hydrogen incidents at each pilot project?	29

5.	Scoping Issue 4e: What specific outreach has been conducted with communities potentially affected by each pilot project and how has informed consent been documented?	29
6.	Scoping Issue 4f: How does each utility plan to monitor and assess hydrogen embrittlement of the gas components within its pilot project(s)?.....	30
E.	Scoping Issue 5: Are the pilots equitable and do the pilots create any positive or negative community impacts?	32
1.	Scoping Issue 5a: How were pilot project locations selected?	32
2.	Scoping Issue 5b: What measures ensure equitable distribution of risks and benefits for each project?	32
3.	Scoping Issue 5c: How were community stakeholders in each pilot project included in the planning process?.....	33
4.	Scoping Issue 5d: What ongoing community engagement is planned during implementation of each pilot project?.....	33
5.	Scoping Issue 5e: 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?	33
V.	CONCLUSION	33

TABLE OF AUTHORITIES

STATUTES AND LEGISLATION

17 Cal. Code of Reg. §§ 94200-94214	8
88 Fed. Reg. 89220.....	7
AB 32, Stats. 2005-2006, Ch. 488 (Cal. 2006).....	18
Cal. Pub. Util. Code § 399.24.....	2
SB 32, Stats. 2015-2016, Ch. 249 (Cal. 2016)	18
SB 100, Stats. 2017-2018, Ch. 312 (Cal. 2018)	18

CALIFORNIA PUBLIC UTILITIES COMMISSION DECISIONS

D.21-07-005, 2021 Cal. PUC LEXIS 317	2
D.22-12-057, 2022 Cal. PUC LEXIS 558.....	<i>passim</i>

OTHER AUTHORITIES

Commission Rules of Practice and Procedure, Rule 13.12.....	v, 1
Executive Order B-48-18.....	20

SUMMARY OF RECOMMENDATIONS

Pursuant to Rule 13.12 of the California Public Utilities Commission's ("Commission") Rules of Practice and Procedure, San Diego Gas & Electric Company ("SDG&E") hereby provides a summary of its recommendations in this proceeding. Specifically, SDG&E recommends the Commission find as follows:

1. Authorize SDG&E to establish and implement the SDG&E Hydrogen Blending Demonstration Project (hereinafter "SDG&E Project").
2. Authorize SDG&E to enter into the necessary contracts and/or agreements with third parties to implement the SDG&E Project.
3. Authorize SDG&E to recover \$13.79 million in total direct costs related to the SDGE Project. These direct costs translate into a revenue requirement of \$21.1 million to be recovered over five years.
4. Authorize SDG&E to create a two-way balancing account (*i.e.*, the Hydrogen Blending Demonstration Project Balancing Account ("HBDPBA")) to track and recover the costs to implement the SDG&E Project.
5. Authorize SDG&E to create a subaccount in the HBDPBA to record its proportional share of the cost allocation for any shared plans studies and reporting required by D.22-12-057.

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Application of Southern California Gas Company (U904G), San Diego Gas & Electric Company (U902G), Pacific Gas and Electric Company (U39G), and Southwest Gas Corporation (U905G) to Establish Hydrogen Blending Demonstration Projects.

A.22-09-006
(Filed September 8, 2022)

**OPENING BRIEF OF SAN DIEGO GAS & ELECTRIC COMPANY (U902G)
IN SUPPORT OF AMENDED APPLICATION TO ESTABLISH HYDROGEN
BLENDING DEMONSTRATION PROJECTS**

I. INTRODUCTION

In accordance with Rule 13.12 of the California Public Utilities Commission’s (“Commission”) Rules of Practice and Procedure (“Rules”), San Diego Gas & Electric Company (“SDG&E”) hereby submits its Opening Brief in support of the Amended Application to Establish Hydrogen Blending Demonstration Projects (“Application”). SDG&E’s Opening Brief focuses specifically on the *SDG&E Hydrogen Blending Demonstration Project* (hereinafter “SDG&E Project”).

The SDG&E Project is unique and different from the other proposed blending demonstration projects in that it seeks to understand the impacts of hydrogen blending in state-of-the-art medium density polyethylene (“PE”) pipe in moderate coastal conditions. The SDG&E Project will blend hydrogen into a custom-built medium-pressure natural gas distribution pipeline loop isolated from the central gas system. Testing PE pipe is critical for SDG&E as this is the most common pipeline material in its system. The SDG&E Project plan is to begin with an initial hydrogen blend of five percent by volume and gradually increase to twenty percent over the testing period. SDG&E proposes to locate the project entirely on its own property, at the Kearny Construction & Operations Center (“Kearny C&O”) in San Diego. SDG&E seeks authorization to recover a total revenue requirement for the project in the amount of \$21.1M over a five-year period (to recover direct costs of \$13.79M). Approval of the SDG&E Project will help inform a future

hydrogen blending standard that focuses on safety, system integrity, and reliability, as well as adheres to the project requirements set out by Decision (“D.”) 22-12-057 and D.21-07-005.

SDG&E’s Opening Brief is organized to address each of the five (5) issues (including sub-issues) set forth in the *Assigned Commissioner’s Scoping Memo and Ruling* dated June 12, 2025 (“Scoping Memo”).¹ SDG&E’s Opening Brief attempts to anticipate issues Intervenor may raise in this proceeding, based on testimony, data requests or other submissions to date. SDG&E’s failure to address a specific issue or argument raised by any Intervenor in their opening briefs should not be construed as an agreement or acquiescence with any argument or position. Rather, to the extent SDG&E does not address a particular issue in its Opening Brief, SDG&E will address the issue or argument in its Reply Brief.

II. PROCEDURAL BACKGROUND

A. The Biomethane Ruling

The genesis of the Application is 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 Proceeding”), which was initiated to develop an injection standard for renewable gases, including hydrogen. In that proceeding, the Commission acknowledged the statutory and policy directives to develop a hydrogen injection standard. In the July 5, 2018 Assigned Commissioner’s Scoping Memo and Ruling, Commissioner Rechtschaffen stated, “In 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.”²

¹ Scoping Memo, pp. 11-13.

² R.13-02-008, Assigned Commissioner’s Amended Scoping Memo and Ruling (July 5, 2018) at p. 7.

As a result, 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,”³ including that “California has been advancing the deployment of hydrogen throughout the state as a zero-emissions fuel.”⁴ Since then, the 2022 California Air Resources Board, (“CARB”) Scoping Plan confirmed the role that renewable hydrogen could play in decarbonization.⁵

As recommended by SoCalGas and SDG&E, the Phase 4 Scoping Ruling stressed that “more technical expertise is needed to determine the maximum safe level of hydrogen blend in pipelines” and 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.”⁶ Consequently, the Commission sponsored the Hydrogen Blending Impacts Study prepared by the University of California, Riverside (“UC Riverside Study”).

³ 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 p. 1.

⁴ *Id.* at p. 6.

⁵ CARB, *2022 Scoping Plan for Achieving Carbon Neutrality* (December 2022) at p. 78, available at: <https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents>. (“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.”).

⁶ R.13-02-008, Phase 4 Scoping Ruling at p. 8 and 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.

B. The UC Riverside Study (July 2022)

In July 2022, the Commission released a UC Riverside–led study, conducted with GTI Energy, evaluating the feasibility of blending hydrogen into California’s existing natural gas system.⁷ The study assessed how much hydrogen could be blended without significant infrastructure or appliance modifications, the changes required at higher blend levels, and impacts on safety, appliance performance, pipelines, leakage, storage, and corrosion protection.⁸ It concluded that any statewide hydrogen injection standard must account for the most vulnerable infrastructure components, end-uses, appliances, and industrial processes.⁹

The UC Riverside Study found that significant knowledge gaps remain regarding hydrogen blending that cannot be resolved through modeling or lab-scale testing alone.¹⁰ It emphasized the need for real-world demonstration projects conducted under safe, controlled conditions using isolated or custom-built sections of natural gas infrastructure representative of California’s system.¹¹ The study recommended testing hydrogen blends of 5–20% to better understand long-term impacts, including effects of temperature changes, pressure cycling, exposure duration, gas contaminants, and mitigation measures.¹² Demonstration projects evaluating blends above 5% would help address these critical knowledge gaps related to materials performance and system impacts.

⁷ Exhibit (“Ex.”) SCG-07, UC Riverside, *Hydrogen Blending Impacts Study* (July 2022) (“Ex. SCG-07”). All exhibit references are based on the exhibit designations set forth in the pending *Joint Motion to Admit Exhibits Into the Evidentiary Record* dated April 22, 2026.

⁸ Ex. SCG-07.

⁹ *Id.*, p. 4.

¹⁰ *Id.*

¹¹ Ex. SCG-07.

¹² *Id.*, p. 5.

C. The Hydrogen Blending Compendium Report (February 2025)

In D.22-12-057, the Commission ordered the Joint Utilities to jointly file in the Biomethane Proceeding a Hydrogen Blending Compendium Report (“Compendium Report”) within two years “to identify existing studies and regulatory proceedings that are complete and underway...”¹³ The Compendium Report must include findings related to key safety, performance, and operational considerations for hydrogen blending in natural gas systems, including pipeline integrity and safety thresholds at varying blend levels, comparative methane-hydrogen leakage and permeation rates, and modeling of hydrogen losses due to leakage.¹⁴ The findings must also encompass impacts on storage facilities, evaluation of monitoring and leak-detection technologies, effects on heating value and end-use equipment performance, and identification of any associated human health concerns.¹⁵

The Compendium Report was filed in February 2025 in the Biomethane Proceeding.¹⁶ The Joint Utilities sought an independent and impartial organization to prepare the Literature Review portion of the Compendium Report, and therefore selected UC Riverside based on its expertise and having authored the UC Riverside Study.¹⁷ The report’s Literature Review summarizes technical research published within two years of the UC Riverside Study. It does not evaluate the practical feasibility or real-world implications of hydrogen blending within California’s natural gas infrastructure or the demonstration projects proposed in Application (“A.”) 22-09-006. The Literature Review concluded that “there is a need for demonstration projects that can simulate the

¹³ D.22-12-057, Ordering Paragraph (“OP”) 10 at p. 71.

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ *See* Ex. SCG-08, R.13-02-008, Notice of Filing of Joint Utilities’ Hydrogen Blending Compendium Report (February 14, 2025) (“Ex. SCG-08”). The Joint Utilities received an extension from the Executive Director to file the Compendium Report.

¹⁷ Ex. SCG-08, Letter of Transmittal at p. 1.

conditions and environments of California’s natural gas infrastructure as knowledge gaps exist, especially under the real-world environments that systems operate under.”¹⁸

III. THE SDG&E PROJECT

A. Project Overview

SDG&E will investigate the impacts of blended hydrogen on at least two typical types of medium density PE pipe in the test loop.¹⁹ The PE will be new, state-of-the-art PE meeting current industry standards and specifications (*i.e.*, ASTM D3350-21).

The Project test period will begin by establishing a 100 percent natural gas baseline in the new pipeline loop. In this way, SDG&E will benchmark PE pipe performance to compare and characterize any potential future degradation resulting from hydrogen blending. Once that baseline is established, SDG&E plans to blend and inject electrolytic hydrogen produced with renewable energy into the system, starting at five percent hydrogen and transitioning to twenty percent by volume over time. The project team will gradually increase hydrogen in the blend as the testing progresses. The team will evaluate key impacts on related equipment, including the blending skid, transmitters, pipes, valves, meters, connections, and the fuel cell. The composition of the blended gas will be monitored with a gas chromatograph, which will detect and report the percentage of hydrogen in the blend, ensuring the accuracy of the blend composition throughout the process. SDG&E is committed to operating the Project in an environmentally responsible manner. SDG&E will follow all local permitting guidelines.

SDG&E plans to source the hydrogen for the demonstration from its existing asset, the Hydrogen Systems at Palomar Energy Center in Escondido, CA. Palomar Energy Center currently operates an electrolyzer to produce clean hydrogen onsite for multiple uses and offers sufficient hydrogen production capacity to support the blending demonstration project. The electrolyzer at Palomar Energy Center is powered by a

¹⁸ *Id.*, Literature Review at p. 3.

¹⁹ Ex. SDGE-03, *Revised Prepared Direct Testimony of Pooyan Kabir* (May 28, 2025) (“Ex. SDGE-03 (Kabir)”), pp. 2-3.

purpose built, onsite solar array and also has a grid connection. SDG&E generates and retires its own renewable energy credits from this solar array to offset electricity drawn by the electrolyzer. Should additional energy be needed to generate hydrogen and the SDG&E solar system output be insufficient, SDG&E plans to use grid electricity and purchase renewable energy credits (“RECs”) to offset carbon emissions related to grid electricity use. This method aligns with the clean hydrogen production tax credit regulations under Section 45V of the US Department of Treasury Internal Revenue Service Code, which allows for Energy Attribute Certificates (“EACs”), including RECs, to be purchased to offset the related carbon emissions from clean hydrogen production.²⁰ Sourcing hydrogen from Palomar Energy Center is estimated to save \$2.31 million in direct costs versus purchasing and installing a dedicated onsite electrolyzer for the project. Upon conclusion of the testing period, hydrogen-related equipment deployed for the testing program will be decommissioned, and SDG&E will evaluate the best use and/or disposition of the equipment and necessary site restoration.

B. Major Equipment List

The following chart provides a description of the major equipment to be included in the SDG&E Project.²¹

Equipment	Description
PE Pipe from gas main to blending skid	Approximately 300 feet of new, state-of-the-art PE pipe will connect an existing SDG&E distribution pipe to the blending skid.
PE Pipe for the test loop	Approximately 200 feet of new, state-of-the-art PE pipe will be used to test hydrogen blends. At least two different types of resin representative of the PE in SDG&E’s distribution system will be included in the test loop.
New Meters	One main gas meter will be installed to measure gas flow to the fuel cell.

²⁰ 88 FR 89220, *Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property*, available at: <https://www.federalregister.gov/documents/2023/12/26/2023-28359/section-45v-credit-for-production-of-clean-hydrogen-section-48a15-election-to-treat-clean-hydrogen>.

²¹ Ex. SDGE-03 (Kabir), pp. 6-7.

Equipment	Description
Hydrogen Blending Skid	A hydrogen blending skid is required to blend natural gas with hydrogen.
Storage Tanks	Pressure vessels that can transport hydrogen to the site and store hydrogen for use onsite.
Fuel Cell	The fuel cell will receive the blended gas and is considered “end-use equipment.” The fuel cell produces combustion-free electricity that will be supplied to the SDG&E grid. The estimated maximum power output of the fuel cell will be 100 kilowatts. San Diego’s Air Pollution Control District (APCD) does not require air permits for fuel cell distributed generator systems that meet the California Air Resources Board (CARB) criteria for certification due to minimal criteria pollutant emissions. ²²
Additional Equipment	Additional equipment may include pressure regulators, temperature transmitters, gas analyzers, gas detectors/leak detectors, fire detectors, control valves, relief valves, isolation valves, and pressure and temperature transmitters.

C. Hydrogen Blending Data Collection

SDG&E will collect data as it blends hydrogen into natural gas. The SDG&E Project will allow for operational review and confirmation of the following within the limitations of the candidate Project site:

- Odorant compatibility;
- Leak detection equipment compatibility;
- Material compatibility;
- Component (*e.g.*, fittings, valves) compatibility;
- Long-term integrity modeling;
- Blend consistency (hydrogen blending injection skid);
- End-use appliance/equipment efficiency;
- Development of new Gas Standards for the construction, maintenance, and operations of hydrogen-blended natural gas systems;

²² 17 CCR Sections (“§§”) 94200-94214, *available at*: https://ww2.arb.ca.gov/sites/default/files/2022-05/dg06-final-regulation-unofficial_0.pdf.

- Effects on metering equipment; and
- Impact on emissions associated with hydrogen blending, including NO_x²³.

D. Post-Data Collection Activity

Asset validation for the SDG&E Project includes the following post-hydrogen blending activities:

- Leak surveys of the pipeline system to verify that no leaks have developed.
- Gathering of pipe and component samples to test and compare with pre-demo samples to determine if there are any material changes after exposure to hydrogen blends.
- End-use equipment checks to ensure equipment continues to work correctly.
- The meter will be removed for mechanical integrity testing.

Following the completion of the Project, SDG&E will draft its final Annual Report, which will include technical findings from the Project.²⁴ The Annual Report will be available on the SDG&E website and served on the service list. This report will guide future hydrogen blending, supporting a hydrogen injection standard in the California gas system. SDG&E will collaborate with the other Joint Utilities and the Commission to determine the best next steps for disseminating the data collected through the Project. As California is widely understood to be a leader in national energy policy, SDG&E anticipates significant and broad interest in the results of this pilot.

IV. DISCUSSION OF ISSUES IN SCOPE

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

1. Scoping Issue 1a: How does each pilot comply with specific requirements set forth in Public Utilities Code and D.22-12-057?

D.22-12-057 contains several Ordering Paragraphs that outline requirements for the hydrogen blending pilot projects. Below is a discussion of how the SDG&E Project

²³ Ex. SDGE-03 (Kabir), pp. 8-9.

²⁴ *Id.*, p. 11.

complies with OP 7, which directs the Joint Utilities to propose pilot programs to test hydrogen blending in natural gas. A more detailed discussion can be found in Ex. SDGE-03 (Kabir).

OP 7.a.

“Ensures long-term safety of the California Pipeline, the prevention of hydrogen leakage, the inclusion of hydrogen monitoring, the consideration of the dilution rate, and the monitoring and reporting of all mechanical characteristics of hydrogen blends in the natural gas pipeline stream.”

The SDG&E Project will help prepare California to develop a hydrogen injection standard that ensures the long-term safety of the California Pipeline, prevents hydrogen leakage, and understands the impacts of mechanical characteristics of hydrogen blends.²⁵ Specifically, the Project will test the material impacts of hydrogen blending on approximately 200 feet of state-of-the-art PE pipe in a closed-loop, standalone, and custom-built distribution pipe test loop. This Project will be entirely disconnected from SDG&E’s existing natural gas system, *e.g.*, “closed loop.” Because the pipe loop length is approximately 200 feet, and the system is a closed loop, terminating into a single fuel cell, SDG&E has not included dilution rate considerations as they are not relevant to this design.

The Project includes several measures to ensure safe operation, prevent hydrogen leakage, and monitor gas characteristics.

SDG&E will:

- Perform enhanced leak detection protocols throughout the Project to ensure that the gas system and associated end-use equipment are not compromised.
- Perform leak detection surveys to ensure potential leaks are caught early and reported.
- Deploy robust monitoring surrounding the hydrogen production, storage, and blending areas to detect any potential leak from hydrogen equipment.

²⁵ *Id.*, pp. 15-16.

- Include a gas chromatograph at the outlet of the blending skid to ensure the accuracy of the blend percentage.
- Include continuous remote monitoring that will notify SDG&E of leakage events.
- Include remote controls will stop hydrogen production and automatically shut down hydrogen production should leakage be detected above a defined level.

OP 7.b.

“Prevents hydrogen from reaching natural gas storage areas and electrical switching equipment directly or through leakage.”

The Project features a new, custom-built distribution pipe test loop that is completely isolated from the rest of the gas distribution system, natural gas storage areas, and electrical switching equipment.²⁶ There is no possibility of hydrogen reaching these items. The Project will utilize gas flow preventers and shut-off valves to prevent hydrogen from reaching electrical equipment or natural gas networks.

OP 7.c.

“Avoids end user appliance malfunctions.”

The end-use appliance in this Project is a new fuel cell that will be installed for this test. The fuel cell will be manufacturer approved to accept at least twenty percent hydrogen by volume.²⁷ The fuel cell manufacturer will be involved in installing, commissioning, maintaining, monitoring, and decommissioning the equipment.

OP 7.d.

“Evaluates hydrogen injection at blends between [0.1] and five percent and five percent to twenty percent; such evaluations must adhere to approved monitoring, reporting, heating value, system safety, environmental considerations, end-use emissions, and all other elements enumerated in this decision.”

²⁶ *Id.*, p. 16.

²⁷ *Id.*

The SDG&E Project will evaluate blends between five and twenty percent by volume.²⁸ It will adhere to approved monitoring, reporting, system safety, environmental considerations, and end-use emissions requirements in alignment with the study published by UC Riverside.²⁹

OP 7.e.

“Specifies the amount of funding necessary to complete all aspects of the proposal and proposes testing durations adequate to draw meaningful conclusions.”

A Class Five cost estimate was performed to calculate the funding necessary for Phases One through Four of the SDG&E Project.³⁰ As set forth in Ex. SDGE-03 (Kabir), the direct costs for the SDG&E Project total \$13.79 million.³¹ In addition, Ex. SDGE-03-WP-A provides a detailed breakdown of Project cost.

Regarding the duration of the Project, it was designed to be reasonable and aligned with other notable hydrogen blending studies, including the HyDeploy Keele Study and the UC Riverside Study. SDG&E’s study will evaluate the impact of hydrogen blends over 18 months. Similar studies were able to gather enough data and evidence for meaningful conclusions through this time frame, including the first Phase of the HyDeploy Keele University Project, which was conducted on campus over eighteen months.^{32,33} Laboratory

²⁸ *Id.*

²⁹ Ex. SCG-07.

³⁰ Ex. SDGE-03 (Kabir), p. 17.

³¹ *Id.*, Table 8 at p. 22.

³² U.S. Department of Energy – Office of Scientific and Technical Information, *Polymer pipes for distributing mixtures of hydrogen and natural gas: evolution of their transport and mechanical properties after an ageing under an hydrogen environment* (May 16-21, 2010), available at: <https://www.osti.gov/etdeweb/servlets/purl/21400887>.

³³ Netbeheer Nederland, *Management Summary “Hydrogen blending with Natural Gas on Ameland”* (April 2012), available

testing has been conducted in increments of ten to 30 days for a fixed blend percentage.^{34,35} The Project will test at least three months each for lower levels (five and 10 percent) and six months each for greater hydrogen concentrations (15 and 20 percent). Considering this is a closed system test on PE pipe, this time range can provide data and evidence to support the future development of hydrogen blending standards.

OP 7.f.

“Is consistent with all directed courses of action specified in this decision relevant to leakage, reporting, heating value, system safety, environmental considerations, end-use emissions, and all other elements enumerated in this decision.”

The Project is consistent with all directed courses of action specified in decision D.22.12-057.³⁶ The details of how the Project addresses all courses of action are summarized in Ex. SDGE-03 at Table 6, which is copied below for reference.

Ex. SDGE-03 Table 6: Directed Courses of Action in D.22-12-057

Topic	Recap of SDG&E’s Action
Leakage	The Project will be designed to minimize and monitor leakage for hydrogen, methane, and methane blend with sensors, remote alerts, and other detection systems.
Reporting	The Project’s testing program will collect and analyze data as described in Section II [of Ex. SDGE-03]. SDG&E will work with a third party and the Joint Utilities to report on findings.

at: https://www.netbeheernederland.nl/sites/default/files/page_files/Waterstof_56_7c0ff368de.pdf.

³⁴ PE 100+ Association, *Permeation Studies on Polyethylene Pipes at Different Temperatures*, (August 29, 2022), available at: <https://www.pe100plus.com/Download/News/PieceJointeInfo/fichier/508.pdf>.

³⁵ Ex. SCG-07.

³⁶ Ex. SDGE-03 (Kabir), p. 18.

Topic	Recap of SDG&E's Action
Heating value	There is no heating value impact on a customer, given that the fuel cell will export power back to the SDG&E grid.
System Safety	Various safety and alert systems are in place to ensure the Project adheres to safety requirements, including a remote monitoring, alarm, and shutdown system. Continuous remote monitoring that will notify SDG&E of leakage events. All relevant codes and standards will be followed.
Environmental considerations	The SDG&E project will use electrolytic hydrogen. No local air permits will be required for distributed generation technologies.
End-use emissions	NOx, CO2, CO, and Oxygen will be measured from the fuel cell system to monitor the emission performance. While SDG&E does not anticipate NOx issues, NOx monitoring and testing will nevertheless be conducted.
Blending limitations	The Project will evaluate hydrogen blending between five percent to twenty percent by volume on a closed system as directed by the D.22-12-057 and suggested by the UCR study. The closed system is a test loop using representative SDG&E gas distribution pipeline components.
Additional consideration	Section IV [of Ex. SDGE-03] addresses how the Project is complying with the directives of decision D.22.-12-057

OP 7.g.

“Proposes rigorous testing protocols consistent with the UC Riverside Study.”

The Project is consistent with all directed courses of action specified in the UC Riverside Study and actions identified in decision D.22-12-057.³⁷ Rigorous testing protocols will be developed to address leakage rates, degradation, durability, and

³⁷ Ex. SCG-07, p. 4.

hydrogen embrittlement on materials, fittings, and other components. Ex. SDGE-03 details the pre-design test plan SDG&E has developed for the SDG&E Project.

OP 7.h.

“Takes into account parties’ comments and further stakeholder input and includes the opportunity for compensation for parties and for community-based organizations.”

SDG&E has and will continue to consider parties’ comments and stakeholder input. Refer to Section IV.D.5 for more details on SDGE’s stakeholder engagement activities and plans for engagement post-application filing.

OP 7.i.

“Propose a methodology for performing a Hydrogen Blending System Impact Analysis that can ensure that any hydrogen blend will not pose a risk to the common carrier pipeline system.”

This System Impact Analysis would be a checklist for Joint Utilities and potential third parties connecting to the gas system to ensure the standard carrier pipeline system remains safe should a hydrogen injection standard be established.

The Joint Utilities propose developing a methodology for performing the Hydrogen Blending System Impact Analysis upon completion of the projects. The proposed methodology will provide a framework to ensure hydrogen blends do not compromise gas system integrity and safety or impact end-use equipment.

The methodology will benefit from using the data collected from the demonstration Projects. The proposed methodology for hydrogen blending will follow a framework similar to that of a biomethane interconnection agreement.

The framework will include, but will not be limited to:

- Identification of downstream systems.
- Potential materials.
- Operating pressures.
- Equipment (*e.g.*, valves, meters, etc.).
- Review the pipeline history and end-use equipment.

- Any further analysis that is deemed necessary by the interconnecting utility.³⁸

OP 7.j.

“Includes new or revised heating values and discuss whether heating values would be modified through propane or other means and whether such modification to heating value can be done safely.”

The SDG&E Project will assess and measure the heating value of blended hydrogen and natural gas for learning purposes.³⁹ However, since SDG&E is the only offtaker for the blended gas, any change in heating value will not impact customers. Therefore, SDG&E does not plan to create a new thermal zone. Additionally, SDG&E will not modify the heating value with propane or other means.

OP 7.k.

“Demonstrates the ability to reliably detect leakage of any hydrogen, methane, or hydrogen/methane blends and describes rigorous hydrogen leak testing protocols that are consistent with leak testing and reporting elements identified in the University of California at Riverside’s 2022 Hydrogen Blending Impacts Study, identifies and addresses the comments presented by parties in this proceeding regarding leak issues, and identifies and addresses the comments presented by workshop stakeholders in this proceeding regarding leak issues.”

This Project will include procedures to monitor, identify, and quickly repair leaks to minimize safety risks, including appropriate methods for prompt and reliable leak detection, including using odorant.⁴⁰ First, the Project will utilize the appropriate design and construction standards and operating gas standards within the design parameters to minimize the risk of hydrogen leakage. Additionally, leaks will be monitored at the system level with pressure sensors, at the facility level with hydrogen sensors, or through audible or ultrasonic detection. Operators will also manually inspect for leaks on a

³⁸ Ex. SDGE-03 (Kabir), pp. 19-20.

³⁹ *Id.*, p. 20.

⁴⁰ *Id.*, pp. 20-21.

monthly basis with handheld hydrogen detectors or soap bubble leak detection. Sampling will be conducted throughout the process to evaluate odorant compatibility and confirm the effectiveness of the odorant.⁴¹

Instrumentation systems will measure the blended gas's overall performance, temperature, pressure, and quality. Moreover, the fuel cell system has a monitoring/control system for performance control.

OP 7.1.

“Contains an independent research plan for assessment, measurements, monitoring, and reporting through an independent party, which must be engaged in such activities during the development, construction, operational life, and decommissioning of the pilot project.”

Upon approval of this application, the Joint Utilities will issue a request for proposal to solicit competitive bids for an independent party (or parties) to complete the independent research plan covering the phases of the Project, including development, construction, operations, and decommissioning.⁴² Given the differences in demonstration projects, different entities might be contracted for various aspects of the research plan. All information related to the SDG&E pilot herein should be considered pre-development.

2. Scoping Issue 1b: If there are any exemptions or waivers being requested for any pilot project, are there sufficient justification?

Not applicable.

⁴¹ Haeseldonckx, D., and W. D'haeseleer, *The Use of the Natural-Gas Pipeline Infrastructure for Hydrogen Transport in a Changing Market Structure*. International Journal of Hydrogen Energy 32, nos. 10-11 (July): 1381–1386. ISSN: 03603199. doi:10.1016/j.ijhydene.2006.10.018, available at: <https://www.sciencedirect.com/science/article/abs/pii/S0360319906004940>.

⁴² Ex. SDGE-03 (Kabir), p. 21.

3. Scoping Issue 1c: Does each pilot project align with broader state energy and climate goals? If so, how?

The SDG&E Project aligns with state energy and climate goals as it is being proposed pursuant to the Biomethane Proceeding to help the Commission develop an injection standard for the blending of renewable gases, including hydrogen, into the existing natural gas system. Hydrogen represents a complementary decarbonization strategy that is particularly well-suited for hard-to-electrify sectors, including electric generation, industrial processes and transportation. SDG&E's Project does not preclude electrification; rather, it is designed to explore parallel pathways that can collectively meet California's diverse and evolving energy needs. By advancing hydrogen blending technologies in a controlled, safety-focused environment, the SDG&E Project supports innovation and system resilience. This approach aligns with California's broader clean energy transition goals, including those outlined in Assembly Bill ("AB") 32, Senate Bill ("SB") 32, and SB 100, and contributes to the development of a robust, multi-sector decarbonization framework.

B. Scoping Issue 2: Are the pilots useful and well designed?

1. Scoping Issue 2a: 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?

The SDG&E Project aims to address knowledge gaps not fully covered in the Hydrogen Blending Impact Report and Compendium Report by conducting a live hydrogen blending demonstration in a real-world, isolated polyethylene (PE) pipe loop.⁴³ This includes testing state-of-the-art PE materials under actual operating conditions, evaluating the operational impacts on meters, valves, fittings, and end-use equipment (fuel cells), and validating laboratory-based results in a controlled, isolated loop that is

⁴³ Ex. SDGE-06, *SDGE Response to Public Advocates Office Data Request 01* (July 21, 2025) ("Ex. SDGE-06"), Response to Question 1a).

representative of the SDG&E system. The project will also validate how the SDG&E gas operations team can validate the effectiveness of natural gas odorization with a hydrogen blend.

The Project will examine at least two types of commonly used medium-density PE pipes that have distinctive chemical compositions. The goal is to assess their chemical, mechanical, and operational performance with hydrogen blends of 5-20% compared to a benchmark of operating with natural gas only. As stated in the Hydrogen Blending Compendium Report, “Overall, the review shows that there is a need for demonstration projects that can simulate the conditions and environments of California’s natural gas infrastructure as knowledge gaps exist, especially under the real-world environments that systems operate under.”⁴⁴ The findings will further complement the research in the report and follow the recommendation of independent experts at the University of California, Riverside (“UCR”) by validating the safety of the live hydrogen blending demonstration in medium duty PE pipe to inform California of a safe injection and blending standard.

The scope and scale of SDG&E’s Project is appropriate and will deliver unique and high-quality data that is not already covered in the Hydrogen Blending Impact Report or the Hydrogen Blending Compendium Report. The Project is designed to generate high-quality, system-level data under real-world operating conditions. The Project is intentionally scoped to be small and controlled, minimizing risk while generating meaningful data. The preliminary design shows that this is a sufficient amount of pipe for the components necessary to test. The loop incorporates typical distribution components—including meters, valves, fittings, odorant, and analyzers—and is isolated from the central gas system to ensure safety. The Project’s scale enables rapid deployment and iterative learning, which is crucial for informing future, larger-scale demonstrations.

⁴⁴ Ex. SCG-08, p. 3.

The SDG&E Project follows recommendations from UCR to evaluate hydrogen blends between 5–20% over an extended duration in a real-life demonstration.⁴⁵ This Project mimics real-world operations, beyond the scope of a lab bench test. Additionally, SDG&E has indicated a willingness to expand testing to other materials if needed, showing flexibility and responsiveness to stakeholder concerns.

Finally, the SDG&E Project is designed to address knowledge gaps and complement other demonstration projects.⁴⁶ SDG&E's Project is designed to address specific operational knowledge gaps, including permeation, leak monitoring, alarm systems, and odorant performance. The Project will include pre- and post-exposure sampling of pipes and components to detect the effects on mechanical and chemical performance induced by hydrogen, enabling a quantitative comparison to a pure natural gas baseline. SDG&E will also collect mechanical performance and operational data, including leak survey results, throughout the demonstration period. SDG&E plans to measure gas composition using a gas chromatograph (before and after the blending skid) and will perform hydraulic modeling for flow calculations and pressure loss. The Project will also monitor gas pressure, temperature, and gas flow to the fuel cell. This will help validate computer modeling results and will add to the body of knowledge around performance data of common and representative chemical compositions of PE pipe. The project will also enable SDG&E operators to learn how to manage and engage with blended fuels.

2. Scoping Issue 2b: How will the additional knowledge, contributed by each project, be useful to utility operators and state policy makers?

Information collected during this demonstration will help utility operators and state policymakers assess whether materials tested in our Project are adequate or need modification to implement hydrogen blending at 5-20% concentrations in the gas

⁴⁵ Ex. SCG-07.

⁴⁶ Ex. SDGE-05, *Prepared Rebuttal Testimony of Pooyan Kabir* (September 29, 2025) (“Ex. SDGE-05 (Kabir Rebuttal)”), pp. 13-14

distribution system and verify the overall safety of hydrogen blending at these levels for communities and our workforce.⁴⁷ Any system-wide modification to gas operations or gas infrastructure undertaken by SDG&E would follow this process of developing and carrying out a prudent pilot on a representative portion of the gas system to determine efficacy and feasibility and this project is no different. This approach is aligned with the recommendations of UCR in both the Hydrogen Blending Impacts Study and the Hydrogen Blending Compendium Report. Following the completion of the Project, SDG&E will draft its final Annual Report, which will include technical findings and recommendations from the Project. The Annual Report will be available on SDG&E's website and will be served to the service list. This report will support the development of a standard for hydrogen injection into the California gas system. SDG&E will collaborate with the other Joint Utilities and the Commission to determine the best next steps for disseminating the data collected through the Project

3. Scoping Issue 2c: 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?

SDG&E will define and measure the success of the Project by observing, analyzing, and disseminating the real-world operational data obtained from the project to inform a future statewide hydrogen injection standard.⁴⁸ A detailed narrative of how SDG&E will collect, measure, and analyze data can be found in Ex. SDGE-03 (Kabir), Section II - Phase Two: Testing and Demonstration.⁴⁹ SDG&E will collaborate with other Joint Utilities and the Commission to determine the best next steps for analyzing and disseminating the data collected through the Project. Following the completion of the Project, SDG&E will draft its final Annual Report, which will include technical

⁴⁷ Ex. SDGE-06, Response to Question 1b).

⁴⁸ *Id.*, Response to Question 1c).

⁴⁹ Ex. SDGE-03 (Kabir), pp. 8-9.

findings and recommendations from the Project. The Annual Report will be available on SDG&E's website and will be served to the service list.

4. Scoping Issue 2d: 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?

Alternative approaches were considered.⁵⁰ SDG&E's approach always focused on new PE pipe for distribution, since plastic pipeline is the most common distribution piping material in SDG&E's system, and the issues of blending hydrogen up to 20% in a PE distribution pipeline system are well defined, understood, and the material is "capable of handling this blend."⁵¹ Furthermore, SDG&E's testing area of focus was designed to complement and also be distinct from the tests operated by the other IOUs.

In September 2022, SDG&E put forth its first detailed blending project proposal in collaboration with the University of California, San Diego ("UCSD"). This proposal was based on a previous successful demonstration study in the UK in collaboration with Keele University. It included blending 5-20% hydrogen into an isolated portion of the distribution system on the UCSD campus, made of new state-of-the-art PE pipe. The blended gas would have been used in campus graduate student housing end-use appliances, including campus-owned water heaters.

Despite a safe and rigorous testing design and approach, upon hearing stakeholder concerns about this project design, SDG&E and UCSD staff collaborated to develop a project that avoided blending in with campus buildings. A new SDG&E project design was refiled in an Amended Application on March 1, 2024, which maintained many components of the original project, including testing an isolated section of new distribution PE pipe. However, the end-use appliance was changed to a single fuel cell.

⁵⁰ Ex. SDGE-06, Response to Question 1d).

⁵¹ Pipeline Research Council International (PRCI), *Emerging Fuels – Hydrogen SOTA, Gap Analysis, Future Project Roadmap*, Catalog No. PR-720-20603-R01. (November 9, 2020), p. 45.

SDG&E proposed a “candidate location” for the preliminary project design, which was the UCSD parking lot southeast of Genesse Ave and Campus Point Drive (Voight Parking Lot). SDG&E and UCSD collaborated to finalize a site on UCSD property, but ultimately were unsuccessful in doing so. However, the Project was designed to be suitable for placement at alternative candidate locations with slight modifications.

On May 28, 2025, SDG&E submitted revised testimony that identified a suitable new location on SDG&E property at the Kearny C&O.⁵² This revised location was identified due to the available space, reasonable proximity to existing SDG&E gas and electric grid tie-ins, and reasonable alignment with SDG&E cost estimates. The Project approach maintained all of the critical components from the March 2024 proposal. However, to improve project affordability, SDG&E now proposes trucking electrolytic hydrogen from its existing renewable hydrogen production facility in Escondido, CA, to the project, rather than a more costly approach of purchasing, constructing, and permitting a new electrolyzer at the site to support a short-term, 18-month demonstration. No aspects related to blending itself have changed

5. Scoping Issue 2e: How will the ultimate findings from these pilot projects be documented, validated, and shared with stakeholders and the Commission?

SDG&E will conduct and record regular monthly leak surveys, material sampling, and emissions testing.⁵³ Third-party experts will validate the design and the collected data from the Project. Findings will be shared through a public report and collaboration with the Commission and Joint Utilities. SDG&E will collect mechanical and operational data, as well as leak survey data, during the pilot project timeframe. Testing will be conducted in conjunction with a third-party expert as required by D.22-12-057 to ensure that testing protocols are followed and thoughtfully incorporated into the project design.

⁵² Ex. SDGE-03 (Kabir), pp. 2-3.

⁵³ Ex. SDGE-06, Response to Question 1e.)

6. Scoping Issue 2f: What would be needed to move from a pilot project to full implementation if the pilot project was successful?

As an initial matter, pursuant to D.22-12-057 the purpose of the proposed pilots is to provide data and learnings to help inform a future hydrogen blending standard that focusses on safety, system integrity, and reliability. As such, SDG&E is unable to state with any certainty what the Commission or other stakeholders would require to transition to full implementation (*i.e.*, adopting a future hydrogen blending standard). SDG&E anticipates that there would likely be a Commission-led proceeding, similar to or within the Biomethane Proceeding, that establishes standards and requirements relative to health, safety and facility integrity for hydrogen injected into common carrier pipelines, just as the Commission developed for injection of renewable natural gas.

C. Scoping Issue 3: Are the pilots prudent?

1. Scoping Issue 3a: What is the detailed cost breakdown for each pilot project, including equipment, monitoring, safety system, and administration?

The detailed cost breakdown for the SDG&E Project are contained in Ex. SDGE-03-WP *Hydrogen Blending at Kearny C&O Plan Workpaper Supporting Chapter 3 (Revised)*, Ex. SDGE-03-WP-A *Workpaper Appendix A*, and Ex. SDGE-03-WP-B *Workpaper Appendix B*. Please note that the monitoring and safety systems are integrated into the cost estimates and cannot be broken down. The total capital and operations and maintenance (“O&M”) for the SDG&E Project are set forth in Table 1 to the workpapers as:⁵⁴

Table 1: Revised Total Capital and O&M						
	(\$M)					
	2025	2026	2027	2028	2029	Total
Capital	0.0	0.0	0.0	0.0	0.0	0.0
O&M	8.13	3.72	0.61	1.23	0.1	13.79
Total	8.13	3.72	0.61	1.23	0.1	13.79

⁵⁴ Ex. SDGE-03-WP, *Hydrogen Blending at Kearny C&O Plan Workpaper Supporting Chapter 3 (Revised)* (“Ex. SDGE-03-WP”), at Table 1.

2. Scoping Issue 3b: What specific benefits will gas ratepayers receive from investment in these pilot projects?

Gas ratepayers will benefit from validated safety and performance data for hydrogen blending in PE pipelines, which supports future standards and decarbonization strategies.⁵⁵ All costs will be treated as O&M expense because the Project is a short-term research, development, and demonstration project. The projects will directly benefit California customers because if the projects successfully demonstrate the safe and reliable transport of hydrogen blends, the Joint Utilities may be able to start injecting clean, renewable hydrogen into the existing infrastructure. This would help reduce California's reliance on fossil fuels, thereby reducing greenhouse gas emissions across the State. CARB adopted its 2022 Scoping Plan, which includes a reference scenario featuring renewable hydrogen blended into fossil gas pipelines at 7% energy (~20% by volume), with a ramp-up between 2030 and 2040.⁵⁶ Establishing a hydrogen blending injection standard can accelerate the market and adoption of clean fuels and move California closer to achieving broader energy system decarbonization. Distributing hydrogen through the state's existing standard carrier, the natural gas pipeline system, and delivering it to connected end-users can materially reduce the state's emissions and contribute to California's goals for carbon neutrality. Hydrogen blending, combined with clean fuels like RNG, can help California meet its long-term gas decarbonization goals while supporting its economy. Not all end uses can be electrified, they will require decarbonized fuels. Blending can allow decarbonized fuels to be delivered affordably through existing critical infrastructure, enabling manufacturing, ports (such as the Port of San Diego and the Otay Mesa Land Port of Entry), reliable and dispatchable power generation, and others to continue to operate in the state and our region and support employment, and energy affordability and reliability in these sectors.

⁵⁵ Ex. SDGE-06, Response to Question 2b).

⁵⁶ *Supra* note 5, p. 78.

3. Scoping Issue 3c: What cost-sharing arrangements have been made or pursued with potential non-ratepayer beneficiaries of this research?

No cost-sharing arrangement has been made.⁵⁷ SDG&E will manage, own, and operate the system and fund the project through authorized cost recovery mechanisms. As noted in the Application, SDG&E made reasonable attempts to use existing Commission-authorized funding and other funds, including the CEC R&D Program and federal funding, to the extent possible. However, SDG&E is unaware of Commission-authorized funding for hydrogen blending pilot projects. Similarly, SDG&E could not have secured funding from the CEC R&D Program. Although the CEC has issued two hydrogen blending solicitations, they were focused on the power generation and industrial sectors; these solicitations have also explicitly excluded hydrogen blending in live pipelines due to the lack of a pipeline hydrogen injection standard in California.⁵⁸ SDG&E is also unaware of any federal funding opportunities for live blending pilot projects in natural gas pipelines; the existing federal funds under the Infrastructure Investment and Jobs Act of 2021 and Inflation Reduction Act of 2022 are focused on fostering the production of clean hydrogen, development of clean hydrogen hubs, carbon management, advancing equipment manufacturing and recycling, and improving the efficiency of electrolysis. Therefore, SDG&E did not have other available funding for its Project.

4. Scoping Issue 3d: How will cost overruns be handled?

SDG&E does not anticipate cost overruns with this project for a few reasons.⁵⁹ First, SDG&E included a 30% contingency for Phases 2 and 4, and a 25% contingency for Phases 1 and 3 of the Project. Additionally, SDG&E has not revised its cost recovery request despite anticipating 14% cost reductions in the project stemming from the change

⁵⁷ Ex. SDGE-06, Response to Question 2c).

⁵⁸ *Id.*

⁵⁹ Ex. SDGE-06, Response to Question 2d).

in location. Third, SDG&E plans to monitor and forecast the project budget throughout the Project's duration, to stay within the cost estimate range.

D. Scoping Issue 4: Are the pilot projects safe?

- 1. Scoping Issue 4a: 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?**

To date, a comprehensive risk assessment has not been conducted.⁶⁰ Note that the SDG&E Project design as provided in the Application follows standards and codes established by the National Fire Protection Association and others. Once the Project is authorized, during Phase 1 (Engineering and Design), a Hazard Identification ("HAZID") study, performed by an expert third party as per custom, will be conducted to identify potential hazards. The rigor of the HAZID supports compliance with safety regulations, enhances cross-functional collaboration, and reduces overall risk. Later, as part of the engineering design phase, a Hazard and Operability Study ("HAZOP") will be conducted, again by a third-party consultant. Typical HAZOPs include elements such as process safety management, risk assessment, and hazard identification. The HAZOP will identify potential hazards—such as leaks or instrumentation failures—and implement mitigation measures to prevent them from posing risks to personnel, the public, equipment, or the environment. Taken together, the HAZOP and HAZID will help SDG&E understand and establish the baseline risk of the Project. After performing the HAZOP and HAZID, if the third party identifies a need for further risk assessment, then SDG&E would progress to a Quantitative Risk Assessment for the project. These steps, taken together, will constitute a comprehensive risk assessment. Some items SDG&E has included in the project to mitigate risk include but are not limited to:

- Isolating the blend from the existing gas system
- Leak testing the new pipe

⁶⁰ *Id.*, Response to Question 3a).

- Establishing a baseline of 100% natural gas in the test loop;
- Fencing the project to protect it from the public;
- Protecting equipment with bollards;
- 24/7 leak detection and monitoring;
- Fire detection and protection systems;
- Appropriate material selection;
- Automatic shut off valves

2. Scoping Issue 4b: Beyond monitoring, what automated safety systems and shutdown protocols are in place for each pilot project?

Automated safety systems include continuous, 24/7 remote monitoring, leak detection sensors, and automatic shutdown protocols that halt hydrogen flow to the blending skid if leaks are detected.⁶¹ SDG&E plans to have an automatic shut-off valve to stop hydrogen flow. If a leak exceeds a particular threshold, the system will automatically shut down by closing valves to stop the flow of hydrogen.

3. Scoping Issue 4c: What baseline testing of infrastructure integrity has been and will be completed prior to pilot project implementation?

Baseline testing includes inspections and surveys of pipelines, fittings, valves, and meters, as well as leak detection and performance benchmarking with 100% natural gas.⁶² SDG&E's project will use a new medium-density PE pipeline. SDG&E plans to benchmark the performance of the pipeline using natural gas and then gradually increase the percentage of hydrogen blended into the pipeline. SDG&E will monitor the pipeline's performance at each stage of the Project.

⁶¹ *Id.*, Response to Question 3b).

⁶² *Id.*, Response to Question 3c).

4. Scoping Issue 4d: How have emergency response plans been updated specifically for hydrogen incidents at each pilot project?

Emergency response plans for the SDG&E Project have not been developed yet.⁶³ An emergency response plan will be developed for the Project as part of the HAZOP Study with a third-party consultant. SDG&E will engage with the Fire Department as the emergency response plan is being developed. Hydrogen emergency response plans will also be integrated into the Kearny C&O master emergency response plan.

5. Scoping Issue 4e: What specific outreach has been conducted with communities potentially affected by each pilot project and how has informed consent been documented?

SDG&E recognizes the importance of stakeholder and community engagement around novel hydrogen projects such as blending. SDG&E performed significant engagement with the UCSD community, where the initial project site was proposed. Now that the project location has changed, SDG&E is working with its Community Relations team to engage and coordinate with the local community.⁶⁴ SDG&E notes that its Kearny C&O is located in Kearny Mesa—a predominantly commercial and industrial area surrounded by major highways.

A summary of relevant stakeholder engagement for the revised project to date is listed here:

- June 13, 2023: SDG&E and the Joint Utilities held a public Joint Utilities Stakeholder Workshop to present their proposed Projects.
- November 6, 2023: SDG&E and the Joint Utilities held a public Joint Utilities Technical Workshop to solicit feedback on technical aspects of the proposed Projects, including hydrogen leakage, emissions, and material safety.

In addition, on September 26, 2025, the CPUC held two in-person Public Participation Hearings (“PPHs”) at the United Way of San Diego County to solicit public input on the Project. Members of the public attended both sessions, and SDG&E and the

⁶³ *Id.*, Response to Question 3d).

⁶⁴ Ex. SDGE-03 (Kabir), pp. 13-14.

Commission received public feedback, both in support of and against the Project. SDG&E remains committed to stakeholder engagement and will continue outreach.

Moreover, the SDG&E Project team will coordinate with the SDG&E Office of the Customer to identify relevant community-based organizations (“CBOs”) for engagement during the course of the Project. SDG&E proposes a maximum of four CBO engagement workshops during Phase One and an additional three workshops, one each at the conclusion of Project Phases Two, Three, and Four, to share updates, conclusions, and findings.

Details related to the Project will be available online, including related environmental health and safety issues. The demonstration site will include signage directing viewers to the website and the SDG&E hydrogen email address for additional information: hydrogen@sdge.com.

Finally, SDG&E notes that D.22-12-057 does not require the utilities to obtain “informed consent” before moving forward with the project. SDG&E also notes that the Project will be housed entirely on SDG&E’s own property – the Kearny C&O located in Kearny Mesa, which is primarily a commercial and industrial area surrounded by major highways on all sides.

6. Scoping Issue 4f: How does each utility plan to monitor and assess hydrogen embrittlement of the gas components within its pilot project(s)?

Rigorous testing protocols will be developed to address hydrogen embrittlement on materials, fittings, and other components.⁶⁵ Exhibit 3A, *Preliminary Testing Protocols*, attached to Mr. Kabir’s Revised Direct Testimony⁶⁶ sets forth the pre-design test plan SDG&E has created for the Project. Moreover, SDG&E plans to test pipe performance at the end of each blending interval.⁶⁷ Additionally, a set of control samples

⁶⁵ Ex. SDGE-06, Response to Question 3f).

⁶⁶ Ex. SDGE-03 (Kabir), Ex. 3A.

⁶⁷ *Id.*, p. 10.

will be collected to test baseline pipe performance. The control set of pipe will only have a standard natural gas blend for the same duration under similar flow conditions. In addition, the effect of hydrogen on materials will be continuously monitored through leak surveys at various points within the system.

SDG&E notes that during the proceeding, some intervenors raised concerns about the Project's focus on "new PE pipe" and questioned whether this limits its relevance to California's existing gas distribution. SDG&E acknowledges that legacy infrastructure presents unique challenges; however, the Project's focus on modern medium-density polyethylene ("MDPE") pipe is deliberate, complementary to other projects, and aligned with the Distribution Integrity Management Program ("DIMP") modernization pathway.⁶⁸ The Project utilizes a live, medium-pressure (≤ 60 psig) distribution-loop composed of state-of-the-art MDPE. The loop incorporates typical distribution components (meters, fittings, valves, odorant, analyzers) and a manufacturer-approved end-use fuel cell, producing system-level data that bench tests cannot deliver.

MDPE is the dominant and future-facing material in SDG&E's system. SDG&E's approach always focused on new PE pipe for distribution, since plastic pipeline is the most common distribution piping material in SDG&E's system, and the issues of blending hydrogen up to 20% in a PE distribution pipeline system are well defined, understood, and the material is "capable of handling this blend." Field validation of hydrogen compatibility with MDPE is a necessary precursor to broader implementation and complements other projects, such as those conducted by SoCalGas and Southwest Gas, that examine steel and mixed-material systems. SDG&E remains open to expanding testing to additional pipeline materials should it be deemed necessary to address specific knowledge gaps. Field validation that hydrogen does not degrade modern PE—consistent with lab findings—is a necessary precursor to any injection standard. The

⁶⁸ SDG&E, *Distribution Integrity Management Program – for our natural gas system* (2019), available at: https://www.sdge.com/sites/default/files/documents/DIMP_fact_sheet_6-20-19.pdf?nid=9586

Project includes two commonly used varieties of MDPE pipe which allows SDG&E to better understand how and if hydrogen impacts MDPE, including but not limited to characteristic factors such as permeation, embrittlement, and long-term durability. SDG&E can better understand how and if hydrogen impacts MDPE, including but not limited to characteristics such as permeation, embrittlement, and long-term durability. By testing different MDPE samples, SDG&E will generate performance data that reflects the diversity of materials currently in use and anticipated under the DIMP. This is new data that will further the body of knowledge. SDG&E will implement pre- and post-exposure sampling of pipe and components to detect any hydrogen-related changes, enabling quantitative comparison to the 100% natural gas baseline established in the same loop. This material-specific analysis will be conducted under real-world operating conditions within a live, medium-pressure (≤ 60 psig) distribution-class loop. The loop incorporates standard distribution components and is isolated from the central gas system to ensure safety. Pre- and post-exposure sampling will be performed to detect any hydrogen-induced changes, enabling quantitative assessment of material compatibility and system integrity. These findings will inform the development of safe hydrogen injection standards and support broader implementation across California's gas distribution network.

E. Scoping Issue 5: Are the pilots equitable and do the pilots create any positive or negative community impacts?

1. Scoping Issue 5a: How were pilot project locations selected?

See discussion in Section IV.B.4 explaining how the Kearny C&O location was selected for SDG&E's Project.

2. Scoping Issue 5b: What measures ensure equitable distribution of risks and benefits for each project?

SDG&E's Project is located at the Kearny C&O location which is a secure SDG&E location that only can be accessed by specific SDG&E employees and will limit the exposure of public to any risk associated with the SDG&E Project.

SDG&E will use risk quantification framework described in SDG&E Ramp Report⁶⁹ to follow Commission's Risk-Based Decision Making Framework. SDG&E will follow the Risk Assessment Mitigation for Medium Pressure Gas System described in SDG&E Ramp Report, SDG&E-Risk-3, Medium Pressure Gas system for the Project. SDG&E will follow standardized value for reliability and safety benefits.

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

See discussion in Section IV.D.5 describing how community stakeholders were included in the planning process.

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

See discussion in Section IV.D.5 describing how community engagement is planned during implementation of SDG&E's Project.

5. Scoping Issue 5e: 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?

Not applicable.

V. CONCLUSION

The record shows that SDG&E's Project (a) eliminates customer risk through complete isolation; (b) rigorously measures leakage, emissions, materials integrity, metering, and odorant performance; (c) focuses on modern MDPE, the dominant existing and future plastic distribution material; (d) aligns with UCR guidance and regulatory provisions; (e) includes an independent research plan and public reporting; and (f) reduces cost while maximizing learning. SDG&E's Project is structured to complement

⁶⁹ A.25-05-013, 2025 Risk Assessment Mitigation Phase, Chapter RAMP-3, Risk Quantification Framework (May 15, 2025), *available at*: https://www.sdge.com/sites/default/files/regulatory/SDGE%202025%20RAMP%20Report_PDFA_0.pdf.)

other utility pilots, fill critical knowledge gaps, and inform future standards for safe and equitable hydrogen integration. SDG&E respectfully requests that the Commission approve the SDG&E Project and associated cost recovery and accounting mechanisms as outlined in the Application.

Respectfully submitted,

/s/ Roger A. Cerda

Roger A. Cerda
8330 Century Park Court, CP32D
San Diego, California 92123
Telephone: (858) 654-1781
Email: rcerda@sdge.com

Attorney for:
SAN DIEGO GAS & ELECTRIC COMPANY

May 4, 2026