

# Angeles Link Q4 Quarterly Report (Phase One)

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



#### TABLE OF CONTENTS

I.	BACKGROUND	1
II.	PLANNING ADVISORY GROUP AND COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP ACTIVITY SUMMARY	
	October Workshops	1
	December Quarterly Meetings	2
	Technical Approach Redline Document	2
III.	COMMENTS AND RESPONSES TO STAKEHOLDER FEEDBACK	2
	SUMMARY OF GENERAL COMMENTS	3
	Equity Principles for Hydrogen (Equity Principles)	3
	Hydrogen Demand	3
	Greenhouse Gas (GHG) Emissions/Leakage	4
	Affordability	4
	Hydrogen Production and Electrification	4
IV.	ALLIANCE FOR RENEWABLE CLEAN HYDROGEN ENERGY SYSTEMS (ARCHES)	4
V.	PHASE ONE FEASIBILITY STUDIES UPDATE	
MAR	KET ASSESSMENT & ALTERNATIVES	5
	Demand Study	5
	Production Planning & Assessment	6
	Project Options and Alternatives	6
	High-Level Economic Analysis & Cost Effectiveness	7
REGI	ULATORY, POLICY & ENVIRONMENTAL	7
	Water Resource Evaluation	7
	Nitrogen Oxide (NOx) and other Air Emissions Assessment	8
	Hydrogen Leakage Assessment	
	Greenhouse Gas Emissions Evaluation	8
	Environmental & Environmental Social Justice Analysis	9
	High-Level Feasibility Assessment & Permitting Analysis	9
	Right-of-Way Study	10



Franchise Study	10
ENGINEERING DESIGN	11
Preliminary Routing/Configuration Analysis	11
Pipeline Sizing & Design Criteria	11
Plan for Applicable Safety Requirements	12
Workforce Planning & Training Evaluation	12

#### **APPENDICES**

- 1. Redline to Technical Approach Document
- 2. PAG/CBOSG Written Comments
- 3. SoCalGas Responses to Comments
- 4. Attendee list for PAG and CBOSG meetings, including those invited
- 5. Transcripts
- 6. CBOSG meeting materials
- 7. PAG meeting materials
- 8. Links to PAG and CBOSG meeting recordings
- 9. Summary of CBO stakeholder meetings, including survey question responses, other verbal feedback during Q4 meetings, and polling results
- 10. Summary of PAG meetings, including survey question responses, other verbal feedback obtained during Q4 meetings, and polling results

#### I. BACKGROUND

On December 15, 2022, the California Public Utilities Commission (CPUC) adopted Decision 22-12-055 (Decision) authorizing the establishment of SoCalGas's Angeles Link Memorandum Account (Memorandum Account) to track costs for advancing the first phase of the Angeles Link Project (Project). SoCalGas established the Memorandum Account on December 21, 2022.

The objective of the proposed Project is to develop a high-pressure, non-discriminatory pipeline system that is dedicated to public use to transport clean renewable hydrogen<sup>1</sup> from regional third-party production and storage sites to end users in Central and Southern California, including the Los Angeles Basin (inclusive of the Ports of Los Angeles and Long Beach). The CPUC recognized clean renewable hydrogen "has the potential to decarbonize the state and the Los Angeles Basin's energy future and bring economic opportunities and new jobs to the region."<sup>2</sup>

To increase transparency and gain valuable feedback, SoCalGas proposed in its Memorandum Account Application for Angeles Link to submit interim reports to the CPUC and the public regarding Project status and updates. Pursuant to Ordering Paragraph (OP) 3(h) of the Decision, SoCalGas hereby submits this Q4 Quarterly Report, for the period October 1, 2023, through December 31, 2023 (Q4-2023). In compliance with the Decision, this report is also served on the service list for the Angeles Link proceeding (A.22-02-007) and is publicly available at: <a href="https://www.socalgas.com/sustainability/hydrogen/angeles-link">https://www.socalgas.com/sustainability/hydrogen/angeles-link</a>.

# II. PLANNING ADVISORY GROUP AND COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP ACTIVITY SUMMARY

During this reporting period, in compliance with the Decision's directive to conduct quarterly stakeholder engagement meetings, two Planning Advisory Group (PAG) meetings (one quarterly and one workshop) and two Community Based Organization Stakeholder Group (CBOSG) meetings (one quarterly and one workshop) were held. These meetings are discussed below.

#### **October Workshops**

SoCalGas hosted two workshops in the month of October (one for PAG and one for CBOSG). At the October 18, 2023, PAG workshop, SoCalGas presented the technical approach on: Production Planning & Assessment; Preliminary Routing/Configuration Analysis; and Pipeline Sizing & Design Criteria. At the October 19, 2023, CBOSG workshop, SoCalGas presented the technical

<sup>&</sup>lt;sup>1</sup> Per the Decision (D.22-12-055), "clean renewable hydrogen" is defined as hydrogen produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process.

<sup>&</sup>lt;sup>2</sup> Decision 22-12-055, p. 2

<sup>&</sup>lt;sup>3</sup> *Id.* at pp. 74-75.

approach on: Project Options & Alternatives; Preliminary Routing/Configuration Analysis; and Workforce Planning & Training Evaluation.

#### **December Quarterly Meetings**

SoCalGas hosted two quarterly meetings in the month of December (one for PAG and one for CBOSG). At the CBOSG quarterly meeting held on December 13, 2023, SoCalGas presented preliminary findings for the Greenhouse Gas Emissions Evaluation and Nitrogen Oxide (NOx) and Other Air Emissions Assessment and presented on the Demand Study Draft Report. As a part of the meeting, SoCalGas hosted a breakout session to discuss the potential impact of air emissions in CBOSG communities and how SoCalGas can share emissions information related to Angeles Link. At the PAG quarterly meeting held on December 15, 2023, SoCalGas presented an update on Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES), provided updated information on the Demand Study Draft Report, and presented preliminary findings for the Greenhouse Gas Emissions Evaluation and Nitrogen Oxide and Other Air Emissions Assessment.

#### **Technical Approach Redline Document**

On September 7, 2023, SoCalGas provided summaries of the technical approaches for the Phase One studies to the PAG and CBOSG members. As described above and in the Angeles Link Q3 Quarterly Report, SoCalGas also presented the technical approaches for certain Phase One studies to the PAG and CBOSG at various meetings during Q4 2023. SoCalGas has since incorporated modifications to the technical approach for certain studies based on feedback from the PAG and CBOSG members and as a result of refinements to the studies as they have progressed. Appendix 1 - Redline to Technical Approach Document provides a redline document highlighting the modifications to these technical approaches since September 2023.

# III. COMMENTS AND RESPONSES TO STAKEHOLDER FEEDBACK

In compliance with D.12-22-015, Ordering Paragraph (OP) 3(h), SoCalGas has (1) solicited feedback from the PAG and CBOSG, (2) summarized that feedback in this Quarterly Report, (3) attached written comments submitted through the dedicated Angeles Link feedback email address (Appendix 2 - PAG/CBOSG Written Comments), and (4) provided responses to comments (Appendix 3 - SoCalGas Responses to Comments). SoCalGas appreciates the continued engagement of the PAG and CBOSG throughout the stakeholder engagement process and the continued active participation in the fourth quarter stakeholder workshops and meetings. The work being conducted for each of the Phase One studies is part of an iterative process and the feedback and insights provided by members of the PAG and CBOSG are being considered as the Angeles Link Phase One studies progress.

SoCalGas received PAG and CBOSG member input verbally, through in-person and virtual attendee comments/discussions at workshops and quarterly meetings, and in writing through email and through Zoom chat functions from virtual attendees. Feedback was often relayed as part of a PAG/CBOSG discussion, and, in many cases, responses were provided in real time. As noted above, formal written communications have been included as Appendix 1 and SoCalGas provided

responses to written comments in Appendix 2. Meeting participants are included in Appendix 4 (Appendix 4 - Attendee list for PAG and CBOSG Meetings), including those invited. For additional detail on verbal feedback and meeting discussions, please refer to court reporter transcripts of all fourth quarter meetings (Appendix 5 - Transcripts). CBOSG and PAG meeting materials are provided in Appendices 6 and 7, respectively.

#### **Summary of General Comments**

This summary provides an overview of key topics that were raised during the meetings and workshops and in written comments during the Q4 2023 period.

#### **Equity Principles for Hydrogen (Equity Principles)**

Several commenters have shared the Equity Principles for Hydrogen (Equity Principles) document, which outlines the principles of nine major California environmental justice organizations. SoCalGas believes it is a foundational document that can help guide the company as we proceed with Angeles Link to foster meaningful conversation between environmental justice advocates and SoCalGas. SoCalGas acknowledges alignment with the Equity Principles document and our vision for Angeles Link. The Equity Principles document underscores the critical importance of incorporating equity, sustainability, and environmental justice considerations when shaping the future of hydrogen infrastructure in California. Overall, our vision for Angeles Link aligns in the following areas: Prioritizing Community Engagement, Tribal Consultation, Minimizing and Mitigating Environmental Impacts and Reducing Energy Pollution, Safety is Foundational Throughout the Lifecycle, and Cost Transparency.

While SoCalGas does not plan to produce hydrogen as part of the Angeles Link project, SoCalGas supports sustainable upstream production pathways as well as hydrogen usage that minimizes adverse environmental impacts. Keeping this in mind, SoCalGas is supportive of the following issues raised in the Hydrogen Equity Principles document: Non-fossil hydrogen production, Hydrogen Production Regulation, and Continued Research on Hydrogen End Uses. SoCalGas remains dedicated to upholding these principles and fostering ongoing dialogue with environmental justice advocates. Collaboration and shared understanding are essential as we shape the future of clean renewable hydrogen infrastructure in California. SoCalGas also includes response to the Equity Principles document as an appendix in this quarterly report.

#### **Hydrogen Demand**

Commenters expressed concern that SoCalGas is overstating potential demand for hydrogen by a significant margin. Commenters note that with the incorporation of broad electrification, demand projections may be considerably lower. Commenters questioned the use of any feedstock that could potentially result in use of natural gas (or other fossil fuels). Additionally, several commenters questioned demand projections because of the shift of vehicle fleets to electric, thereby reducing the need for refineries as a potential end user of hydrogen. SoCalGas previously considered comments concerning projections in the Demand Study and found recommendations to lower projected demands to be inconsistent with both internal and external research done for the Demand Study as well as with feedback from peer reviews, academia, federal and state agencies, and industry. SoCalGas appreciates this input and will continue to incorporate technical data on hydrogen demand as information becomes available.

#### Greenhouse Gas (GHG) Emissions/Leakage

Commenters noted that hydrogen may have climate impacts from leakage. Commenters recommended looking at global warming potential of hydrogen for both 20-year and 100-year timeframes. SoCalGas has incorporated this input into the GHG emissions assessment.

#### **Affordability**

Commenters questioned the general affordability of hydrogen and argue that electrification is more cost effective. SoCalGas appreciates the questions around affordability. The High-Level Economics and Cost Effectiveness Study will evaluate the cost effectiveness of the Project as compared to alternatives, including electrification. Moreover, in future phases of Angeles Link, SoCalGas will begin examining the estimated cost to ratepayers and potential cost allocation and rate design approaches for the project, with the latter informing an affordability analysis supporting the selection of a preferred route.

#### **Hydrogen Production and Electrification**

Commenters noted that production of clean renewable hydrogen is energy-intensive and may divert electricity from the grid in order to shift electricity to producers. Commenters also noted that electrification of end uses is the preferred outcome, rather than investing in hydrogen to offset fossil fuel demand. SoCalGas appreciates the comments concerning the energy use for clean renewable hydrogen production and investments in electrification. An underlying purpose of the proposed Project is to support California reaching its decarbonization goals, including by displacing fossil fuels for certain hard-to-electrify uses. Many of the Phase One Angeles Link studies, including the Greenhouse Gas Emissions Evaluation and the Project Options & Alternatives Study, are evaluating how the Project may achieve that purpose, including understanding the availability of renewable resources that could be added for hydrogen production.

### IV. ALLIANCE FOR RENEWABLE CLEAN **HYDROGEN ENERGY SYSTEMS (ARCHES)**

ARCHES is California's public-private hydrogen hub consortium to accelerate the development and deployment of clean, renewable energy sources to reduce greenhouse gas emissions and advance to a zero-carbon economy. On October 13, 2023, the DOE announced that, after a rigorous application and review process, ARCHES was one of seven hydrogen hubs selected to receive up to \$1.2 billion in federal funding.<sup>5</sup> While certain details are confidential, ARCHES is in the negotiation stage with the DOE to secure funding and start building out the hub. DOE/ARCHES negotiations began in November 2023 and are expected to conclude prior to the end of Q2 2024.

<sup>&</sup>lt;sup>4</sup> Ibid.

<sup>&</sup>lt;sup>5</sup> https://archesh2.org/california-wins-up-to-1-2-billion-from-feds-for-hydrogen/.

SoCalGas has been supportive of the state's efforts to secure federal funding for a California hydrogen hub. In accordance with D.22-12-055, SoCalGas joined ARCHES in October 2022 and has been coordinating with ARCHES throughout the development of ARCHES's application for federal funding. As a utility company with in-depth expertise delivering reliable and affordable energy, SoCalGas is uniquely positioned to support California's clean energy and climate goals with a strong commitment to community benefits.

#### V. PHASE ONE FEASIBILITY STUDIES UPDATE

D.22-12-055 requires SoCalGas to submit Quarterly Reports to the Commission's Deputy Executive Director for Energy and Climate Policy on the progress of the Phase One activities and to report any preliminary results and findings regarding the feasibility studies included in Phase One. This section provides an update on the status of the sixteen technical studies being undertaken in compliance with the Decision, in furtherance of the Project, and in alignment with project-specific standards adopted by the CPUC. Note that the studies may be subject to further modification given PAG/CBOSG input on study descriptions, technical approaches, preliminary findings and data, and draft reports, and are also subject to change based on results from other studies, and/or other variables.

#### **Market Assessment & Alternatives**

Demand Study	
Overview	The Decision requires (OP 6 (a) and OP 6 (c)) SoCalGas to identify hydrogen demand, end uses, and potential end-users (including current natural gas customers and future customers) of the Project. This study will evaluate potential clean renewable hydrogen demand and assess adoption in the Mobility, Power Generation, and Industrial sectors. [Decision Directive (OP 6 (a), OP 6 (c))]
Progress Summary	Over the reporting period, SoCalGas developed the preliminary outputs into a Demand Study Draft Report. The draft report was completed and shared with the CPUC. The Demand Study was also presented at the December 2023 PAG/CBOSG meeting.

<sup>&</sup>lt;sup>6</sup> Decision 22-12-055, p. 74. OP 3(h).

Production Planning & Assessment	
Overview	The Decision requires SoCalGas to identify the potential sources of hydrogen generation for the Project (OP 6 (b)) and its plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision (OP 6 (j)). This study will evaluate potential sources of clean renewable hydrogen production from renewable sources such as solar and wind, input requirements, estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards.
Progress Summary	Over the reporting period, SoCalGas continued to advance the production study. This work included identifying primary production zones, assessing production design cases, and refining analysis to understand how production capacity could meet the demand requirements for various Angeles Link throughput scenarios over time. Production work is being performed in coordination and consideration of other Angeles Link Phase One studies (e.g., storage, demand) as well as with on-going PAG/CBOSG input.

Project Options and Alternatives		
Overview	The Decision requires (OP 6 (d)) SoCalGas to consider and evaluate Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification. SoCalGas is also required (OP 3 (c)) to study a localized hydrogen hub solution under the specifications required to be eligible for federal funding as part of Phase One. This study will evaluate Project options and alternatives, including a localized hydrogen hub.	
Progress Summary	Over the reporting period, progress was made to evaluate potential options and alternatives for non-hydrogen alternatives (e.g., electrification, energy efficiency, etc.) as well as other hydrogen delivery pathways (e.g., trucking, shipping, etc.) against the established criteria. Evaluations of these alternatives against the criteria is currently being completed. The results from the Project Options and Alternatives study will inform the High-Level Economics and Cost Effectiveness study. The evaluation of the alternatives will also inform the analysis of alternatives in the Environmental & Social Justice Analysis.	

High-Level Economic Analysis & Cost Effectiveness		
Overview	The Decision requires (OP 6 (d)) SoCalGas to evaluate the cost effectiveness of the Project against alternatives and determine a methodology to measure cost effectiveness between alternatives. This study will determine a methodology to measure cost effectiveness that includes gathering cost estimates, performing an economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end users, and comparing the cost effectiveness of the Project against various project alternatives.	
Progress Summary	Over the reporting period, progress was made to develop a modeling framework to measure cost effectiveness of the Project and the alternatives. The modeling analysis will develop a comparative analysis across the Project and the alternatives to determine the cost effectiveness (from a levelized cost perspective).	

# Regulatory, Policy & Environmental

Water Resource Evaluation	
Overview	The Decision requires (OP 6 (b)) SoCalGas to identify the potential sources of clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project. This study will evaluate the availability of water resources for clean renewable hydrogen production in the Central and Southern California regions.
Progress Summary	Over the reporting period, SoCalGas continued to progress different tasks in this study, including: (1) evaluation of potential water resources available for third-party hydrogen production; (2) cost estimates for water conveyance, acquisition, and purification; and (3) analysis of challenges and opportunities for water acquisition in Central and Southern California.

Nitrogen Oxide (NOx) and other Air Emissions Assessment		
Overview	The Decision requires (OP 6 (h)) SoCalGas to assess potential NOx emissions associated with the Project, including appropriate controls to mitigate emissions. The NOx assessment will evaluate NOx and other air emissions associated with storage and transportation of hydrogen, as well as NOx emissions associated with end users. Key areas of focus will be the Mobility, Power Generation, and Industrial sectors. Identification and evaluation of potential mitigation measures will also be included.	
Progress Summary	Over the reporting period, SoCalGas prepared and presented Preliminary Data and Findings summarizing projected reductions for NOx, VOC, and PM based on the Demand Study at the December 15, 2023, PAG meeting.	

Hydrogen Leakage Assessment	
Overview	The Decision directs (OP 6 (g)) SoCalGas to assess the risks and mitigations for hydrogen leakage. During Phase One, an evaluation of potential hydrogen leakage associated with production, storage, and transportation of hydrogen will be prepared. Identification and evaluation of potential mitigation measures will also be included.
Progress Summary	Over the reporting period, SoCalGas prepared the Preliminary Data and Findings document.

Greenhouse Gas Emissions Evaluation		
Overview	The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental laws and public policies. To support environmental laws and public policies, SoCalGas will conduct an initial evaluation of greenhouse gas (GHG) emissions associated with the Project, including the potential for emissions reductions. This assessment will evaluate GHG emissions associated with storage and transportation of hydrogen, as well as GHG emissions associated with end users. Key areas of focus will be the Mobility, Power Generation, and Industrial sectors.	
Progress Summary	Over the reporting period, SoCalGas prepared and presented Preliminary Data and Findings summarizing projected reductions for GHG emissions based on the Demand Study at the December 15, 2023, PAG meeting.	

Environmental & Environmental Social Justice Analysis		
Overview	The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental law and public policies. Further, the Decision directs SoCalGas to address and mitigate impacts to disadvantaged communities and other environmental justice concerns (OP 6 (l)). SoCalGas will conduct an initial evaluation of a clean renewable hydrogen transportation system's compliance with environmental law and public policies, which will include an assessment of environmental impacts of project alternatives, environmental justice concerns and impacts to disadvantaged communities.	
Progress Summary	Over the reporting period, work continued to progress for the environmental analysis, including impact evaluations for the proposed pipeline system, potential production facilities, potential storage areas, and alternatives to the Project. Work also continued to progress on the draft of an Environmental Justice Community Engagement Plan being prepared in response to PAG and CBOSG feedback received in earlier quarters. The Environmental Justice Community Engagement Plan would be implemented in future phases.	

High-Level Feasibility Assessment & Permitting Analysis		
Overview	The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct a high-level assessment of potential environmental and regulatory approvals, including federal, state, and local environmental permitting and regulatory approvals, regulatory approval timing, and environmental constraints.	
Progress Summary	Over the reporting period, SoCalGas continued the process of evaluating potential environmental and regulatory approvals for the Project at the state and federal level.	

Right-of-Way Study	
Overview	The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing private rights-of-way to accommodate the Project and future right-of-way locations needed.
Progress Summary	Over the reporting period, SoCalGas continued the process of evaluating SoCalGas's existing rights-of-way. This analysis included preliminary identification of private property ownership and private rights of way.

Franchise Study	
Overview	The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing franchises to accommodate the Project and potential future franchises needed for the Project.
Progress Summary	Over the reporting period, SoCalGas continued the process of identifying and reviewing existing SoCalGas city and county franchise agreements.

## **Engineering Design**

Preliminary Routing/Configuration Analysis	
Overview	The Decision requires (OP 6 (i)) SoCalGas to identify and compare possible routes and configurations for the Project. This study will (i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, other known existing rights-of-way, franchise rights, designated federal energy corridors or rights-of-way, and the need for new rights-of-way; and (iii) evaluate technical considerations, and other potential geographical and urban challenges. This study includes high-level construction staging for implementation of routes and evaluation of a localized hydrogen hub. As part of the configuration analysis, SoCalGas will conduct an initial evaluation of hydrogen storage technology. SoCalGas will assess storage proximity to the Southern California region and both aboveground and underground technologies.
Progress Summary	Over the reporting period, work continued to progress, including evaluation of routing criteria, integration of information from other studies as available, and process development. The routing evaluation considers multiple engineering, environmental, and social criteria, which are defined in a "Criteria Glossary.". The study includes the use of publicly available GIS (Geographic Information System) information and the Pivvot platform ( <a href="https://pivvot.com/">https://pivvot.com/</a> ), which is a route optimization software tool, to assist with the routing process, specifically to streamline siting, suitability analysis and permitting requirements using a datadriven process.

Pipeline Sizing & Design Criteria	
Overview	The Decision requires SoCalGas to compare possible routes and configurations (OP 6 (i)). This study will: (i) estimate potential range of pipeline sizes for the pipeline route from production to end-use; (ii) identify potential materials for pipeline, fittings, and differences in operational equipment; (iii) discuss pressures and maintenance operations associated with design; and (iv) evaluate compression characteristics and options.
Progress Summary	Over the reporting period, SoCalGas initiated preliminary data collection and analysis from other studies as available to establish initial hydraulic modeling cases.

Plan for Applicable Safety Requirements	
Overview	The Decision requires (OP 6 (f)) SoCalGas to evaluate safety concerns involved in pipeline transmission, storage, and transportation of hydrogen applicable to the Project. This study will evaluate safety concerns and develop an assessment of applicable safety requirements for employee, contractor, system, and public safety.
Progress Summary	Over the reporting period, SoCalGas continued to assess and review the applicable safety requirements from regulations and codes and to evaluate how those requirements may apply to the Project.

Workforce Planning & Training Evaluation		
Overview	The Decision requires (OP 6 (e)) SoCalGas to evaluate workforce planning and training. This study will evaluate operations and maintenance protocols for utility workers regarding hydrogen infrastructure and workforce needs in terms of staging and growth for the Project.	
Progress Summary	Over the reporting period, SoCalGas continued to undergo internal assessments and to coordinate internal subject matter expertise specific to training programs and workforce planning to evaluate potential planning and training applicable to the Project.	

# **Appendices**

- 1. Redline to Technical Approach Document
- 2. PAG/CBOSG Written Comments
- 3. SoCalGas Responses to Comments 3A Equity Principles for Hydrogen
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