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SoCalGas Comments on the CEC SB 643 Workshop

Additional submitted attachment is included below.

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October 30, 2023

Melanie Vail
California Energy Commission
Docket Unit, MS-4
Docket No. 22-HYD-02
715 P Street
Sacramento, CA 95814-5512

Subject: Comments on the SB 643 Workshop: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium- and Heavy-Duty Fuel Cell Electric Vehicles and Off-Road Applications

Dear Ms. Vail,

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide comments on the October 16, 2023 California Energy Commission (CEC) workshop on Senate Bill (SB) 643 Staff Report: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium- and Heavy-Duty (MD/HD) Fuel Cell Electric Vehicles (FCEVs) and Off-Road Applications. On October 13, 2023, the United States Department of Energy (U.S. DOE) recently awarded the State of California, through the Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) of which SoCalGas is a partner, up to $1.2 billion to construct a regional clean hydrogen hub and accelerate renewable hydrogen's contribution to decarbonizing the State's economy and build on California's long-standing hydrogen and renewable energy leadership.[1] In light of this major development, the forthcoming SB 643 report is a foundational step in examining the role of clean hydrogen in supporting medium- and heavy-duty FCEVs and delivery to the MD/HD refueling infrastructure.

The following are SoCalGas's responses to the questions posed by the CEC during the workshop:

[1] Governor's Office of Business and Economic Development (GO-Biz), "California Awarded Up to $1.2 Billion to Advance Hydrogen Roadmap and Meet Climate and Clean Energy Goals," October 13, 2023, available at: https://business.ca.gov/california-awarded-up-to-1-2-billion-to-advance-hydrogen-roadmap-and-meet-climate-and-clean-energy-goals/.

A. What are the greatest challenges faced by infrastructure developers? How could they be addressed within the next 5 years, 10 years?

1) Streamlining clean hydrogen infrastructure permit processes will help to simplify and facilitate the process of hydrogen infrastructure construction.

Hydrogen infrastructure operators will require additional intrastate pipelines and related infrastructure to transport hydrogen between production plants, storage facilities, refineries, refueling stations, and customers as the market for clean hydrogen continues to grow and develop. Specifically, SoCalGas' view is this will require pipelines designated as common carriers[2], where pipeline operators receive and transport products without discrimination, and are subject to safety and tariff regulations, preferably subject to the regulatory process of the California Public Utilities Commission (CPUC). In addition, market players and consumers can benefit from a transparent market structure and regulation.

Today, hydrogen use is generally limited to consumption that is co-located or close to production sites (or in industrial clusters). As hydrogen use expands at-scale as regional hydrogen hubs are developed during the near-term expansion and industrial scaling of new networks of shared hydrogen infrastructure, the most cost-effective and reliable means to deliver hydrogen is by pipelines and related infrastructure in bulk from production facilities to demand centers according to U.S. DOE. A key obstacle to making hydrogen fuel widely available is the scale of expansion needed to serve additional markets. Hydrogen production costs are projected to fall significantly during the near-term and industrial scaling expansion periods.[3] However, in order for total delivered cost of clean hydrogen to decline, currently high hydrogen distribution and delivery costs also have to decline, making the cost-effective development of related infrastructure a must for the California hydrogen economy to become sustainable.[4] Figure 1 below from the U.S. DOE *U.S. National Clean Hydrogen Strategy and Roadmap* shows that pipelines have an order of magnitude difference in costs per kilogram compared to other forms of hydrogen transport.

Two potential regulatory approaches to address these challenges are: 1) utilizing the gas utilities' rights-of way (ROWs) whenever feasible to manage hydrogen pipeline costs, 2) permitting streamlining to accelerate the environmental review process for pipeline construction, while maintaining robust safety and environmental considerations. Some features of hydrogen pipelines are similar to those of natural gas pipelines and the same construction, safety, and operating standards of natural gas networks could be adapted for hydrogen pipeline networks. Actions to streamline the permitting and environmental review process and implementing timetables for reviewing applications to construct hydrogen infrastructure would support a timelier pace of deployment while providing that appropriate stakeholder and agency review and ratepayer protections are maintained.

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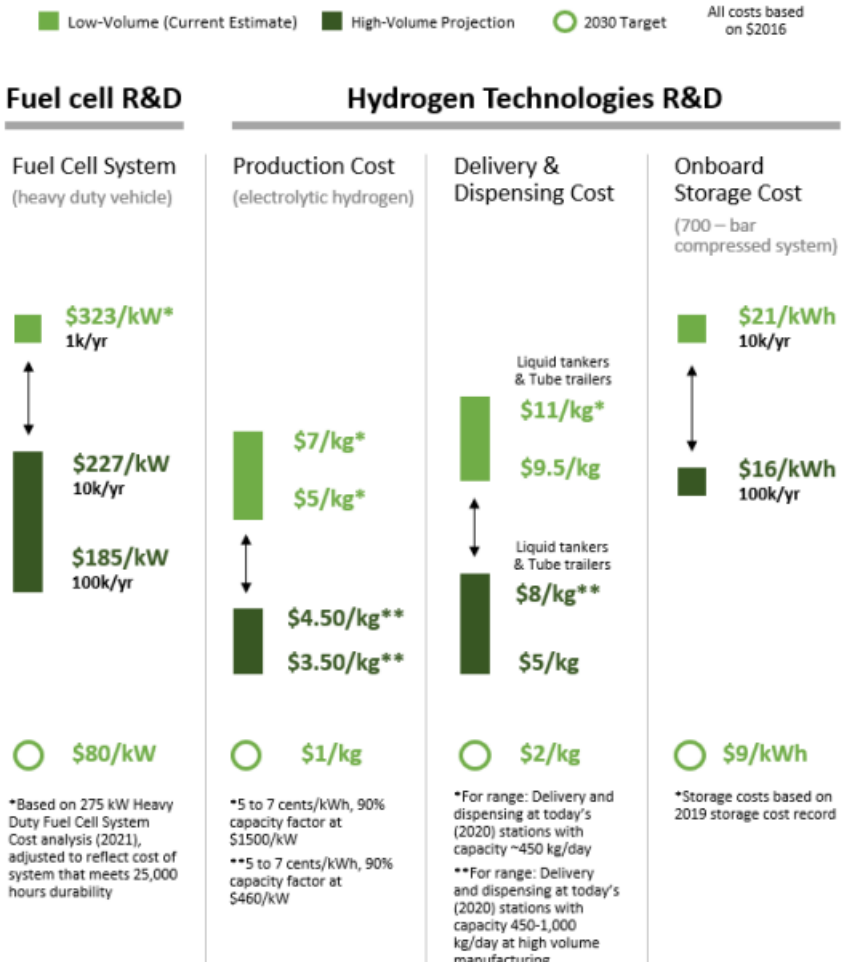
[2] The U.S. DOE similarly states, "open access for pipeline transport and storage of hydrogen is the key trigger to enable low-cost hydrogen energy storage for long duration and for resilience events" in the *U.S. National Clean Hydrogen Strategy Roadmap* at page 41.

[3] U.S. DOE, "U.S. National Clean Hydrogen Strategy and Roadmap," June 2023, at p.24, available at: https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf.

[4] *Ibid.*, p. 26.

A clear and efficient permitting process will demonstrate to prospective market participants the State's commitment to growing hydrogen as a key resource. An expedited permitting process supports the state's efforts to advance one of the nation's first hydrogen hubs, consistent with California's ARCHES application to the U.S. DOE[5] as well as a smoother phase out of heavy-duty diesel trucks, in line with California Air Resources Board (CARB)'s Advanced Clean Fleets rule and transportation decarbonization objectives.

Figure 1: Hydrogen Production, Delivery, Dispensing, and Storage Costs Analyzed, Relative to Cost Projection for High-Volumes and Cost Target[6]



[5] In addition, note that to assist state and local permitting officials address applications for proposed hydrogen fueling stations and other hydrogen and fuel cell projects, U.S. DOE developed permitting tools that help identify model codes and standards related to hydrogen work. *See* "H2 Tools," U.@S. DOE, in collaboration with National Renewable Energy Laboratory (NREL) and Pacific Northwest National Lab (PNNL), available at https://h2tools.org/codes-standards/codes-standards-permitting-tools.

[6] The status of production, delivery and dispensing, and onboard storage costs relative to the cost projection for high-volumes and the ultimate cost target for market competitiveness, provided by U.S. DOE National Clean Hydrogen Strategy and Roadmap, at p.26.

2) Clear regulatory support, oversight and market signals are critical to establishing hydrogen's role in supporting California's decarbonization goals.

During the CEC's Integrated Energy Policy Report (IEPR) Workshop on hydrogen's potential growth in California, CEC Commissioner Andrew McAllister raised questions regarding which regulatory approach would be most appropriate for the developing hydrogen market.[7] SoCalGas agrees that an efficient regulatory framework can provide certainty and clarity to the developing market and to help assure potential offtakers. In addition, clean hydrogen infrastructure projects are capital-intensive and clear market signals could help to attract needed financing of capital from investors for these projects.

Scaling up hydrogen production and its delivery to a broad range of end-users can establish decarbonization pathways for the most difficult-to-decarbonize sectors of the economy like transportation, power generation, cement manufacturing, and other industrial sectors. The SB 1075 process can support strategies that bolster hydrogen supply and delivery to these sectors and support the development and commercialization of hydrogen end-use technologies such as fuel cells and turbines. For example, the U.S. DOE recently released a demand-side initiative to help develop hydrogen offtake opportunities.[8] As the clean hydrogen market grows and gains scale, safe and reliable transport and delivery are critical market elements to connect hydrogen supply and demand and will help to grow it by more effectively connecting supply with demand.

In addition, investing in "clean firm power" (e.g., dispatchable generation resources) is necessary to support overall energy system reliability, and we encourage the Joint Agencies[9] to support such investments. Examples of clean firm power include clean renewable hydrogen fuel cells and combustion turbines, natural gas generation with carbon capture and storage, and geothermal power.[10] Through the Scoping Plan, CARB identified that approximately 9 gigawatts (GW) of hydrogen combustion capacity would be needed to meet 2045 targets.[11] Independent third-party modeling analysis has also shown the need and value of clean firm power to maintain electric reliability in an increasingly decarbonized future.[12]

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[7] CEC, "IEPR Commissioner Workshop on the Potential Growth of Hydrogen Recording," September 8, 2023, available at: https://www.energy.ca.gov/event/workshop/2023-09/iepr-commissioner-workshop-potential-growth-hydrogen.

[8] U.S. DOE, "U.S. Department of Energy Seeks Independent Entity for New Demand-Side Initiative to Accelerate Clean Hydrogen Economy," September 14, 2023, available at: https://www.energy.gov/oced/articles/us-department-energy-seeks-independent-entity-new-demand-side-initiative-accelerate. See also "Biden Harris Administration to Jumpstart Clean Hydrogen Economy with New Initiative to Provide Market Certainty and Unlock Private Investment," DOE, July 5, 2023, available at: https://www.energy.gov/articles/biden-harris-administration-jumpstart-clean-hydrogen-economy-new-initiative-provide-market.

[9] Joint Agencies refers to the CEC, CARB, and CPUC.

[10] CARB, "2022 Scoping Plan for Achieving Carbon Neutrality," December 2022, p. 203, available at: https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

[11] *Ibid*.

[12] Environmental Defense Fund (EDF), Clean Air Task Force, Harvard Center for the Environment, "California Needs Clean Firm Power, and So Does the Rest of the World," p. 2, available at: https://www.edf.org/sites/default/files/documents/SB100%20clean%20firm%20power%20report%20plus%20SI.pdf.

Multiple analyses point to the need for clean firm power and the Joint Agencies should explore the use of clean fuel combustion as a dispatchable clean firm power resource. Use of clean and renewable hydrogen in the power generation sector supports energy system reliability and can help achieve significant greenhouse gas (GHG) emissions reductions benefits.[13] As indicated in CARB's presentation, achieving SB 32's 2030 greenhouse gas (GHG) emission reduction target requires a "462x increase in renewable hydrogen" and achieving carbon neutrality requires "1,700x current hydrogen supply."[14,15] In addition, scaling up the use of clean and renewable hydrogen in power generation will stimulate and facilitate its adoption in a number of hard-to-electrify sectors, such as the industrial and mobility sectors. Delivery of clean and renewable hydrogen through dedicated, common carrier pipelines is crucial to meeting that demand and achieving California's decarbonization goals.

B. What are some assumptions the CEC could use to inform refueling station requirements by 2030, 2035 and beyond? (Capacity of station, mixed-use concept, fuel delivery methods, etc.)

1) Common carrier dedicated pipelines can be used to effectively deliver hydrogen fuel to MD/HD refueling stations.

Based on the CEC's preliminary analysis of hydrogen delivery and onsite production presented during the September 8th IEPR Workshop on the Potential Growth of Hydrogen, dedicated hydrogen pipelines are likely the most viable option for delivering hydrogen to power plants. The CEC should consider policies that support the development of a common carrier hydrogen network that connects multiple hydrogen producers and end users. Indeed, the U.S. DOE has concluded that "for the clean hydrogen economy to reach its full potential we need open access infrastructure," and that "[o]pen access infrastructure would help to drive a competitive market by helping producers and off-takers, both small and large, to access the advantages of infrastructure scale including via pipeline delivery and salt cavern storage."[16]

CEC findings regarding the challenges of onsite hydrogen production as presented during the IEPR Potential Growth of Hydrogen Workshop include:

- Trucking in hydrogen is unsuitable as a delivery option in the context of delivering hydrogen to power plants due to the high delivery volumes required. Cooling infrastructure and liquefaction for trucking also add cost.
- Geographic information system (GIS) review of existing California gas-fired generators showed only a limited set of power plants have space nearby to co-locate electrolyzers.[17]

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[13] CARB, "SB 1075: Joint Agency Kickoff Workshop Presentation," September 5, 2023, slide 8, available at: https://ww2.arb.ca.gov/sites/default/files/2023-09/sb-1075-workshop-090523-presentation-carb.pdf.
[14] *Ibid*. CARB, "SB 1075: Joint Agency Kickoff Workshop Presentation," slides 5 and 11.
[15] CARB, "2022 Scoping Plan for Achieving Carbon Neutrality," November 16, 2022, p. 9, available at: https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp_1.pdf.
[16] U.S. DOE, "Pathways to Commercial Liftoff: Fireside Chat and Clean Hydrogen Deep-Dive," March 23, 2023, at 34:00, available at: https://www.youtube.com/watch?v=3i7qZfJ5G9Q.
[17] The CEC estimated only 33 to 40 of California's gas-fired generators would have space nearby to locate electrolyzers.

- Other challenges exist for co-located production of hydrogen at power plants including: (1) hydrogen storage space requirements, (2) water availability, and (3) land availability for dedicated, co-located renewable generation that may be needed to power the electrolysis process.[18]

As part of the Phase One feasibility studies for the Angeles Link project, which proposes to transport clean renewable hydrogen to decarbonize hard-to-electrify sectors such as dispatchable electric generation, heavy-duty transportation, and commercial (e.g., high value manufacturing) and industrial processes in the Los Angeles Basin and in the broader Southern and Central California region, SoCalGas is currently assessing potential clean renewable hydrogen demand scenarios.[19] The results of the Angeles Link Phase One demand study will be finalized and made public in the near future. The preliminary findings of the transportation demand scenario are similar to the adopted scenario in the California Air Resources Board (CARB) Scoping Plan, which shows there will be significant demand for clean hydrogen in the transportation and mobility sector.[20] This demand can be partially supported by common carrier, dedicated hydrogen pipelines, which can deliver the hydrogen directly to major MD/HD hydrogen refueling stations (~3,000 kg/day)[21]. Smaller MD/HD hydrogen refueling stations with lower daily capacity (~1,000 kg/day)[22] that are in close proximity to hydrogen hubs can receive a clean hydrogen supply through tube trailers and cryogenic liquid-carrying trucks as a last mile delivery method, which is in line with the SB 643 report's assertion that trucking is the cost-effective option to distribute hydrogen at smaller volumes and shorter distances.

2) Hydrogen blending and deblending technologies can be a successful tool for providing hydrogen to help decarbonize the transportation sector.

Hydrogen blending into existing natural gas pipelines has the potential to establish decarbonization opportunities and a means to encourage clean renewable hydrogen production at scale. Blended hydrogen and natural gas streams can potentially be separated at point of use through the deblending process. Deblending can leverage existing natural gas infrastructure to enable transmission and distribution of hydrogen for a variety of end uses that require pure hydrogen. For instance, emerging electrochemical or physical technologies can achieve the selective extraction of hydrogen from a blended stream and may produce fuel cell grade hydrogen for refueling stations. The existing gas system is an in-place investment made by California ratepayers that should be leveraged to transport and deliver clean fuels as it does today with renewable natural gas and, potentially, in the future with clean renewable hydrogen.

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[18] CEC, "IEPR Commissioner Workshop on the Potential Growth of Hydrogen," September 8, 2023, available at: https://www.energy.ca.gov/event/workshop/2023-09/iepr-commissioner-workshop-potential-growth-hydrogen.
[19] Angeles Link could potentially displace up to 3 million gallons of diesel fuel per day by replacing diesel powered HD trucks with hydrogen fuel cell trucks. Please see https://www.socalgas.com/sustainability/hydrogen/angeles-link.
[20] *Ibid.,* CARB, "SB 1075: Joint Agency Kickoff Workshop Presentation," slide 10.
[21] Current assumption used by the CEC for the 2022 Scoping Plan Scenario in the SB 643 report.
[22] *Ibid.*

The creation of a hydrogen injection standard is key to the success of hydrogen production and distribution at scale,[23] and when coupled with deblending technologies can prove to be a successful tool for providing hydrogen for the transportation sector. Hydrogen transportation via pipeline can assure reliability and resiliency in terms of a "continuous" or reliable supply of a hydrogen source, if coupled with deblending technologies. Further, hydrogen blending can allow for lower cost and for price stability in terms of transportation of the hydrogen by utilizing existing pipeline infrastructure and thus eliminating the need to build new pipeline infrastructure and reducing reliance on transporting hydrogen through specialized trucks from station to station. This, in turn, will reduce the impact of other fueling costs on the delivery of hydrogen fuel.

A statewide injection standard for hydrogen and injection into the larger, existing gas system allows for the reduction of hydrogen costs through production and delivery at scale, thus reducing costs to consumers. To reduce the costs of hydrogen[24], there must be increased sources of production to make the costs of the technology process come down. SoCalGas is the largest natural gas utility in the nation with approximately 24,000 square miles service territory and approximately 100,000 miles of natural gas pipeline.[25] SoCalGas thus operates a large network of pipeline infrastructure that has the potential to be leveraged as hydrogen blending and deblending technology is developed. Hydrogen blending demonstrations underway and proposed by the SoCalGas are the next key step in moving toward a statewide hydrogen injection standard for the gas system.

3) Uniform definitions of clean hydrogen across SB 643 and U.S. DOE programs will eliminate confusion and streamline processes.

It is in the public interest to align clean hydrogen definitions with those used by federal government so California is prepared to apply for and receive federal incentives relying on such definitions. SoCalGas commends the CEC for the use of U.S. DOE's proposed definition of clean hydrogen which is a target of 4.0 kilograms of carbon dioxide equivalent (kg of CO_2e) produced per kilogram of hydrogen that is directly produced, or 4.0 kg CO_2e/kg H_2. CEC staff noted during the SB 643 workshop that this definition of clean hydrogen is inclusive of multiple pathways of production beyond electrolysis. This is a technology and production pathway neutral definition, focused instead on well-to-gate carbon intensity. Clear and consistent definitions will help establish guidelines in funding opportunities, procurement, and modeling efforts which will help drive the hydrogen U.S. market.

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[23] CPUC, Scoping Memo and Ruling Opening Phase 4 of Rulemaking 13-02-008, Order Instituting Rulemaking to Adopt Biomethane Standards and Requirements, Pipeline Open Access Rules, and Related Enforcement Provisions, p. 6, available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M320/K307/320307147.PDF.

[24] The U.S. DOE recognizes the overall challenge to hydrogen production is cost. DOE's Hydrogen and Fuel Cell Technologies Office is focused on developing technologies that can produce hydrogen at $2/kg by 2026 and $1/kg by 2031 via net-zero-carbon pathways, in support of the Hydrogen Energy Earthshot goal of reducing the cost of clean hydrogen by 80% to $1 per 1 kilogram in 1 decade ("1 1 1"). More information available here: https://www.energy.gov/eere/fuelcells/hydrogen-production.

[25] Securities and Exchange Commission (SEC), Sempra Energy 2022 Form 10-K, December 21, 2022, available at: Form 10-K for Sempra Energy filed 02/28/2023.

C. *Do you have suggestions on how the CEC can provide relevant information and create an ongoing platform to help inform developers and fleet owners in their decision making?*

The CEC website currently lists its programs in alphabetical order instead of by category. It would be helpful to developers, fleet owners, and other market players to view a list of the programs by category so it would be easier for site visitors to locate relevant information. Fleet owners would benefit from having their own dedicated website geared towards helping them navigate potential CEC funding opportunities.

Conclusion

SoCalGas appreciates the opportunity to provide input to the CEC as it analyzes the role that clean hydrogen can play in the transportation, electric generation, and industrial sectors through various workshops such as SB 643, SB 1075, and the IEPR. This analysis comes at a critical point as the State of California gains momentum in developing its hydrogen hub and network of producers and consumers consistent with the federal hydrogen framework. We look forward to working with the CEC on this and other clean hydrogen production and distribution analyses. Thank you for your consideration of our comments.

Respectfully,

/s/ Kevin Barker

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