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State Agency Relations

September 19, 2023

Rajinder Sahota, Deputy Executive Officer
California Air Resources Board
1001 "I" Street
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RE: PG&E Comments on the Joint Agency SB 1075 Hydrogen Report Workshop

Pacific Gas and Electric Company (PG&E) appreciates this opportunity to comment in response to the Joint Agency Senate Bill (SB) 1075 Hydrogen Report kick-off workshop held on September 5, 2023. PG&E acknowledges the need for further education and clarification of the role for hydrogen in California's energy future and welcomes the opportunity to collaborate with agencies and stakeholders who support decarbonizing California's energy system as quickly as possible.

PG&E is committed to reaching a net-zero energy system by 2040, five years ahead of California's statewide goal. To make this transition, we expect a diverse mix of resources to be available—including broad electrification, cleaner fuels (such as RNG and hydrogen), nature-based solutions, and carbon capture, storage, and utilization.

It is through this lens that we provide the following recommendations to the California Air Resources Board (CARB), the California Public Utilities Commission (CPUC), the California Energy Commission (CEC) and the other State agencies tasked with preparing the SB 1075 report (Report).

PG&E recommends that the Joint Agencies review and support mid-stream hydrogen infrastructure investments targeted at decreasing permitting and hydrogen transportation costs.

CARB notes that 'permitting and building of infrastructure to support climate and air quality goals' will be an area in need of significant work ahead. The State can reduce both the time and cost of hydrogen deployment at scale by supporting projects that seek to validate use of existing infrastructure for hydrogen transport. Therefore, PG&E recommends the State pursue and financially support projects that seek to utilize existing infrastructure and thereby decrease the dependency on permitting.

The Federal government has various programs designed to facilitate hydrogen production (Inflation Reduction Act (IRA) hydrogen production tax credit) and end uses (aspects of the Department of Energy Hydrogen Hubs program). However, there remains a gap in financial support to implement full-scale hydrogen transportation infrastructure.[1] PG&E recommends the Report examine mid-stream infrastructure for the transport of hydrogen and identify opportunities to close this gap by recommending funding for projects that unlock the potential of the entire hydrogen system by connecting production to end uses.

PG&E recommends the Report adopt a definition for 'Clean Hydrogen.'

We acknowledge the CPUC's current definition of 'Clean Renewable Hydrogen[2]' and support this in the long term, including the emphasis on renewable feedstocks. However, in the short and medium term, PG&E recommends the adoption of a definition for 'Clean Hydrogen' that omits the renewable feedstock requirement: "Hydrogen which is produced through a process that results in a lifecycle (well-to-gate) greenhouse gas emissions rate of not greater than 4 kilograms of CO2e per kilogram of hydrogen produced." This definition would align with federal hydrogen production incentives that only assess emissions associated with the hydrogen production method.

There are hydrogen production methods, including methane pyrolysis, that can be created with low-to-zero CO_2 emissions with a fossil feedstock. Allowing for this flexibility in the near-term will decrease the cost of hydrogen, promote efficient use of renewable resources, and spur innovation that is compatible with renewable feedstocks like renewable natural gas.

PG&E recommends the Joint Agencies address hydrogen blending into existing natural gas infrastructure in the Report.

The CPUC is currently examining hydrogen blending in Rulemaking 13-02-008: *Decision Directing Biomethane Reporting And Directing Pilot Projects To Further Evaluate And Establish Pipeline Injection Standards For Clean Renewable Hydrogen.* In this proceeding, the CPUC's Energy Division has identified three key considerations for hydrogen blending into existing natural gas pipeline systems that should be incorporated into the Report:

1) Is injection of hydrogen into the methane system a good environmental solution?
2) Is the risk worth the reward?
3) How do test scenarios translate to broader system impact?

Addressing each of these in turn:

[1] PG&E is investing in mid-stream hydrogen infrastructure research through participation in DOE's Pipeline Blending CRADA (HyBlend) and other Joint Industry Projects (through PHMSA, California Energy Commission, Pipeline Research Council International, etc.). These research projects close knowledge gaps at a laboratory scale. Financial assistance to implement full-scale research is needed.

[2] Hydrogen which is produced through a process that results in a lifecycle (i.e., well-to-gate) greenhouse gas emissions rate of not greater than 4 kilograms of CO2e per kilogram of hydrogen produced and does not use fossil fuel as either a feedstock or production energy source. (CPUC Decision 22-12-057 Ordering Paragraph 4)

1) Hydrogen Injection

PG&E believes that injection of hydrogen into the existing natural gas pipeline system is a good environmental solution and will allow for benefits to be achieved sooner than waiting for dedicated hydrogen infrastructure. In the short- to medium-term, all means of emissions reduction should be considered given the urgency of the climate crisis before us.

However, another important metric is the cost to implement emissions reduction strategies as affordability must go together with decarbonization. The State's energy system cannot be transitioned immediately, so incremental progress should be pursued wherever practical and possible. While challenges exist, hydrogen is one of the most promising avenues to reduce the emissions associated with the use of energy delivered through the natural gas pipeline system.

In addition to reducing emissions from gas combustion, blended hydrogen can be separated after delivery through the pipeline network, enabling the use of 100% hydrogen in applications such as transportation, industrial feedstock, green ammonia for agriculture and small-scale power generation.

For example, electric microgrids that can help reduce risks to the larger electric grid can be powered by clean renewable hydrogen and are technically viable today, as demonstrated by PG&E's microgrid project designed to support the city of Calistoga. When hydrogen is used with fuel cells in this way there are zero emissions apart from water. Deblending technology is within the scope for demonstration at the Hydrogen to Infinity project and PG&E is already in conversation with several vendors working in this space.

2) Risk / Reward

PG&E agrees that the assessment of risk and ensuring safety are key considerations related to blending of hydrogen into natural gas infrastructure.

The Hydrogen to Infinity (H2∞) project[3] will enable large-scale decarbonization of natural gas networks by demonstrating it is safe to leverage existing infrastructure for long-distance transmission of hydrogen. This will minimize the need for capital-intensive new pipeline networks to deliver hydrogen at scale and minimize the need to permit new pipelines.

PG&E and partners are in the engineering design stages of this major initiative (which was announced in May 2022[4]) as the centerpiece of PG&E's efforts to explore the use of

[3] https://www.pge.com/en_US/about-pge/environment/hydrogen.page?WT.mc_id=Vanity_hydrogen

[4] "PG&E Launches the Nation's Most Comprehensive Study on Hydrogen's Feasibility Within Gas Pipelines," PGE Currents: https://www.pgecurrents.com/articles/3441-pg-e-launches-nation-s-comprehensive-study-hydrogen-s-feasibility-gas-pipelines

hydrogen as a fuel to help reduce greenhouse gas (GHG) emissions. H2∞ will be the most comprehensive end-to-end hydrogen study and demonstration site in the US—carrying out full-scale, real-world testing of high hydrogen concentrations at high system pressures. It will fill critical gaps in global knowledge about how to implement carrying high-concentration blends in existing high-pressure transmission systems. The H2∞ project will be a leap forward, providing information that will help advance global efforts to utilize hydrogen as a valued tool in society's decarbonization toolbox.

The H2∞ facility includes low-carbon hydrogen production and significant consumer loads, full-scale testing in high-pressure transmission assets with a comprehensive RD&D program, education and training facilities for workforce transition and internal and external stakeholder education, as well as a hydrogen refueling station to support local low-carbon fleets.

Transmission pipelines are more economical than trucks for long-distance transportation of large amounts of hydrogen. Using existing infrastructure would be less expensive than constructing new systems. Robust research around the world has yielded valuable information about low hydrogen concentrations in low-pressure distribution systems. However, to significantly reduce GHG emissions, higher hydrogen concentrations are needed, and the blended fuel will need to be transmitted at higher pressures to carry fuels long distances.

H2∞ will fill critical safety and system-integrity information gaps, advancing understanding of how blends with different hydrogen concentrations will affect transmission infrastructure when transmitted at high pressures. This ambitious endeavor will enhance US leadership in adopting alternative fuels to reduce our carbon footprint.

PG&E requests support from the Joint Agencies, and from ARCHES, in our pursuit of state and federal funding to reduce the financial burden to PG&E customer rates, because the project will benefit the entire state, not just PG&E customers. Hydrogen to Infinity is a project that can enable large-scale decarbonization in a cost-effective way that may be replicated across the country.

Due to the nationwide and interconnected nature of natural gas infrastructure, PG&E recommends the CPUC engage the National Association of Regulatory Utility Commissioners (NARUC) on the topic of hydrogen blending. PG&E could be a host to a national collaboration of utilities, overseen and supported by various utility commissions working synergistically to decarbonize the interstate natural gas systems. PG&E recently discussed the H2∞ project with leadership from the Pipeline and Hazardous Materials Safety Administration (PHMSA), and this coordination with NARUC was one of their recommendations.

3) Test Scenarios

Comprehensive full-scale research and testing programs that build on and validate existing research and small-scale models will effectively simulate real-world conditions.

In collaboration with leading global experts, including staff from national laboratories, PG&E's H2∞ project will focus on the impact from hydrogen blending on all aspects of gas transmission, which is not yet fully understood by the industry. The project has three components: (1) research, development, and demonstration (RD&D); (2) education; and (3) market activation.

For RD&D, the primary components are:

- Full-Scale Pipeline Loop—built and operated as real-world natural gas transmission pipelines are, but completely standalone so that tests can be run safely
- Full-Scale Destructive Testing—facilities to enable full-scale equipment compatibility and leak, materials, and integrity testing
- Laboratory—advanced research and testing facility, control center and digital infrastructure for monitoring and controlling the pipeline and testing equipment

A partial list of program topics range from materials compatibility over long durations and varied operating conditions, operations and maintenance including training for workers, welding considerations, leak detection, inspection practices, measurement and control, and compression.

PG&E recommends the Joint Agencies in California oppose additionality requirements for clean hydrogen production.

The US Treasury Department is tasked with providing implementation guidance for the new, Section 45V of the tax code, created under the Inflation Reduction Act, which establishes a clean hydrogen production tax credit. One aspect under consideration for the guidance is the concept of additionality, where only hydrogen produced from newly installed renewable energy projects would be eligible for the tax credit. PG&E opposes the implementation of an additionality requirement for two main reasons:

1. Requiring new dedicated renewable energy resources to be deployed for hydrogen production would significantly increase the total cost to produce clean hydrogen, undermining the intent of the hydrogen production tax credit.
2. California already curtails excess renewable energy[5] that could be used to produce clean hydrogen. Additionality requirements would strand renewable energy that could be used to decarbonize electricity at a future time when new renewables aren't sufficient.

The California Independent System Operator includes energy storage as a solution to renewables' curtailment[6] and hydrogen production fits this role well as an energy storage medium.

PG&E agrees with the intent of additionality requirements, in that we do not want hydrogen production to result in any increase in carbon emissions. Rules that enable high-GHG emission

[5] In 2022, California has curtailed more than 1,860 gigawatt-hours of wind and solar. http://www.caiso.com/informed/Pages/ManagingOversupply.aspx
[6] https://www.caiso.com/informed/Pages/ManagingOversupply.aspx

hydrogen production are counterproductive to our State and company goals and would not demonstrate leadership on climate action. However, ideally all renewable power is used instead of being curtailed. Enabling the use of existing resources for hydrogen production would allow the best use of existing resources and encourage rapid hydrogen infrastructure deployment. Finally, as California progresses in its goal towards 100% zero-carbon and renewable electricity this will lead to more hours of renewable curtailment, meaning the principle of additionality is more likely to be achieved over time.

PG&E supports the pragmatic approach the Joint Agencies are taking to hydrogen implementation.

As noted in CARB's 2022 Scoping Plan, increased production, deployment, and use of low-carbon hydrogen will be an essential tool to achieve carbon neutrality and reduce use of fossil fuels as quickly as possible. Investments in research and testing to ensure safety and reliability of hydrogen infrastructure must be funded and advanced to support these goals. PG&E supports the proposed approach shared by the Joint Agencies in the workshop for development of the Report and we look forward to providing additional input throughout the process.

Sincerely,

/s/
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