

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

Order Instituting Rulemaking to  
Establish Policies, Processes, and  
Rules to Ensure Safe and Reliable Gas  
Systems in California and perform  
Long-Term Gas System Planning.

Rulemaking 20-01-007  
(Filed January 16, 2020)

**COMMENTS OF THE GREEN HYDROGEN COALITION ON THE  
ADMINISTRATIVE LAW JUDGE'S RULING SEEKING COMMENTS ON SCOPING  
MEMO TRACK 2A SCOPING QUESTIONS 2.1(B)-2.1(K)**

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In accordance with the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), the Green Hydrogen Coalition ("GHC") hereby submits these comments on the Administrative Law Judge’s Ruling seeking comments on Scoping Memo Track 2a scoping questions 2.1(b)-2.1(k) on May 25, 2022.

**I. INTRODUCTION.**

GHC<sup>1</sup> is a California educational 501(c)(3) non-profit organization. GHC was formed in 2019 to recognize the game-changing potential of "green hydrogen" to accelerate multi-sector decarbonization and combat climate change. GHC's mission is to facilitate policies and practices that advance green hydrogen production and use in all sectors of the economy to accelerate a carbon-free energy future and a just energy transition. Our sponsors include renewable energy users and developers, utilities, and other supporters of a reliable, affordable green hydrogen fuel economy for all.

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<sup>1</sup> See <https://www.ghcoalition.org/>

GHC appreciates the Commission's recognition of the capability of green hydrogen to play a critical role in maintaining the reliability of the State's electric grid while advancing decarbonization within the power sector. The Commission's efforts on green hydrogen reflect progressive thinking and a much-needed market signal that will support the foundational approach to scaling green hydrogen, which is to aggregate demand and encourage large-scale off-takers to utilize green hydrogen.

The GHC defines green hydrogen as hydrogen produced from non-fossil fuel resources and has climate integrity – emits zero or de minimis<sup>2</sup> greenhouse gases on a lifecycle basis. Green hydrogen can be used as a fuel for electricity production and a means for multi-day and seasonal renewable energy storage. In addition, once scaled, green hydrogen can help California move away from fossil fuel use in other applications such as transportation, industrial, maritime, and aviation. Considering that hydrogen is a mainstream commodity that can be utilized in many applications across many sectors of the economy, the production and use of green hydrogen will be essential to decarbonize sectors beyond electricity, further enabling the attainment of our climate goals.

GHC appreciates the opportunity to comment on the Commission's Ruling. GHC generally supports the Commission's effort to develop and implement a long-term gas system planning strategy. GHC's comments focus on the potential for zero-carbon fuels such as green hydrogen as a solution to repower the existing gas system to decarbonize hard-to-electrify sectors while furthering California's economy and supporting reliability needs. The development of a green hydrogen gas pipeline system is critical to achieving low delivered cost and accelerating a clean and just energy transition with green hydrogen. GHC's system planning work was completed in

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<sup>2</sup> "De minimis" means an insignificant amount of non-renewable energy resources (does not exceed 10 percent of the total energy inputs) allowed to be counted as RPS-eligible. See Green, Lynette, Christina Crume. 2017. Renewables Portfolio Standard Eligibility Guidebook, Ninth Edition. California Energy Commission, Publication Number: CEC-300-2016-006-ED9-CMFREV.

2021 to architect a green hydrogen economy for multi-sectoral off-takers in the LA basin and determined that gas pipeline infrastructure was the lowest cost pathway for achieving mass scale, <\$2/kg delivered green hydrogen.<sup>3</sup>

Green hydrogen and needed pipeline infrastructure are also timely from energy security and fuel risk standpoint. The war in Ukraine and resulting fossil fuel price spikes are affecting all sectors that rely on fossil fuels, including fertilizer costs for California's crucial agricultural sector. California is blessed with abundant feedstocks to produce green hydrogen and can and should be diversifying our energy mix accordingly. Advancing green hydrogen pipeline infrastructure will not only aid California's multi-sectoral decarbonization and energy security but will also create jobs and set up California well for high volume international export of green hydrogen, which will emerge as one of the world's most traded commodities. Given the high prices of natural gas in Europe, this international trade is already commencing, as evidenced by a recent substantial transaction between Forestcue Future Industries and German utility Eon, which represents one-third of Germany's total imports of natural gas from Russia on an energy basis.<sup>4</sup>

In our responses, GHC urges the Commission to consider implementing a long-term gas planning approach that would allow for the identification of critical gas infrastructure that should be leveraged and enhanced to enable an accelerated transition to zero-carbon fuels. In this context, GHC's comments can be summarized as follows:

- The Commission should engage in a long-term programmatic planning approach every two years to identify critical gas infrastructure, determine the share of these

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<sup>3</sup> See <https://www.ghcoalition.org/hydeal-la>

<sup>4</sup> See <https://www.reuters.com/business/sustainable-business/eon-australias-ffi-explore-green-hydrogen-transport-europe-2022-03-29/>

assets that merit enhancement, and establish a plan to develop a green hydrogen pipeline network to support California's climate goals while preserving reliability.

- Before developing criteria for transmission investments, the Commission should first provide a strategic vision of how the gas system will evolve in line with the State's climate goals.
- The Commission should begin by setting an overarching goal with clear targets to guide gas planning in the context of California's climate ambitions.
- The Commission should identify the gas infrastructure that remains critical, even under the state's ambitious decarbonization targets, given:
  - Downstream needs with a particular focus on hard to electrify applications/sectors.
  - Role for the production of needed zero-carbon liquid fuels.
  - Impact on cross-sectoral decarbonization efforts, including the ability to co-optimize across existing infrastructure (e.g., gas sector and electric sector)
  - Impacts on local emissions and reliability, particularly emphasizing near-term ability to improve the air quality of communities of concern

**II. B. WHAT CRITERIA SHOULD THE COMMISSION USE TO DETERMINE WHETHER AGING TRANSMISSION INFRASTRUCTURE SHOULD BE REPAIRED OR REPLACED WHEN A GAS UTILITY REQUESTS RATEPAYER FUNDS?**

Before developing criteria for transmission investments, the Commission should provide a strategic vision of how the gas system will evolve in line with the state’s climate goals. This will help the Commission address the many decisions about the infrastructure needed to support a zero-carbon energy system. The Commission should begin by setting an overarching goal with clear targets to guide gas planning in the context of California’s climate ambitions and set clear criteria to ensure a robust assessment of alternative solutions to traditional infrastructure needs. Doing so will send clear signals to utilities to maintain system safety while transitioning the natural gas pipeline network to a green hydrogen pipeline network to support those hard-to-abate sectors that require an alternative to electrification.

Then, the Commission should identify the gas infrastructure that remains critical, even under the state’s ambitious decarbonization targets. This infrastructure may include pipelines and generators serving locally constrained areas and users but may not be limited to such parameters. The GHC elaborates on the criteria used for this analysis in our response to Questions 2.1 (D) and (J). Once the infrastructure that will remain critical has been identified, the Commission should evaluate the potential emissions of preserving these assets and compare those metrics with the emissions allowable under the state’s Senate Bill (“SB”) 100 goals. This comparison will allow the Commission to identify the needed abatement and make informed decisions regarding the transition of this infrastructure to zero-carbon fuels, such as green hydrogen.

**III. D. I. WHAT PIPELINE-RELATED CHARACTERISTICS SHOULD BE CONSIDERED WHEN DETERMINING WHETHER TO REPLACE DISTRIBUTION INFRASTRUCTURE (E.G., DOWNSTREAM IMPACTS, PIPELINE’S ROLE IN SERVING INDUSTRIAL (HARD TO ELECTRIFY) LOAD, TYPE OF CUSTOMERS SERVED, CUSTOMER DENSITY, AGE, SAFETY CONDITION, PIPE MATERIAL SUCH AS ALDYL-A, PROXIMITY TO A SOURCE OF RENEWABLE GAS)?**

Pipeline infrastructure is particularly critical to deploying low-cost, mass-scale delivered zero-carbon fuels in California. Given the continued need for zero-carbon firm dispatchable generation and its affordability benefits, the Commission should prioritize identifying critical gas pipeline infrastructure needed to achieve economy-wide decarbonization with a particular focus on hard-to-electrify sectors and applications before derating and decommissioning any existing pipeline infrastructure. One near-term application is clean firm dispatchable power utilizing existing thermal generators. The thermal generation that is physically located close to other potential mass-scale off-takers of green hydrogen and its derivative fuels in non-attainment areas should be prioritized. Specifically, the Commission should consider the needs of local load pockets, local reliability areas, and hard-to-electrify customers and sectors to construct a cohesive landscape of the pipeline assets that merit continued investment to repurpose and, in a timely and orderly fashion, convert them towards 100% green hydrogen pipelines (*as is being done in Europe today via the European Hydrogen Backbone Initiative<sup>5</sup> and as contemplated by Southern California Gas Company’s Angeles Link application<sup>6</sup>* ).

The Commission must acknowledge that some thermal generation will be required in some load pockets to provide reliability, resiliency, and resource adequacy in a decarbonized grid to support weather-dependent intermittent renewable resources and seasonal fluctuations in demand.

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<sup>5</sup> See <https://ehb.eu/>

<sup>6</sup> See <https://www.socalgas.com/sustainability/hydrogen/angeles-link>

Ultimately, the critical value of thermal generation will be to deliver the capacity backup needed to help ensure reliability during multi-day, weekly, monthly, and ultimately seasonal periods where renewable production is significantly lower than demand. Near-term local onsite renewable hydrogen generation produced with renewable electricity can serve as a fuel and long-duration energy storage for thermal generation resources to produce local dispatchable resilient clean electricity and reduce curtailment. It can also address the opportunity to repurpose existing gas transmission and distribution infrastructure while maintaining reliability. In the medium term, green hydrogen injection into existing natural gas pipelines can supply these plants. In the longer term, the transition to a 100% green hydrogen pipeline can enable additional multi-sectoral offtake.

Given the fact that current California planning models indicate a continued need for dispatchable generation, even retaining carbon-emitting assets such as thermal generators, the GHC considers that specific criteria must be established to determine if a gas infrastructure asset is critical or not. GHC believes that assets deemed critical should be further studied to evaluate if their transition to a zero-carbon fuel is needed under California's environmental goals and/or desirable given its transformative cross-sectoral and regional effects. As such, GHC proposes that the following criteria are considered in the determination of whether a pipeline should be replaced, repaired, or enhanced:

- Downstream needs: The Commission must consider if the underlying needs served by the pipeline relate to uses that are hard to electrify or to the preservation of local reliability.
- Usage for zero-carbon fuels: The Commission should consider if the pipeline material can accommodate high blends of or 100% green hydrogen and necessary modifications to related compression equipment



- Impact on cross-sectoral decarbonization efforts: The Commission should consider the effects of repairing or enhancing assets that serve needs across sectors and how the gas pipeline infrastructure can be co-optimized with other needed infrastructure to achieve a green hydrogen economy – namely the power, water, and waste sectors.
- Impacts on local emissions and reliability: The Commission should consider the benefits of enhancing the infrastructure to mitigate local air pollution and retain reliability through the use of zero-carbon fuels.

With this criterion in mind, the Commission should be able to discern infrastructure that could be replaced or enhanced to accommodate zero-carbon fuels and comply with the state’s overarching climate goals while retaining reliability in its gas and electric systems. Such analysis should be carried out in accordance with GHC’s response to Questions 2.1 (B) and (J).

**IV. F. WHAT INFRASTRUCTURE IS NEEDED TO FULFILL THE NEEDS OF CUSTOMERS WHO ARE LIKELY TO REMAIN ON THE GAS SYSTEM THE LONGEST, SUCH AS ELECTRIC GENERATORS OR DIFFICULT-TO-ELECTRIFY INDUSTRIAL USERS?**

The GHC considers that an accelerated transition towards zero-carbon fuels such as green hydrogen would meet the needs of customers likely to remain in the gas system while advancing California’s climate goals and retaining a reliable electric system. This transition, however, can only be achieved in the near term by leveraging cross-sectoral demand for hydrogen and overhauling the gas system’s critical infrastructure. As detailed in our work in the HyDeal initiative, GHC envisions connecting green hydrogen producers with off-takers to create a bankable hydrogen market, thereby accelerating the deployment of renewables, fostering market competition, and revitalizing California’s decarbonized industrial sector.

By 2045, California will be closing in on its climate targets. By complementing the rapid deployment of renewables and electrification with storable, climate-neutral energy carriers such as hydrogen, the state will be able to retain affordability and adequacy within its future energy system. System analysis completed to date in the HyDeal platform has shown that achieving this vision is only possible with 100% green hydrogen pipelines – the lowest cost way of transporting mass quantities of needed green hydrogen from areas of low-cost production to areas of concentrated multi-sectoral demand. To do so, the Commission should proactively review the current state of the gas system and identify critical infrastructure that should be enhanced to transition towards a green hydrogen pipeline network.

A green hydrogen pipeline network will be needed to serve thermal generation, long-haul trucking corridors, air- and seaports, and connect industrial hydrogen demand with supply. This backbone will require substantial green hydrogen volumes, and to achieve this, natural gas pipelines will need to be retrofitted for 100% green hydrogen transport. This green hydrogen pipeline network will enable more rapid scaling of hydrogen producers who are more likely to build scaled systems with the capability to transport hydrogen to the broadest set of end-users. Green hydrogen producers will be more prone to develop smaller projects that serve a more localized need without the ability to transport hydrogen at scale. Accordingly, early investments in hydrogen delivery infrastructure will play a critical role in catalyzing zero-carbon fuel development.

Furthermore, some hard-to-abate sectors such as shipping, industry, and aviation are making long-term investments today. They must know if green hydrogen and a green hydrogen delivery network will be in place before said investments. Tackling the hard-to-abate sectors early on is essential as industry and transportation emissions represent most of the remaining emissions

that California will ultimately need to tackle. Overall, investment in green hydrogen pipeline infrastructure will be required to help enable industry and heavy-duty transport to decarbonize to manage costs and bring more stability to the sectors that are particularly exposed to the energy transition. The Commission can accelerate progress for these sectors by establishing needed market signals – a clear vision and framework for transforming existing gas infrastructure to serve green hydrogen.

V. **G. WHAT SHOULD BE THE ROLE OF EXISTING NATURAL GAS STORAGE FACILITIES AS A COMPONENT OF GAS UTILITIES' INFRASTRUCTURE PORTFOLIO?**

Natural gas storage facilities transitioning to green hydrogen storage facilities could be necessary in the future because no other natural reserves (e.g., geologic salt formations) can be relied upon at times of high demand. With hydrogen produced from intermittent renewables, green hydrogen storage becomes a needed investment for a clean fuels system. The amount of hydrogen storage required will depend on the fluctuations in green hydrogen production and the amount of hydrogen needed for grid reliability and local resource adequacy. Grid reliability and local resource adequacy will rise in importance in a fully decarbonized California when low solar and wind energy production may periodically occur for long periods of time. Hydrogen storage is a critical tool to address these needs. For this reason, existing natural gas storage facilities could provide a more cost-effective storage solution for large-scale green hydrogen storage, but they are not yet commercially proven, and more R&D is needed. The Commission, in collaboration with the CEC, should further explore this as an alternative for repurposing this existing infrastructure and investment. However, the needed R&D for repurposing existing natural gas storage assets should not slow progress.

Hydrogen is commercially stored in underground salt domes in the US today. There is a very large, commercially proven, and recently funded salt dome in Delta, Utah that could be leveraged for California’s green hydrogen economy. The ACES Delta project, located in Utah, is the closest commercially proven salt dome and was modeled in the first phase of HyDeal LA is key to achieving <\$2/kg delivered. Further, as recently as June 9, the DOE announced that it closed on a \$504 million loan guarantee to establish hydrogen storage with 150GWh of seasonal storage capacity.<sup>7</sup> For this reason, GHC recommends that the Commission consider the role of this already commercially proven facility in its green hydrogen gas pipeline decarbonization strategy, particularly since California does not have any proven geologic salt domes. It would be prudent, for example, for green hydrogen pipeline development in California to build in the direction of this massive regional green hydrogen storage capability.

**VI. J. HOW SHOULD THE COMMISSION CONSIDER THE NEED FOR GAS INFRASTRUCTURE THAT MAY BE NEEDED TO SERVE NEW INDUSTRIAL GAS CUSTOMERS IN DIFFICULT-TO-ELECTRIFY SECTORS AS PART OF THE LONG-TERM GAS SYSTEM PLANNING PROCESS?**

As stated in GHC’s responses to Questions 2.1 (B) and (D), GHC considers that the Commission should engage in a programmatic planning approach to identify critical gas infrastructure, determine the share of these assets that merit enhancement, and establish a plan to develop a green hydrogen pipeline network to support California’s climate goals while preserving reliability. In this context, GHC considers that the Commission should initiate a long-term planning process similar to the one led by Energy Division (“ED”) under the Integrated Resource Planning (“IRP”) proceeding.

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<sup>7</sup> See <https://www.energy.gov/articles/doe-announces-first-loan-guarantee-clean-energy-project-nearly-decade>

In said process, which is conducted every two years, ED first utilizes the forecasts developed by load-serving entities (“LSEs”) and the California Energy Commission (“CEC”) to determine the demand for electricity in the next ten years. These demand forecasts, plus a planning reserve margin (“PRM”), inform the demand that the overall system is required to cover. Following this assessment, capacity expansion models are fed LSE plans to identify the least-cost portfolio that meets both the load requirement and the policy constraints adopted, such as the greenhouse gas (“GHG”) limit. Once an optimal resource mix has been identified, ED uses production cost models to determine the reliability of the solution. This modeling process is carried out iteratively until an acceptable solution is found. Once an optimal and reliable solution has been identified, the portfolio is adopted, and the Commission is able to direct procurement to its jurisdictional LSEs based on said results.

GHC considers that a similar planning process should be adopted for the gas sector. This is reasonable since, similar to the electric sector, the gas sector requires long lead times for planning. The deployment of large-scale transmission, storage, and port infrastructure— including development, engineering studies, and construction – can take up to 10 years. As such, the sector needs a regularly scheduled planning process that can send the right market signals, seize the upcoming investment windows, and have concrete infrastructure projects in place by 2030.

Moreover, a planning venue for gas infrastructure would support the efforts currently underway in the electric sector. Today, long-term electricity planning is performed in a vacuum, without much explicit consideration of the effects of decarbonization and electrification on the costs and demands of other markets. These planning silos have the potential to undermine each other if cross-sectoral strategies and advantages are overlooked. Furthermore, as stated previously, most electric planning results show the need to retain a vast share of the gas infrastructure used in

the electric sector. As such, disconnected and *ad hoc* planning in the gas sector cannot inform other cross-sectoral strategies. Thus, the GHC urges the Commission to establish a long-term planning venue for gas infrastructure based on current policy goals, recognize local needs, and inform electric planning processes.

GHC recommends that the long-term gas planning approach starts by identifying the emission targets applicable for the next decade given California's decarbonization policies, such as SB 100. This metric will allow the Commission to understand the magnitude of emissions that should be subject to abatement strategies. Next, the Commission should conduct a thorough inventory of all gas infrastructure subject to the target. This inventory should be shared with parties and vetted through at least one public workshop. Once the inventory is established, the Commission should use the criteria identified in GHC's response to Question 2.1 (D) to determine which infrastructure is critical and should thus be considered for repair or enhancement. GHC anticipates that identifying critical infrastructure will require the Commission to collaborate with LSEs closely and potentially the California Independent System Operator ("CAISO"), as these entities are closely engaged with ensuring the reliability of locally constrained areas.

Following the identification of critical infrastructure prime for repair or enhancement, the Commission should request gas utilities to submit long-term plans (preferably 10-year plans, as done in IRP) to repair or enhance their critical infrastructure while meeting the overarching climate and emission targets. These filings should then be aggregated by the Commission and reported to parties in the form of a Ruling requesting feedback. After said feedback period, the Commission should incorporate comments, verify the reliability and cost impacts of the plans, and inform parties of these results through a Ruling. Once a plan that satisfies both reliability and emission

targets is identified, the Commission should adopt it as the preferred gas plan via a proposed decision. GHC recommends that this process is carried out every two years.

**VII. CONCLUSION.**

GHC appreciates the opportunity to submit these comments to the Ruling and looks forward to working with the Commission and stakeholders in this proceeding.

Respectfully submitted,

/s/ Nicholas Connell

Nicholas Connell

Policy Director

**GREEN HYDROGEN COALITION**

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