

**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 27, 2020)

**COMMENTS OF THE CALIFORNIA HYROGEN BUSINESS COUNCIL
ON ASSIGNED ADMINISTRATIVE LAW JUDGE’S RULING
ISSUING WORKSHOP REPORT AND STAFF RECOMMENDATIONS,
SEEKING COMMENTS, AND MODIFYING PROCEEDING SCHEDULE**

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November 2, 2020

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I. Introduction

The California Hydrogen Business Council (CHBC)¹ welcomes the opportunity to provide the following comments to the *Assigned Administrative Law Judge’s Ruling Issuing Workshop Report and Staff Recommendations, Seeking Comments, and Modifying Proceeding Schedule* in the above captioned proceeding. Our comments focus on the staff workshop report released on October 2, 2020 titled *R.20-01-007 Track 1A: Reliability Standards and Track 1B: Market Structure and Regulations, Workshop Report and Recommendations* (“Workshop Report”). We appreciate the Workshop Report including a summary of comments in support of hydrogen by Dr. Jeff Reed on behalf of the CHBC at the Track 1B workshop, along with CHBC’s oral

¹ The CHBC is comprised of over 100 companies and agencies involved in the business of hydrogen. Our mission is to advance the commercialization of hydrogen in the energy sector, including transportation, goods movement, and stationary power systems to reduce emissions and dependence on oil. The views expressed in these comments are those of the CHBC, and do not necessarily reflect the views of all of the individual CHBC member companies. Members of the CHBC can be found here: <https://www.californiahydrogen.org/aboutus/chbc-members/>.

comments.² We are concerned and disappointed that the report’s recommendations completely neglect to include actions to examine or advance incorporation of hydrogen into future state gas and electricity system planning. This not only ignores the recommendation of experts, but is also misaligned with state policy that calls for maintaining a reliable energy supply, achieving carbon neutrality (Executive Order B-55-18), mitigating short-lived climate pollutants (SB 1383) and considering green electrolytic hydrogen for storage and other purposes (SB 1369).

Our specific comments are summarized below and detailed in the Comments section that follows.

- A. The Commission has rightly acknowledged that the state faces a challenge of how to reliably meet intraday and seasonal reliability requirements supplied by gas for electricity generation in an increasingly renewable electricity system. However, the Workshop Report recommendations ignores the finding of two workshop panelists, among other experts, that low greenhouse gas fuels, including hydrogen, will be needed to address this problem – an omission we urge you to rectify.**

- B. The aforementioned experts join a growing consensus that hydrogen as a long duration storage and firm power resource among other applications in the transportation, industrial and potential additional sectors stands to play a key role in fulfilling California statutory energy system requirements to maintain reliability while becoming 100% clean and carbon neutral.**

- C. The promise and necessity of hydrogen as a resource to decarbonize and stabilize the electricity system as it transitions to renewable and zero carbon resources is already leading to tangible commercial investment in California and beyond.**

- D. Decarbonized hydrogen will be an important resource to achieve climate goals in other sectors, including transportation, buildings, agriculture and industry, which should additionally be reflected in planning for gas system reliability, market structures and regulations.**

² Workshop report, pp. 25-26, 34

E. The CHBC wishes to correct the record regarding an inaccurate statement attributed to Dr. Jeff Reed about study findings on the near future pricing of renewable hydrogen.

II. Comments

A. The Commission has rightly acknowledged that the state faces a challenge of how to reliably meet intraday and seasonal reliability requirements supplied by gas for electricity generation in an increasingly renewable electricity system. However, the Workshop Report recommendations ignores the finding of two workshop panelists, among other experts, that low greenhouse gas fuels, including hydrogen, will be needed to address this problem – an omission we urge you to rectify.

1. The Commission correctly recognizes in the Scoping Memo Track 2 Issue 1.b and c that reliably meeting the gas needs of electric generators during hourly and intraday fluctuations, as well as multiple days of low renewable generation, presents a challenge that must be addressed.

The agenda for the July 21 Track 1B workshop on market structure and regulations, in its description of the panel on *Reliability in All Timescales: Getting Gas to Electric Generators*, articulates the challenge: “The expansion of intermittent energy resources, such as wind and solar, is currently dependent on the complementary ability of gas-fired generators to meet intraday ramping needs and to generate electricity during the “dunkelflaute” periods in winter when California has very little wind or solar generation for days at a time.”³ The CHBC wholly agrees these concerns need to be addressed, and while we appreciate that panelist recommendations to utilize hydrogen technologies to do so were included in the Workshop Report description of comments, we are concerned that they were excluded from the staff recommendations. More specifics on this concern are detailed below.

³https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Safety/Natural_Gas_Pipeline/News/Agenda%20for%20R2001007%20Track%201B%20Workshop.pdf

2. Two experts on the July 21 workshop panel specifically pointed to the importance of including hydrogen and other low or zero greenhouse gas gaseous fuels in gas and electricity system analyzing and planning to help address this problem, and we disagree strongly with the Workshop Report recommendations neglecting their advice.

- a. *Dr. Long of CCST explained the necessity of deploying low greenhouse gas fuels, such as hydrogen, to ensure reliability as dependence increases on variable renewable electricity.*

Dr. Long of CCST rightly pointed out, as stated in the Workshop Report, that gas storage provides many critical functions related to reliability, including preparing “for winter use, meeting winter peak day demand, supporting hourly changes in demand, and serving as back-up for renewable generation. Additionally, gas storage has been needed to respond to emergencies related to weather and wildfires.”⁴ Dr. Long also correctly stated that “gas storage serves a financial function through seasonal and short-term arbitrage.”⁵ She explained that growing reliance on an electricity system that is powered by variable renewable sources will increasingly cause imbalances between power supply and demand and that in “2030 and beyond, California will need some type of low greenhouse gas fuel such as biomethane, synthetic natural gas, or hydrogen to address multiday or seasonal supply-demand imbalances.”⁶ This finding is not reflected anywhere in the Workshop Report recommendations, and we urge this to be changed and examined in depth in Track 2 of this proceeding.

- b. *Dr. Jeff Reed asserted that the near-term substantial addition of electrolytic gas to the gas system ought to be considered in Track 1A, 1B, and 2 and used the Commission’s own RESOLVE model to show that it is cost effective to include electrolytic gas in electricity system planning – which we strongly believe the Commission ought to integrate*

⁴ Workshop Report, p. 25

⁵ *ibid*

⁶ *ibid*

into its planning efforts.

Dr. Reed of the Advanced Power and Energy Program at the University of California, Irvine (UCI) explained in his presentation (on behalf of the CHBC) that electrolytic fuels (hydrogen and methane derived from electrolytic hydrogen) can enhance reliability because, as the workshop report summarizes, these resources do not depend on interstate gas capacity, and “are flexible and can be generated (with electrolyzers) following a load curve mirroring solar and wind production and then be turned down or off later in the afternoon/early evening to reduce the ramp rate.”⁷ Dr. Reed asserted, as the Workshop Report further touches upon, that the near term (within the next 2-3 years) probability of substantial prevalence of electrolytic hydrogen/gas, among other renewable gaseous fuels, “needs to be considered in Track 1A and Track 1B of this proceeding, as well as Track 2.”⁸

He further demonstrated that by using the Commission’s own RESOLVE model, electrolytic gas is selected as a cost-effective capacity resource at prices electrolytic hydrogen is widely forecasted to reach by 2030 if not sooner.⁹ This, in turn, reduces the need for solar, batteries, and retirement of thermal generation assets. While the Workshop Report characterizes the scenarios Dr. Reed ran as “his own,”¹⁰ to be clear, any Commission staff with knowledge of the RESOLVE model can replicate his effort to activate the biomethane feature as a proxy for other types of renewable gas and select pricing based on industry projections. For a more complete explanation of how UCI completed this analysis, as well as the results and implications, please refer to the white paper Dr. Reed recently published on this topic.¹¹ We strongly urge the Commission to follow this example and include hydrogen solutions in its modeling, whether

⁷ Workshop report, pp. 25-26.

⁸ Ibid and Dr. Reed’s Presentation at approx. 2:18-2:19

<https://cpuc.webex.com/recordingservice/sites/cpuc/recording/play/8f41736f0ab34b13aeb0a16dd3bb2329> password: Gasplanning123

⁹ See p. 4-5 UCI, *Potential Impact of Renewable Gaseous Fuel on Optimizing the California Renewable Portfolio, RESOLVE Model Scenario Analysis*, which cites electrolytic hydrogen pricing forecasts from BloombergNEF, McKinsey, as well as UCI analysis for the CEC.

www.apep.uci.edu/PDF_White_Papers/Impact_of_Renewable_Gaseous_Fuels_on_Grid_Resource_Optimization_Using_RESOLVE.pdf

¹⁰ Workshop report p. 26

¹¹ UCI, *Potential Impact of Renewable Gaseous Fuel on Optimizing the California Renewable Portfolio, RESOLVE Model Scenario Analysis*

www.apep.uci.edu/PDF_White_Papers/Impact_of_Renewable_Gaseous_Fuels_on_Grid_Resource_Optimization_Using_RESOLVE.pdf

using RESOLVE or an alternative – e.g. that which LADWP is using for its 100% renewable energy transition effort¹² – and incorporate findings into long-term planning for gas system requirements.

B. The aforementioned experts join a growing consensus that hydrogen as a long duration storage and firm power resource among other applications in the transportation, industrial and potential additional sectors stands to play a key role in fulfilling California statutory energy system requirements to maintain reliability while becoming 100% clean and carbon neutral.

Cal Tech recently modeled a reliable 100% renewable electricity grid in California and found that the addition of electrolytic hydrogen returned to electricity (“power-to-gas-to-power”) lowers costs and leads the state to depend less on purchasing out-of-state WECC resources.¹³

LADWP’s Los Angeles 100% Renewable Energy Study notably includes using green electrolytic hydrogen in fuel cells and combustion turbines by 2030, and its “LA Leads” scenario deploys green electrolytic hydrogen to displace all fossil natural gas and achieve a 100% zero-carbon electricity system citywide by 2035.¹⁴

California legislators have also called for using hydrogen as a storage and power generation resource. SB 1369 specifically requires the Commission and other state agencies to consider green electrolytic hydrogen an eligible form of energy storage, among other uses. The law’s author Senator Skinner introduced SB 1122 last year, which would require the Commission to consider green electrolytic hydrogen to be a zero carbon-emitting resource for purposes of identifying a diverse and balanced portfolio of resources needed to ensure a reliable electricity supply that provides optimal integration of renewable energy resources in a cost-effective manner. Assemblymember Quirk also introduced AB 2940 to make use of curtailed electricity

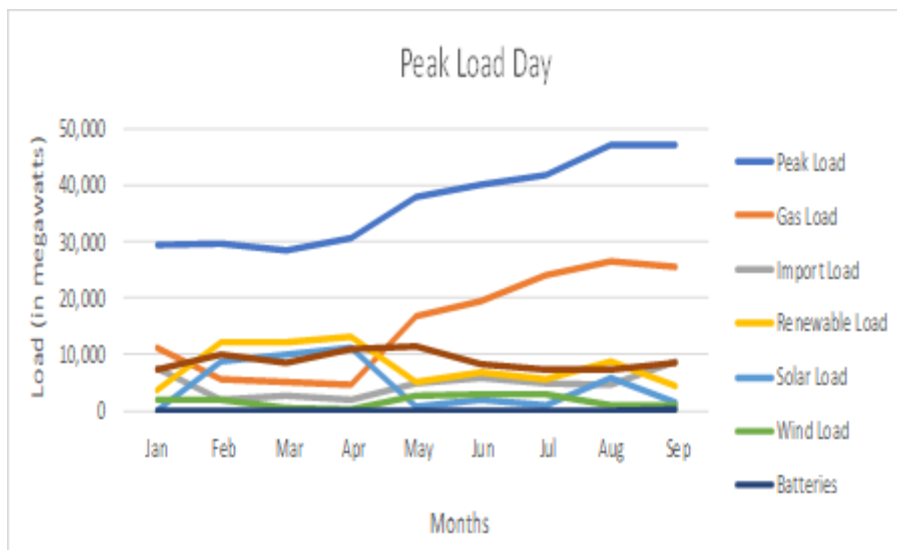
¹² https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-cleanenergyfuture/a-p-renewableenergystudy?jsessionid=6xNcfchCJ7JcJW6tQ5Q5qYhvGQBx8IGX17tgLVP2RHprePWDG3GC!-1423507407?_afWindowId=null&_afWindowMode=0&_adf.ctrl-state=1

¹³ Slide 16, CHBC Webinar: Long Duration Storage: Key to Achieving SB 100: October 20, 2020 <https://www.californiahydrogen.org/wp-content/uploads/2020/10/CHBC-SB-100-Webinar-Slides.pdf>; Full study available here: [https://www.cell.com/joule/fulltext/S2542-4351\(20\)30325-1?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2542435120303251%3Fshowall%3Dtrue](https://www.cell.com/joule/fulltext/S2542-4351(20)30325-1?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS2542435120303251%3Fshowall%3Dtrue)

¹⁴ See July 20, 2020 Comprehensive Meeting Summary, p. 4 https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-power/a-p-cleanenergyfuture/a-p-renewableenergystudy?_adf.ctrl-state=12qrsi79h4_4&_afLoop=63299788972873

for producing electrolytic hydrogen and recently opined that California’s energy regulators “must pursue an aggressive strategy to fully incorporate clean hydrogen into California’s renewable portfolio,” in order to better leverage renewables and avoid further blackouts caused by a mismatch between high demand and inadequate dispatchable supply.¹⁵

CAISO data, as shown below, demonstrates that unless the Commission realistically plans for decarbonized dispatchable resources, including hydrogen, for use in thermal generation, fuel cells, and as long-duration storage, it is essentially prolonging the use of natural gas.



Doing so is incompatible with state policy to reach carbon neutrality economy wide by 2045, as stated in Executive Order B-55-18 and which the Air Resources Board has signaled with its series of recent workshops and reporting on carbon neutrality will be prescribed in the upcoming Scoping Plan update.

C. The promise and necessity of hydrogen as a resource to decarbonize and stabilize the electricity system as it transitions to renewable and zero carbon resources is already leading to tangible commercial investment in California and beyond.

LADWP plans to invest approximately \$1.9 billion to convert their Intermountain Power Project from coal to 100% zero carbon hydrogen by 2045, with an interim target of 30% zero carbon

¹⁵ <https://www.mercurynews.com/2020/10/21/opinion-hydrogen-gas-key-to-california-avoiding-rolling-blackouts/>

hydrogen by 2025.¹⁶ SDG&E also recently announced that by 2022, the utility will build two long duration green hydrogen storage facilities to boost reliability of its system that is becoming increasingly reliant on variable renewables.¹⁷ In Florida, NextEra similarly has proposed investing \$65 million in a hydrogen power plant for Florida Power & Light that will use solar power and electrolysis to produce hydrogen as a cost-effective strategy to accommodate greater reliance on fluctuating renewables.¹⁸

D. Decarbonized hydrogen also will be an important resource to achieve climate goals in other sectors, including transportation, buildings, agriculture and industry, which should additionally be reflected in planning for gas system reliability, market structures and regulations.

Around the world, hydrogen made from low and zero carbon sources is increasingly recognized as key to decarbonizing hard to abate applications, such as heavy duty vehicles, light duty vehicles needed for long distances or where plugging in at home is not easily accessible, building energy, ammonia for agriculture, and industrial heat processes and feedstocks. The European Union has a multi-billion euro strategy for deploying hydrogen as a pillar of its carbon neutral strategy across sectors.¹⁹ The German National Hydrogen Strategy includes 9 billion euros of stimulus investment in green hydrogen development (in addition to a few billion already earmarked) and a target of 5 GW of electrolysis by 2030 and 10 GW by 2040, in order to help achieve the national carbon neutral target.²⁰ France similarly is investing 7.2 billion euros into its hydrogen strategy that targets 6.5 GW of electrolysis by 2030.²¹ Spain likewise has established a 8.9 billion euro goal to develop green hydrogen. There are several other similar examples.

Hydrogen can play a particular role in helping achieve state goals to reduce short lived climate pollutants (SLCPs) by deploying renewable gas, as called for by SB 1383. Insofar as it displaces

¹⁶ See Intermountain Power Project plans to transition to from coal to green hydrogen : <http://www.ladwpintake.com/the-future-of-ipp-is-green/>; <https://finance-commerce.com/2020/03/la-plans-renewable-hydrogen-power/>

¹⁷ <https://ieefa.org/california-utility-sdgc-to-build-two-long-duration-green-hydrogen-storage-projects/>

¹⁸ <https://www.greentechmedia.com/articles/read/nextera-energy-to-build-its-first-green-hydrogen-plant-in-florida>

¹⁹ https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

²⁰ https://www.bmbf.de/files/bmwi_Nationale%20Wasserstoffstrategie_Eng_s01.pdf

²¹ <https://fuelcellworks.com/news/french-economic-recovery-package-to-include-7-billion-euros-for-hydrogen-industry/>

natural gas, it reduces SLCPs. Hydrogen made from renewable sources is the only gas option that is at zero risk of increasing greenhouse gas – SLCPs – over its lifecycle.

The climate benefits of using hydrogen is reflected in a recently finalized report for the Air Resources Board on statewide carbon neutrality, which concludes hydrogen will be an important zero carbon resource for decarbonizing multiple end uses in the two scenarios focused on switching from fossil fuels (the “Balanced” and “Zero Carbon Energy” scenarios).²²

The Commission can and must do more in its long-term gas planning proceeding to incorporate the fact that hydrogen is a key enabler of state clean energy, climate, and energy reliability goals. This should be reflected in an amended draft of the Workshop Report and in Track 2 discussions and decision making.

E. The CHBC wishes to correct the record regarding an inaccurate statement attributed to Dr. Jeff Reed about study findings on the near future pricing of renewable hydrogen.

Lastly, we wish to point out that the description of Dr. Reed’s panel presentation contains a misrepresentation of data shared. The report states, “Dr. Reed shared that several studies found renewable hydrogen could reach \$8/MMBtu in the near future.”²³ An accurate characterization of his comments is that several studies have found that electrolytic hydrogen is likely to fall to \$16/MMBtu by 2030 and \$8/MMBtu by 2050, with some more optimistic forecasts predicting \$8/MMBtu by 2030. We would appreciate the Commission considering this a correction of the record.

III. Conclusion

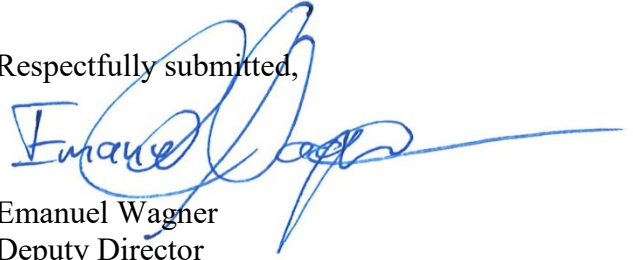
The CHBC thanks the Commission for the opportunity to submit these comments and looks forward to working with you to establish better understanding of the essential role of hydrogen and its derivatives in enabling state climate, clean air, clean energy and resilience goals and in future gas system planning.

²² See, e.g., pp. 5-6, 55, 71, : https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf

²³ Workshop Report, p. 26

Dated: November 2, 2020

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "Emanuel Wagner", with a long horizontal flourish extending to the right.

Emanuel Wagner
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California Hydrogen Business Council