

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Adopt
Biomethane Standards and Requirements,
Pipeline Open Access Rules, and Related
Enforcement Provisions.

Rulemaking 13-02-008

**COMMENTS BY CALIFORNIA HYDROGEN BUSINESS COUNCIL ON
ALTERNATE DECISION REGARDING BIOMETHANE TASKS
IN SENATE BILL 840**

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I. Introduction

The California Hydrogen Business Council (CHBC) welcomes the opportunity to provide comments on the Alternate Decision Regarding Biomethane Tasks in Senate Bill 840 (“APD”) for R.13-02-008.¹ We, along with technical, academic research and industry experts, have been actively engaged in the proceeding at every opportunity for more than a year. We strongly

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 include Air Liquide Advanced Technologies U.S. LLC.; Alameda-Contra Costa Transit District (AC Transit); American Honda Motor Company; Anaerobe Systems; Arriba Energy; Ballard Power Systems, Inc.; Bay Area Air Quality Management District (BAAQMD); Beijing SinoHytec; Black & Veatch; BMW of North America LLC; Center for Transportation and the Environment (CTE); Charm Industrial; Chiyoda Corporation; Clean Energy Enterprises; Community Environmental Services; CP Industries; DasH2energy; Dominion Energy; Eco Energy International, LLC; EcoNavitas; Eldorado National – California; Energy Independence Now (EIN); EPC - Engineering, Procurement & Construction; Ergostech Renewal Energy Solution; EWII Fuel Cells LLC; FIBA Technologies, Inc.; First Element Fuel Inc; General Engineering & Research; General Motors, Infrastructure Planning; Geoffrey Budd G&SB Consulting Ltd; Giner ELX; Gladstein, Neandross & Associates; Greenlight Innovation; GTA; H2B2 USA; H2Safe, LLC; Hexagon Lincoln; Hitachi Zosen Inova ETOGAS GmbH; HODPros; Hydrogenics; Hydrogenious Technologies; Hydrogen Law; HyET - Hydrogen Efficiency Technologies; HyperSolar, Inc.; Hyundai Motor Company; IGX Group Inc; ITM Power Inc; Ivys Inc.; Iwatani Corporation of America; Johnson Matthey Fuel Cells; KORE Infrastructure, LLC; Kraft Powercon; Life Cycle Associates; Longitude 122 West, Inc.; Loop Energy; Magnum Energy; Manticore Advocacy LLC; Millennium Reign Energy; Mitsubishi Hitachi Power Systems Americas; Motive Energy Telecommunications; Natural Gas Fueling Solutions (NGFS); Natural Hydrogen Energy Ltd.; Nel Hydrogen (US); Neo-H2; Neuman & Esser USA, Inc; New Flyer of America Inc; Next Hydrogen; Noyes Law Corporation; Nuvera Fuel Cells; Pacific Gas and Electric Company - PG&E; Pacific Northwest National Laboratory (PNNL); PDC Machines; Planet Hydrogen Inc; Plug Power; Politecnico di Torino; Port of Long Beach; Powertech Labs, Inc.; Primidea Building Solutions; RealEnergy, LLC; RG Associates; Rio Hondo College; Rix Industries; Sacramento Municipal Utility District (SMUD); SAFCell Inc; Sheldon Research and Consulting; South Coast Air Quality Management District; Southern California Gas Company; Strategic Analysis Inc; Sumitomo Corporation of Americas; Sumitomo Electric; Sunline Transit Agency; T2M Global; Tatsuno North America Inc.; Terrella Energy Systems Ltd; The Leighty Foundation; TLM Petro Labor Force; Toyota Motor Sales; Trillium - A Love's Company; University of California, Irvine; US Hybrid; Valley Pacific Petroleum Services Inc; Vaughan Pratt [Individual]; Verde LLC; Vinjamuri Innovations LLC; Winkelmann Flowform Technology; WireTough Cylinders, LLC; Worthington Industries; YanliDesign; Zero Carbon Energy Solutions.

disagree with the APD’s direction to close the proceeding, which we believe to be premature. This action would leave many issues within the scope of this proceeding, including those related to hydrogen, unaddressed and run contrary to several statutory requirements, which were detailed in our comments on the Scoping Memo and are discussed again below. This would harm the hydrogen industry and risk impeding implementation of many California clean air, clean energy and climate policies in which hydrogen and its derivatives are poised to play increasingly integral roles.

A summary of our comments, which are detailed in the next section is attached for quick reference.

II. Comments

1. Closing the proceeding before examining issues related to hydrogen, including protocols and interconnection standards for safe pipeline injection, is premature.

We agree with the approach put forth in Assigned Commissioner Rechtschaffen’s Proposed Decision (“PD”) to keep the proceeding open. There are many issues related to ensuring the “safe, cost effective”² development of hydrogen and other renewable gases that remain open and important to establishing the regulatory frameworks needed to provide market certainty for the hydrogen industry. Closing the proceeding, as directed by the APD, before even looking at these issues is unjustified and unreasonable.

2. Closing the proceeding before decisions regarding Renewable Methane are fully addressed – e.g. the definition of Renewable Methane and whether its injection into the pipeline system ought to be covered by biomethane standards –would ignore the public comments expressed by a majority of parties, disregard a discussion on renewable methane that the Commission pursued as part of this proceeding, and hinder the development of Renewable Methane derived from hydrogen.

² See Scoping Memo, p. 7

The “Issues” section (Section 2.1) of the Alternate Proposed Decision lists several issues on which “(p)arties filed comments...identified in the Scoping Memo.”³ That list is missing three issues (6-8) that were in the original Issues section of the July 5, 2018 *Assigned Commissioner’s Amended Scoping and Ruling* for this proceeding. Specifically, among the issues missing in the Alternate Proposed Decision is:

“6. Injection of renewable methane: Should the biomethane injection standards also apply for pipeline injection of renewable methane? Should any criteria be eliminated or any verification requirements be changed, and how?”⁴

A similar omission was made in the Assigned Commissioner’s Proposed Decision,⁵ but this was more understandable, since that Decision would keep the proceeding open. We trusted the intent was to limit this particular Decision a narrow set of issues specifically germane to biomethane requirements of Senate Bill 840, while taking up additional issues such as Renewable Methane in a next step. By closing the proceeding now, however, that next step will either be delayed or not occur.

The proposed premature closure of the proceeding creates major concerns, without any stated justification. First, it does not acknowledge the explicit interest and recommendations expressed by the majority of parties on the Amended Scoping Ruling and Memo in discussing Renewable Methane.⁶ It is also inconsistent with the Commission’s solicitation of an in-depth discussion of the definition of renewable methane as part of the November 19, 2018 *Assigned Commissioner’s Ruling Seeking Comment on Staff Proposal on Renewable Methane Definition, Joint Utility Interconnection Tariff, and California Science and Technology Updated State of Science Regarding Maximum Permissible Siloxane Concentration.*⁷

³ See Alternate Proposed Decision, p. 8

⁴ See July 5, 2018 *Assigned Commissioner’s Amended Scoping Memo and Ruling*, p. 6-7

⁵ See Section 2.1, Issues, p. 8

⁶ See comments to the July 5, 2018 *Assigned Commissioner’s Amended Scoping Memo and Ruling* by Alaska Applied Sciences, Aquaydrex, BAC, Bloom Energy, CalBio, CASA, CHBC, Clean Energy, CR&R, Harvest Power, Hydrogenics, ITM, National Fuel Cell Research Center, PG&E, RNG Coalition, SDG&E, SW Gas

⁷ Document link: <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M242/K068/242068929.PDF>; emphasis to title added by CHBC

This proposed closure without basis also impedes development of Renewable Methane derived from hydrogen. In the above referenced November 19 Ruling, the Commission notably proposed that the definition of renewable methane be based on production via renewable hydrogen pathways (using non-fossil fuel organic feedstocks or renewable electricity to power electrolysis to produce hydrogen, which is then synthesized to produce renewable methane). There was support among parties, including the CHBC and notably no opposition, to include renewable hydrogen pathways in the renewable methane definition (although there was also a call to broaden the pathways to all those that do not result in a net increase of CO₂ over their lifecycle, which the CHBC supported).⁸ As noted in the CHBC reply comments on this part of the proceeding, no parties disagreed with the CHBC and Aquahydrex that Renewable Methane derived from renewable hydrogen (or other non-fossil, zero carbon pathways) ought to be given the same interconnection standards, injection protocols, and incentives as biomethane. Adopting this recommended position within the final Decision on this proceeding would clearly be beneficial to the development of Renewable Methane produced from hydrogen. Closing the proceeding before addressing this issue, however, would be dismissive of and counter to a majority of party comments and specifically disadvantage the hydrogen industry, which would be left without clear regulatory frameworks needed to allow renewable methane derived from hydrogen to participate in the benefits of access to the common carrier gas system that biomethane enjoys.

- 3. Closing the proceeding, as called for in Alternate Proposed Decision, is inconsistent with the support expressed by the majority of party comments to the Scoping Memo for including a discussion of other renewable gases, such as renewable hydrogen, in this proceeding and/or in a parallel track. It is also inconsistent with the Commission's January 2019 budget request to the Legislature that states the Commission's intent to address pipeline injection of hydrogen.**

⁸ See CHBC Reply Comments on *Assigned Commissioner's Ruling Seeking Comment on Staff Proposal on Renewable Methane Definition, Joint Utility Interconnection Tariff, and California Council on Science and Technology Updated State of Science Regarding Maximum Permissible Siloxane Concentration*
<http://docs.epuc.ca.gov/PublishedDocs/Efile/G000/M257/K867/257867653.PDF>

The Alternate Proposed Decision, by closing the proceeding at this time, would cause the proceeding to fail to address the Assigned Commissioner's stated intention in the Scoping Memo *"to consider issues within this, or a successor proceeding, that pertain to the safe, cost-effective development of other renewable gases, such as renewable hydrogen."*⁹ This is in remarkable contrast to the will expressed by parties to the proceeding participating in public comment. The CHBC urged the Commission in our Comments on the Scoping Memo to include such a discussion within the scope of this proceeding and/or in a parallel track.¹⁰ As stated in the CHBC's Reply Comments on the Scoping Memo, the majority of parties commenting on the Scoping Memo agreed with this position.¹¹ Furthermore, no parties expressed opposition in comments or reply comments.

Leaving hydrogen issues unaddressed also runs contrary to the budget request submitted by the Commission to the Legislature on January 10, 2019, which stated that:

- the Commission was in the process of *"opening a phase to investigate the safe injection of hydrogen"*¹² and that the *"CPUC, jointly with the CEC and CARB, has established a technical working group to develop policies that support developing a roadmap to use hydrogen as a gas blending medium for energy transport, storage and fuel."*¹³
- investigating hydrogen supports gubernatorial direction on ZEV transportation because *"(h)ydrogen for fuel cells falls under the renewable natural gas regulatory umbrella since it is a gaseous energy transport,"* and *"can be used as a zero-carbon fuel source, and that an investigation into safety issues through a regulatory proceeding will be required prior to any rule change permitting it to be transported through the natural gas pipeline system."*¹⁴

⁹ See p. 7, July 5, 2019 *Assigned Commissioner's Amended Scoping and Ruling* <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M217/K229/217229016.PDF>

¹⁰ See *Comments by the California Hydrogen Business Council on the Assigned Commissioner's Amended Scoping Memo and Ruling*. <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M221/K866/221866128.PDF>

¹¹ See p. 3 of CHBC's *Reply Comments on the Assigned Commissioner's Amended Scoping Memo and Ruling*. <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M230/K886/230886802.PDF>

¹² Budget Request 8660-019-BCP-2019-GB, p. 4

¹³ *Ibid.*, p. 5

¹⁴ *Ibid.*, p. 3

- the Commission is seeking to fund a development of “*a report about the international production and use of renewable hydrogen and hydrogen blending for pipeline safety, electrification, pipeline injection, energy storage, and low carbon fuel.*”¹⁵

Now, three months later, the Alternate Proposed Decision, without any explanation, calls for closing the proceeding. Doing so before addressing issues related to hydrogen is confusing, without sound basis, and completely inconsistent with the process up to now.

4. Failure to keep this proceeding open and address issues related to renewable hydrogen and renewable methane derived from renewable hydrogen would also be in conflict with previous CPUC findings and California statutory requirements.

CHBC’s comments on the Scoping Memo noted numerous examples of previous CPUC Decisions, Conclusions of Law, and other findings, as well as state laws and policies that are not aligned with closing the proceeding before issues related to hydrogen are examined and decided upon. These, and some additional ones, are summarized below:

- a. *The original 2013 Scoping Memo and Ruling for this proceeding - Addressing non-discriminatory access to the common carrier gas system for all gas, including hydrogen and its derivatives, in this proceeding is in keeping with the original 2013 Scoping Memo and Ruling for this proceeding.*

In the Commission’s original Scoping Memo and Ruling for this proceeding filed February 13, 2013, the scope of issues to address specifically included rules that the Commission should “*adopt to ensure that each gas corporation provides non-discriminatory open access to its gas pipeline system to any party for the purposes of physically interconnecting with the gas pipeline system and effectuating the safe delivery of gas.*”¹⁶ Hydrogen producers seeking transport on the gas system are clearly one of those parties, and hydrogen producers are actively trying to gain access to the gas pipeline system, but cannot with the current lack of protocols and standards. It

¹⁵ Ibid. p. 10

¹⁶ <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M064/K374/64374754.PDF>

is, therefore, discriminatory and arbitrary to now exclude hydrogen from the proceeding given the instant and prior requests to do so. The CHBC asserts that all renewable gas types ought to be included in the scope of this proceeding to ensure non-discriminatory access to the gas system.¹⁷

b. D.14-01-034 – This Decision requires the Commission to add to the issues to be determined by the end of this phase of the proceeding lower and upper limits for hydrogen injection into the common carrier gas system, and this should be based on a comprehensive and current evidentiary review.

In January 2014, D.14-01-034 specifically identified hydrogen as a constituent of concern for pipeline safety and integrity. For example, in the September 2013 brief filed jointly by the gas utilities¹⁸ and the May 2013 Joint Report by CARB and OEHHA established the findings and recommendations on which the January 2014 decision was based.¹⁹ Therefore, the CHBC contends that hydrogen is de facto already within the scope of this proceeding.

The Decision also adopted a trigger level of .01% for hydrogen in biomethane recommended by the gas utilities, rebutting calls from biomethane proponents who opposed the proposed trigger level. Given the presence of hydrogen levels well above the 0.1% action limit established in D.1401034 on gas systems throughout the United States, Canada and the EU, however, the limit ordered in D.1401034 warrants review and updating. Additionally, a March 2017 study by UC Davis states that a “rule of thumb” from various studies suggest that “relatively low” hydrogen blends in the natural gas system of <5%–15% by volume “would not significantly increase risks” to end-uses or to the gas pipeline and system safety and durability.²⁰ Testing by UC Irvine of hydrogen injected from solar powered electrolyzer into their campus gas infrastructure

¹⁷ See pp. 4-5 of *Comments by the California Hydrogen Business Council on the Assigned Commissioner’s Amended Scoping Memo and Ruling* for more details, including a proposed list of renewable gases.

<http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M221/K866/221866128.PDF>. Note that we altered our definition of renewable methane in our Comments to *Assigned Commissioner’s Ruling Seeking Comment on Staff Proposal on Renewable Methane Definition, Joint Utility Interconnection Tariff, and California Science and Technology Updated State of Science Regarding Maximum Permissible Siloxane Concentration*, which can be found here:

<http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M250/K896/250896279.PDF> – Clean revised proposed definition is on p. 6.

¹⁸ See pp. 13, 15 of *Joint Opening Brief of Southern California Gas Company (U 904 G), San Diego Gas & Electric Company (U 902 G), Pacific Gas and Electric Company (U 39 G), and Southwest Gas Corporation (U 905 G)*

<http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M082/K445/82445591.PDF>

¹⁹ https://www.arb.ca.gov/energy/biogas/documents/FINAL_AB_1900_Staff_Report_&_Appendices_%20051513.pdf

²⁰ p. 33, *The Potential to Build Current Natural Gas Infrastructure to Accommodate the Future Conversion to Near-Zero Transportation Technology*, by Jaffe et al. at UC Davis Institute of Transportation Studies, March 2017

furthermore shows that 10-100% hydrogen blends do not significantly raise the risk of leaks.²¹ Reviewing this and other evidence from recent studies and analyses, as well as identifying where further testing is needed and ordering this to be completed, needs to be done to establish up to date, evidence-based limits, including lower and upper limits, for hydrogen injection into the common carrier gas system. It is exceedingly and unfairly difficult for biogas and hydrogen stakeholders to conduct business in California with only extremely low trigger limits based on minimal and incomplete data.

The Decision additionally found as a Conclusion of Law that the *“four utilities should be required to specify the lower action and upper action levels for ammonia, biologicals, hydrogen, mercury, and siloxanes in the next update proceeding.”*²² This proceeding ought to qualify as the next update proceeding. Furthermore, the Decision ordered a review of the decision by January 2019. The CPUC having failed to do so by that date is non-compliant with its own Conclusion of Law, and shutting the door on the opportunity to do so soon by closing this proceeding would clearly be more egregious.

In sum, pursuant to D.1401034 and Health and Safety Code 24521, the Commission is obligated to keep this proceeding open or open a parallel track to review of standards for hydrogen injection into the common carrier gas system. This should include an evidentiary review of the trigger limit for hydrogen by the five-year deadline, and determination of a limit based on a proper evidentiary record. The proceeding also ought to include establishment of both lower and upper action limits for hydrogen in the gas system, per the Conclusion of Law in D.1401034.

- c. **AB 1900**²³ – *This OIR was opened pursuant to AB 1900, which among other provisions, requires “the PUC to adopt pipeline access rules that ensure that each gas corporation provides nondiscriminatory open access to its gas pipeline system to any party for the purposes of physically interconnecting with the gas pipeline system and effectuating the delivery of gas.”*

²¹ Source: UCI Advanced Power and Energy Program, 2016

²² #13 in Conclusions of Law, D.1401034

²³ https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201120120AB1900

Hydrogen is a gas, but is currently not allowed to access the gas pipeline. Closing the proceeding before establishing standards and protocols of injection of hydrogen into the gas pipeline system is not in accordance with this law.

d. ZEV Transportation Related Laws and Policies (e.g. Executive Order B-18-48, AB 8, SB 1505) - Closing this proceeding before addressing hydrogen related issues would hinder implementation of California's ZEV transportation policies and federal clean air standards, which require ensuring a hydrogen supply chain that would be greatly enabled by hydrogen's access to the common carrier gas system.

California has enacted several policies aimed at increasing hydrogen production for transportation, in order to achieve the state zero-emission vehicles goals. For example:

Executive Order B-48-18, as the Scoping Memo and Ruling rightly notes,²⁴ calls for the expansion of hydrogen fueling stations to enable the state's goal to put 5 million zero emission vehicles on California roads by 2050.

AB 8 further calls for funding of hydrogen fueling infrastructure for transportation.²⁵ A recent Joint Agency report on AB 8, however, predicts a shortfall of hydrogen supply to keep up with ZEV fueling demand by 2020, highlighting the urgency of removing regulatory barriers to increased hydrogen production and transfer to fueling stations in California.²⁶ Currently, virtually all hydrogen used as transportation fuel is delivered by truck. Although in the long-term future, dedicated hydrogen pipelines will likely be the most cost-effective solution, in the near term, existing natural gas infrastructure can serve a critical role in the hydrogen supply chain, and hydrogen blends will likely be part of the natural gas supply over the long term as well. Addressing hydrogen blends in the gas system is, therefore, time critical.

SB 1505 further mandates that a third of hydrogen for transportation fueling in California come from renewable sources, which can be produced from biogas, syngas made from bio-waste,

²⁴ See July 5, 2018 Amended Scoping Memo and Ruling, p. 7

²⁵ Bill text: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB8

²⁶ <http://www.energy.ca.gov/2017publications/CEC-600-2017-002/CEC-600-2017-002.pdf>, p. 3

directly with solar energy, or by electrolysis that splits water into hydrogen and oxygen.²⁷ Any of these production pathways may show improved economics through transport over the natural gas common carrier gas system in various use cases. Currently, the hydrogen industry has surpassed the state's 33% renewable mandate,²⁸ and the CHBC supports the Hydrogen Council's goal of achieving 100% decarbonized hydrogen for transportation by 2030.²⁹ To enable more renewable hydrogen in-state, which the hydrogen industry wants and would provide California the full emissions and jobs benefits of renewable hydrogen, it is essential to create well-formed and supportive regulatory frameworks, including having standards and protocols for interconnecting and injecting renewable hydrogen into gas pipelines. Today, the first generation of renewable hydrogen production facilities are under development in the state, including a 100% renewable hydrogen production facility in Moreno Valley, Riverside County, due to come online in 2020 that is funded by the Energy Commission and will use dedicated renewable generation to power a 2.5 MW electrolyzer to produce hydrogen.³⁰ There are also several other projects bid in the Energy Commission solicitation, along with other projects that have not been publicly announced. Until the Public Utilities Commission acts on developing standards for hydrogen limits on the common carrier gas system, however, these projects cannot consider this option in their production and delivery optimization.

The CPUC's own legislative budget request, as mentioned, states that gubernatorial direction calls for examining issues concerning safe injection of hydrogen into the pipeline.

- e. Federal and State clean air standards - Without adequate and economical hydrogen supplies, large regions of California also risk remaining consistently out of attainment of air quality standards mandated by the federal Clean Air Act.*

The biggest challenge to reaching attainment is excessive NOx emissions, the vast majority of which come from mobile sources, and among mobile sources, the biggest source of NOx in

²⁷ https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=200520060SB1505

²⁸As reported by CARB Staff to CHBC and published in *Zero Emission Transportation and Power The Opportunity of Hydrogen Energy*, CHBC, January 2018 https://www.californiahydrogen.org/wp-content/uploads/2018/03/CHBC_Opportunity-of-Hydrogen-and-Fuel-Cells-January-2018.pdf

²⁹ <https://www.californiahydrogen.org/2018/12/20/chbc-endorses-full-decarbonization-goal-of-hydrogen-in-transportation-by-2030/>

³⁰ This project is being developed by Hydrogenics and StratosFuel with funding from the Energy Commission.

California is heavy duty trucks³¹ – a sector which is difficult to electrify due to long driving ranges, high demand on performance and utilization rates. Hydrogen fuel cell electric technology is a key component of the state’s Mobile Source Strategy to resolve this pernicious problem.³² To ensure abundant, cost-competitive, non-subsidized renewable hydrogen supplies for fueling trucks and other vehicles, the renewable hydrogen industry needs access to pipelines not only as an option to transport vehicle fuel, but also to enable the multiple market entry points, such as energy storage, that will be needed to achieve economies of scale.

f. Short Lived Climate Pollutant Reduction Mandate - Closing this proceeding now also imperils California from implementing its state policy on reducing short-lived climate pollutants laid out in SB 1383 which calls for a broad, multi-agency discussion of renewable gas, including renewable hydrogen.

There is also legislative direction for the Commission to address all forms of renewable gas. SB 1383 requires the Public Utilities Commission, along with other state agencies, “to consider and, as appropriate, adopt policies and incentives to significantly increase the sustainable production and use of renewable gas.”³³The author of SB 1383 ensured CHBC Members that the law explicitly does *not* limit the scope of the agencies’ consideration to biomethane and biogas when deciding upon solutions to mitigating short lived climate pollutants, and that the broad language “renewable gas” was chosen, so that renewable hydrogen would be included in all relevant deliberations.

The Energy Commission’s *2017 Integrated Energy Policy Report* reinforces this in its discussion on implementing SB 1383, explicitly including renewable hydrogen in the suite of solutions California deploys to mitigate short lived climate pollutants.³⁴

³¹ Source: CARB https://www.arb.ca.gov/app/emsinv/2017/emssumcat_query.php?F_YR=2012&F_DIV=-4&F_SEASON=A&SP=SIP105ADJ&F_AREA=CA#7

³² <https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>

³³ SB 1383 text: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1383

³⁴ See, e.g., 2017 IEPR pp. 260, 280, 285-286.

The APD's proposal to not now engage in thorough and comprehensive discussions of hydrogen would be inconsistent with SB 1383 and the Energy Commission's recommendation.

g. Other greenhouse gas reduction mandates – The capabilities of renewable hydrogen to provide unusual, and possibly unique, decarbonization benefits, such as high volume, flexible seasonal storage and zero emissions solutions to difficult-to-electrify transportation applications, will also make renewable hydrogen essential to reaching the deep greenhouse gas reductions mandated by SB 350, SB 32 and Executive Order B-18-55.

Meeting California's deep greenhouse gas reduction targets will likely rely on including renewable hydrogen in the state's energy portfolio. For one, renewable hydrogen coupled with fuel cell technology can help decarbonize transportation applications that are more difficult, if not impossible for batteries to address at scale, such as heavy duty trucks, which are responsible for about 20% of on-road vehicle greenhouse gas emissions.³⁵ Electrolytic hydrogen production can also prevent curtailment of variable renewable generation by making use of surplus renewable electricity that would otherwise be wasted to power an electrolysis process that uses a small amount of water to make hydrogen. The only additional by-product is oxygen. This renewable hydrogen can in turn be used for fuel cells, as fuel at hydrogen filling stations for fuel cell electric vehicles, stored in separate designated locations for use when needed, or blended into the existing gas system adding a zero-carbon resource to the supply mix. No additional greenhouse gas is created when using renewable hydrogen in any use case. In fact, it is currently a preferred renewable gas in many jurisdictions because of its low GHG profile as a substitute for fossil fuels.

Furthermore, renewable hydrogen can be combined with CO₂ captured from a waste source like biogas or chemical processing to create renewable methane that can be injected in unlimited quantities in the existing pipeline structure, providing vast quantities of energy storage, and decarbonized gas for multiple end uses, while making use of infrastructure assets that may

³⁵ Source of GHG data for heavy duty vehicles: CARB
https://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_sum_2000-16.pdf

otherwise be stranded.

Delaying or simply not undertaking establishing standards and protocols for pipeline injection of renewable hydrogen and its derivatives will impede these solutions from being implemented, thus risking California's climate goals from being achieved.

h. 100% renewable and zero carbon electricity – SB 100, which requires 100% of electricity sources in California to be renewable or zero carbon by 2045, will likely require hydrogen solutions in order to integrate high penetrations of variable generation and provide mass scale long duration and seasonal storage.

SB 100 calls for investor owned utilities to procure 60% RPS eligible renewable electricity, which along with large hydro and rooftop solar, will make California's electricity mix predominantly supplied by variable renewables as soon as 2030, if not before. By 2045, electricity generation must by law be 100% renewable and zero carbon. Integrating such a mass scale of variable sources of electricity generation without any fossil fuels is a significant challenge to grid operators, underscored by CAISO's recent finding that in the evenings a 3-hour ramp of more than 13,000 MW is needed years before originally anticipated.³⁶ Electrolysis to create hydrogen can address CAISO's urgent surplus generation, net load and ramping challenges. It can absorb excess renewable power to make useful hydrogen during peak renewable generation, thus helping to flatten "the belly of the duck," and provide rapid downward load capability that ease the ramping requirement.

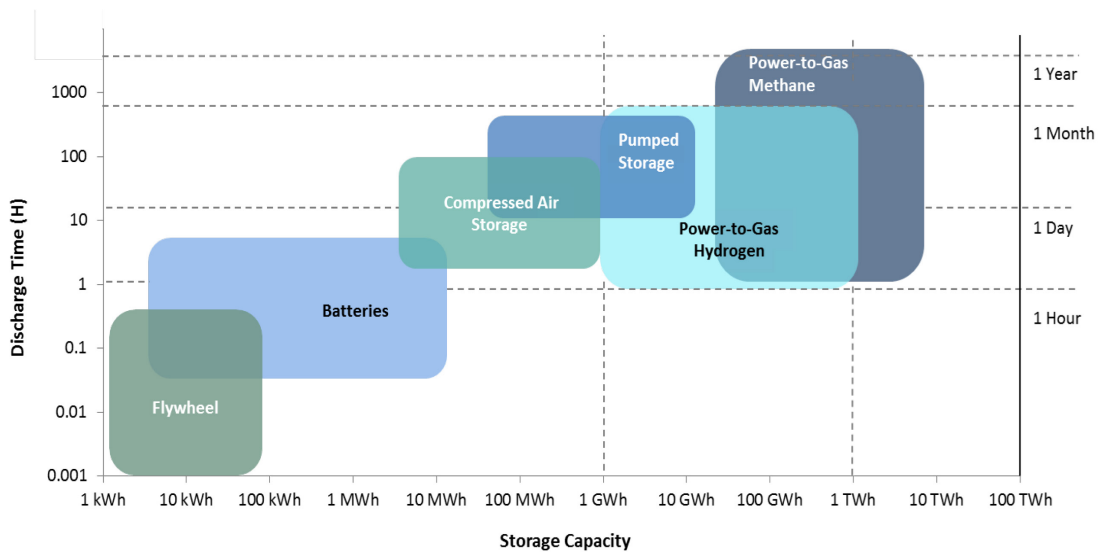
As renewable generation and electrification reaches high levels, long duration and seasonal storage will also become critical. According to a report from the European Association for Energy Storage, electrolytic hydrogen based solutions are "*the only energy storage option available to store large amounts of energy seasonally and provide it on-demand to different sectors and applications.*"³⁷ Electrolytic hydrogen produced using renewable electricity and renewable methane derived from electrolytic hydrogen, if they have access to the gas system for

³⁶ See CAISO's *Renewable Integration Update* presentation at this link:

http://www.energy.ca.gov/2018_energy_policy/documents/2018-06-20_workshop/2018-06-20_presentations.php

³⁷ http://ease-storage.eu/wp-content/uploads/2017/05/2017.05.15_EASE-Recommendations-PtG-PtL_final.pdf

transportation and long-term storage, not only can provide what may be the only feasible pathway to achieve energy storage at the terrawatt-hour scale and for up to a year (see graphic below), but also have the added benefit of being far more geographically flexible of other bulk storage technologies, such as pumped hydro and compressed air.³⁸



Source: European Commission³⁹

Underscoring electrolytic hydrogen’s potential value to integrating renewables, the *2017 Integrated Energy Policy Report* calls for California to explore converting renewable electricity to hydrogen as a strategy for managing excess renewable generation.⁴⁰

Furthermore, E3 in its presentation *Deep Decarbonization in a High Renewables Future - Implications for Renewable Integration and Electric System Flexibility* also acknowledged that hydrogen production is among the key flexible load resources that can “absorb surplus renewable generation, and avoid costly need for additional storage and renewable overbuild.”⁴¹

- i. **SB 1369** – *Related to the points made above, SB 1369, signed into law in 2018 directs the CPUC to examine green electrolytic hydrogen as a storage source and*

³⁸ See CHBC’s submission to the 2017 IEPR Report Comments titled *Economics of Power-to-Gas*.

³⁹ Commission Staff Working Document, Energy Storage – The Role of Electricity, p. 12 https://ec.europa.eu/energy/sites/ener/files/documents/swd2017_61_document_travail_service_part1_v6.pdf

⁴⁰ See 2017 IEPR Ch. 3 Recommendations, p. 120

⁴¹ https://www.energy.ca.gov/2018_energy/policy/documents/2018-06-20_workshop/2018-06-20_presentations.php

for other potential beneficial uses.

Establishing standards and protocols for green electrolytic hydrogen's transport and storage in the common carrier gas system would optimize its potential and potentially better enable the CPUC to fulfill its responsibility as directed by this law.

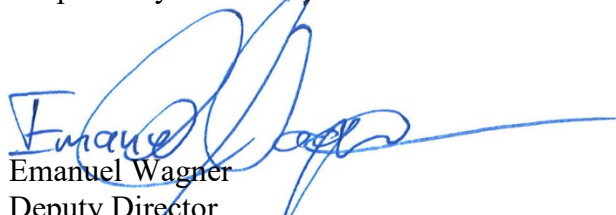
Underscoring the interest in the state legislature in making sure the CPUC establishes protocols and standards for injection of hydrogen into gas system, AB 491 (Rubio)⁴² was also introduced to ensure that a comprehensive study of issues related to this is undertaken, in the event that the Commission fails to do so as it ought to in the context of this current OIR.

II. Conclusion

The CHBC appreciates this opportunity to submit these comments, and we look forward to working further with Commission to address the important issues raised in this discussion.

Respectfully submitted,

Dated: May 2, 2019



Emanuel Wagner
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California Hydrogen Business Council

⁴² https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB491