BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

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Order Instituting Rulemaking to Adopt Biomethane Standards and Requirements, Pipeline Open Access Rules, and Related Enforcement Provisions.	Rulemaking 13-02-008 (Filed February 13, 2013)

COMMENTS BY CALIFORNIA HYDROGEN BUSINESS COUNCIL ON ASSIGNED COMMISSIONER'S AMENDED SCOPING MEMO AND RULING

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I. Introduction

The California Hydrogen Business Council (CHBC) welcomes the opportunity to provide comments on the Assigned Commissioner's Amended Scoping Memo and Ruling for R.13-02-008. 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.[1]

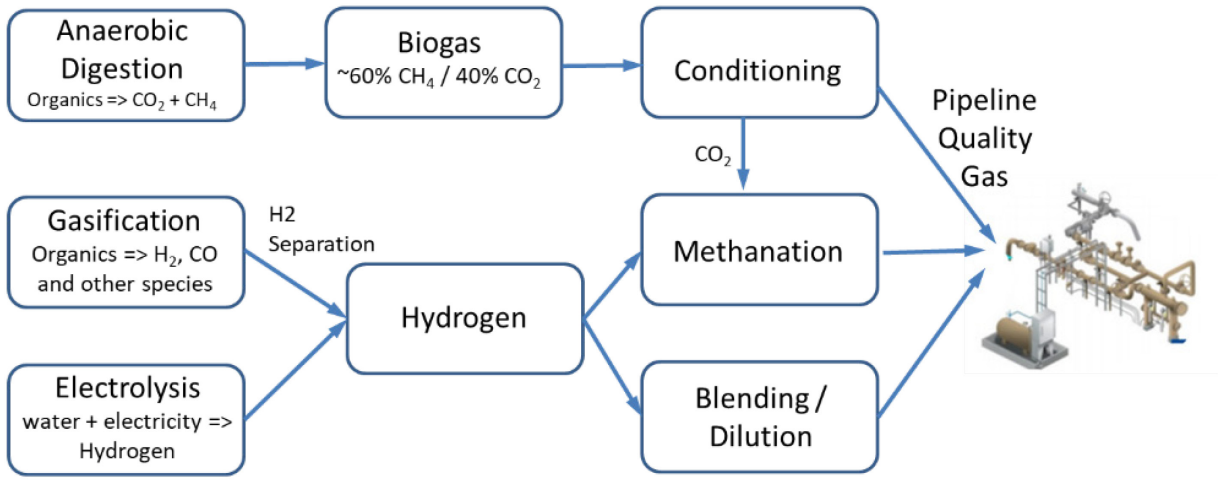
The CHBC has six recommendations for further amending the Amended Scoping Memo and Ruling, which are summarized below.

[1] 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 Advanced Emission Control Solutions, 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, California Air Resources Board (CARB), California Fuel Cell Partnership, CALSTART, Cambridge LCF Group, Center for Transportation and the Environment (CTE), CNG Cylinders International, Coalition for Clean Air, Community Environmental Services, CP Industries, DasH2energy, Eco Energy International, LLC, 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, FuelCell Energy, Inc., GenCell, General Motors, Infrastructure Planning, Geoffrey Budd G&SB Consulting Ltd, Giner ELX, Gladstein, Neandross & Associates, Greenlight Innovation, GTA, GTM Technologies, LLC, H2B2 USA, H2Safe, LLC, H2SG Energy Pte Ltd, Hexagon Lincoln, Hitachi Zosen Inova ETOGAS GmbH, HODPros, Hydrogen Law, Hydrogenics, Hydrogenious Technologies, HydrogenXT, HyET - Hydrogen Efficiency Technologies, Hyundai Motor Company, ITM Power Inc, Ivys Inc., Johnson Matthey Fuel Cells, Kontak, LLC, KORE Infrastructure, LLC, Life Cycle Associates, Linde North America Inc, Longitude 122 West, Inc., Loop Energy, Magnum Energy, McPhy Energy, Millennium Reign Energy, Montreux Energy, Natural Gas Fueling Solutions (NGFS), Natural Hydrogen Energy Ltd., Nel Hydrogen, Neo-H2, New Flyer of America Inc, Next Hydrogen, Noyes Law Corporation, Nuvera Fuel Cells, Pacific Gas and Electric Company - PG&E, PDC Machines, Planet Hydrogen Inc, Plug Power, Politecnico di Torino, Port of Long Beach, PowerHouse Energy, Powertech Labs, Inc., Primidea Building Solutions, Proton OnSite, RG Associates, Rio Hondo College, Rix Industries, Sacramento Municipal Utility District (SMUD), SAFCell Inc, Schatz Energy Research Center (SERC), Sheldon Research and Consulting, Solar Wind Storage LLC, South Coast Air Quality Management District, Southern California Gas Company, Strategic Analysis Inc, Sumitomo Corporation of Americas, 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 Environmental Associates, Vaughan Pratt, Verde LLC, Vinjamuri Innovations LLC, WireTough Cylinders, LLC, Zero Carbon Energy Solutions

II. CHBC's Six Recommendations

Recommendation 1: The CHBC requests that all of the renewable gases in the chart below be addressed in this proceeding, in order to ensure non-discriminatory access to the common carrier gas system, per the original February 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 listed 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."[2] 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. There are a variety of pathways for the production and delivery of renewable gaseous fuels, and several of them use the common carrier natural gas system for transportation and storage, as shown in the figure below.



[2] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M064/K374/64374754.PDF

The table below defines the terms that will be used in these comments.

Term	Definition / Usage
Biogas	Mixture of methane/ CO_2 (typically 20% to 40% CO_2 by volume) and minor constituents derived from bio sources – cannot be introduced onto the common carrier natural gas system without cleanup
Biomethane	Biogas that has been conditioned (cleaned and purified) to meet pipeline standards comprised primarily of methane with small remaining amounts of CO_2
Synthesis Gas (Syngas)	Hydrogen rich gas (with high fraction of carbon monoxide, CO) produced through gasification of biomass , from which (near) pure hydrogen or methane (with additional CO_2) can be synthesized
Renewable Methane	Methane formed by combining renewable hydrogen (generally from electrolysis) with CO_2 that is biogenic, captured from the atmosphere or other source of CO2 certified to be climate-neutral.
Renewable Natural Gas	While generally used interchangeably with biomethane, includes as well renewable electrolytic methane
Renewable or Green Hydrogen	Hydrogen derived through electrolysis or reformation of methane derived from renewable feedstocks (organics and renewable energy)
Renewable Gas	All of the above.

The CHBC believes all these renewable gas types ought to be included in the scope of this proceeding to ensure non-discriminatory access to the gas system.

Recommendation 2: CHBC urges the Commission to adopt the definition in the table above for "renewable methane" in this proceeding and, in any event, to include methane derived from combining renewable hydrogen with CO_2 from climate neutral sources within the scope of the proceeding.

We appreciate the Commission's decision to include in the scope of issues an inquiry into whether biomethane standards should also apply to renewable methane.[3] However, the scoping memo does not define the term "renewable methane." CHBC proposes a definition for renewable methane in the table above.

We additionally wish to clarify that renewable hydrogen combined with biogenic CO_2 (a major component of biogas), in addition to being a form of renewable methane according to the CHBC definition above, is also a derivative of biogas, and therefore, must properly be included in the scope of this proceeding. While the focus of prior phases of this proceeding has been on harvesting the methane in biogas for pipeline injection, combining biogenic CO_2 from biogas

[3] July 5, 2018 Scoping Memo and Ruling, p. 6, item 6.

with renewable hydrogen to create renewable methane is a pathway that has been commercially deployed in Germany[4] and demonstrated successfully in several locations including California[5]. This creates a beneficial use for the CO2 content of biogas and can amplify the renewable methane yield from a dairy digester or other anaerobic digestion system by over 60%. This co-production can enhance the environmental value and financial viability of projects.

In addition to a adjusting the minimum heating value for biomethane which will be addressed in this proceeding, renewable methane projects would benefit from a higher limit on hydrogen fraction and should be addressed within the scope of this proceeding. The same is true of gasification projects, as they have a substantial hydrogen fraction in the product synthesis gas.

Recommendation 3: Per D.14-01-034, the Commission ought to add to the issues to be determined by the end of this phase of the proceeding lower and upper action levels for hydrogen as a constituent of gas injected onto the common carrier system, and this should be based on a comprehensive and current evidentiary record.

While we appreciate the Commission's stated general interest in addressing issues related to a broader spectrum of renewable gas, including renewable hydrogen, we strongly disagree with the decision to exclude renewable hydrogen from the scope until a later time. Doing so is inconsistent with D.1401034.

In January 2014, D.1401034 specifically identified hydrogen as a constituent of concern for pipeline safety and integrity.

The Decision adopted the trigger level of .01% for hydrogen in biomethane recommended by the gas utilities and denied the request by biomethane proponents not to treat hydrogen as a constituent of concern. The Decision does however require the utilities to establish lower and

[4] See http://forschung-energiespeicher.info/en/projektschau/gesamtliste/projekt-einzelansicht/95/Weltweit_erste_industrielle_Power_to_Gas_Anlage/

[5] California - See Opus 12 and So Cal Gas April 2018 press statement, which states that their project demonstrates conversion of the carbon dioxide in raw biogas to methane in a single electrochemical step, which presents "a critical improvement in the science of upgrading biogas to pipeline quality natural gas, and a simpler method of converting excess renewable electricity into storable natural gas."
https://www.sempra.com/newsroom/press-releases/socalgas-and-opus-12-successfully-demonstrate-technology-simplifies
Europe – See, for example, projects in Falkenhagen and Staubing, Germany, Biocat project in Denmark, among others at this link: http://europeanpowertogas.com/projects-in-europe/

upper action levels in the next update proceeding or when new information becomes available but no later than five years from the effective date of the Decision (D.1401034 Ordering Paragraph 9, page 154; and Section 6, page 130). The CHBC contends that the current proceeding meets the definition of an update proceeding as defined in the Decision and therefore, compels inclusion of hydrogen in the scope of this proceeding.

Furthermore, 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, and the lack of a specific trigger or action level for hydrogen in pipeline gas not derived from biomethane, the trigger level 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.[6] Testing by UC Irvine showed the hydrogen blends of 10-100% did not increase leak rate on low-pressure steel piping and that crack propagation was not speeded materially even with 100% hydrogen.[7] 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 action limits, for hydrogen injection into the gas carrier system.

Therefore, in summary, pursuant to D.1401034 and Health and Safety Code 24521, the Commission ought to add to the issues to be addressed this current phase of this proceeding a review of standards for hydrogen concentration for gas injected onto the common carrier system. The proceeding also ought to include establishment of both lower and upper action limits for hydrogen in the gas system, per as ruled in D.1401034.

Recommendation 4: We request that the Commission recognize that not including hydrogen in this proceeding is not aligned with several state policies.

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[6] 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

[7] Dadfarnia, Mohsen, Sofronis, Petros, Brouwer, Jack and Sosa, Siari, *Assessment of the Resistance of Natural Gas Line Pipe Steels to Hydrogen Embrittlement*, under review, International Journal of Hydrogen Energy, July, 2018.

Not including renewable hydrogen in this phase of the proceeding is also not aligned with state policies on ZEV transportation (e.g. Executive Order B-48-18, AB 8, SB 1505), short-lived climate pollutant reduction (SB 1383), deep decarbonization and advancing high penetrations of renewable electricity (e.g. SB 350). An explanation of this is detailed in Section 1V of this document.

Recommendation 5: We request that the Commission recognize the urgency of establishing injection standards, among other actions, to remove regulatory barriers for numerous companies that are investing resources and creating plans to bring economical, climate neutral hydrogen and its derivatives to California consumers.

Renewable hydrogen and renewable methane are capable of replacing fossil-based natural gas in a variety of applications to help decarbonize the energy system on a mass scale. In the case of electrolytic hydrogen or methane, all that is needed is available renewable power generation and electrolyzers, which are both highly modular and scalable, along with a storage and transport system, which if it is the existing gas network, is ubiquitous. However, without standards and injection protocols, pipeline transportation and storage is precluded as an option, which constrains transport of hydrogen fuel to trucking only and altogether eliminates the long-duration storage functionality that could be provided by the gas grid. Electrolyzer companies are currently severely hampered in California from being able to engage with renewable power producers to supply electricity for renewable hydrogen production because the options for transporting and storing the produced hydrogen are so limited.

CHBC membership includes numerous companies interested in pursuing electrolytic hydrogen projects in California using the natural gas system for transport and storage that report being shut out of the market by the lack of hydrogen blending standards and metering protocols. International leaders in the industry share that they currently have more than 100 MW of renewable hydrogen projects in their California opportunity pipeline, for which they are seeking cost effective options to get the hydrogen to market. In many cases, however, the location of the project site precludes simply compressing the hydrogen and transporting by tube trailer because there are no off-takers within a 100 mile radius of the proposed plant. It is also the case that most of these sites have natural gas lines in close proximity. Unfortunately, the lack of standards and protocols (both concentration limits and metering) for pipeline-injected hydrogen are very

significant barriers to project development. State action will also be needed to address certification of renewable attributes (e.g. REC and LCFS credit protocols) and appropriate incentives to support the early market. In the meantime, dozens of projects totaling hundreds of megawatts that include pipeline storage and transport are already in operation or development in Europe, Canada, Japan, Dubai, and Australia,[8] while in California, there is a successful pilot project at UC Irvine but no commercial facilities. The ability of such companies to develop large scale renewable hydrogen projects in California taking advantage of the vast storage and ubiquitous delivery capability of the gas system will continue to be impeded until the CPUC addresses this issue in a specific and substantive way.

Recommendation 6: In addition to establishing injection protocols by the end of this phase of the proceeding, the CHBC requests that the Commission address a broader set of issues relevant to advancing renewable hydrogen and renewable methane in a parallel Track 2 of this proceeding and in a concurrent series of technical workshops.

Finally, the CHBC requests that the Commission open a parallel Track 2 in this proceeding and a series of technical workshops to facilitate broader education and regulatory action to accelerate the adoption of climate neutral hydrogen for various useful applications that can be instrumental in California meeting its climate, renewable energy, and clean air goals. An example of a topic that could be addressed that could help both biomethane and hydrogen producers to potentially improve project economics and gas-quality compliance is dilution or blending of their product gas prior to injection into the common carrier system. We urge the Commission to examine establishment of "borrowed gas" tariffs whereby developers can withdraw pipeline gas as blend stock and re-inject at the same location without incurring inappropriate stacked costs (e.g. full retail rate for borrowed gas and wholesale rate for returned gas).

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[8] See, e.g.: http://www.hydrogenics.com/2014/07/25/hydrogenics-selected-for-2-megawatt-energy-storage-facility-in-ontario/; https://www.h2fc-fair.com/hm17/images/forum/tf/2017-04-25-1020.pdf; http://europeanpowertogas.com/projects-in-europe/; https://cdn.eurelectric.org/media/3172/decarbonisation-pathways-electrificatino-part-study-results-h-AD171CCC.pdf; https://www.umweltbundesamt.de/en/press/pressinformation/a-greenhouse-gas-neutral-germany-is-almost-possible.; https://www.electrive.com/2018/06/04/france-to-utilise-hydrogen-across-all-sectors/; https://networks.online/gphsn/news/1000904/trial-explore-blending-hydrogen-gas-network; https://www.greentechmedia.com/articles/read/australia-looks-to-hydrogen-to-soak-up-excess-renewable-energy-production#gs.sb4MM1M; https://www.businesswire.com/news/home/20180212006494/en/DEWA-Signs-MoU-Expo-2020-Dubai-Siemens; https://asia.nikkei.com/Politics/Renewables-to-form-core-of-Japan-s-new-long-term-energy-strategy

III. Including hydrogen in the issues to be addressed in this phase of the proceeding is aligned with California policies.

Hydrogen is a cornerstone of California's clean energy, clean air, and climate policies. It has many uses, including zero emissions transportation, grid services, decarbonizing the gas system, providing carbon free electricity and energy storage. Establishing standards and protocols for gas pipeline injection is one of the key regulatory actions needed to enable mass scale availability of affordable, non-subsidized, renewable hydrogen and renewable methane derived from renewable hydrogen. Only with these regulatory measures in place can the high-volume market necessary for economical and widely available non-fossil derived hydrogen be achieved.

1. Implementing California's ZEV transportation policies and federal clean air standards requires ensuring a hydrogen supply chain, which would be greatly enabled by hydrogen's access to the common carrier pipeline.

California has enacted several policies aimed at increasing hydrogen for transportation, in order to achieve the state zero-emissions vehicles goals. For example, Executive Order B-48-18, as the Scoping Memo and Ruling rightly notes, calls for the expansion of hydrogen fueling stations to enable the state's goal to put 5 million zero emissions vehicles on California roads by 2050. AB 8 further calls for funding of hydrogen fueling infrastructure for transportation. 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.[9] 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, directly with solar energy, or by electrolysis that splits water into hydrogen and oxygen. Any of

[9] http://www.energy.ca.gov/2017publications/CEC-600-2017-002/CEC-600-2017-002.pdf

these production pathways may show improved economics through transport over natural gas common carrier system in various use cases.

Currently, the hydrogen industry has surpassed the state's 33% renewable mandate,[10] although in addition to the challenge of the aforementioned pending shortfall of hydrogen for transportation, most renewable hydrogen being used in California is coming from credits sourced from out of state. The industry would like to produce more renewable hydrogen in-state, and this would provide California the full emissions and jobs benefits of renewable hydrogen. But again, this can only occur with 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 that will use dedicated renewable generation to power a 2.5 MW electrolyzer to produce hydrogen.[11] 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 natural gas pipeline system, however, these projects cannot consider this option in their production and delivery optimization.

Without adequate and economical hydrogen supplies, large regions of California 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 California is heavy duty trucks.[12] Hydrogen fuel cell electric technology is a key component of the state's Mobile Source Strategy to resolve this pernicious problem.[13] 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

[10]As 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

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

[12] 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

[13] https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf

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.

2. **State policy on reducing short-lived climate pollutants also calls for a broad 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."[14]The CHBC worked closely with the author of SB 1383 to ensure 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, but instead to broaden it to "renewable gas," so that renewable hydrogen is included in all relevant deliberations.

The Energy Commission's *2017 Integrated Energy Policy Report* reinforces this in its recommendations on implementing SB 1383, explicitly calling for inclusion of hydrogen produced via electrolysis and synthetic methane derived from this process (also often referred to as "power to gas") in the suite of solutions California deploys to mitigate short lived climate pollutants.[15]

The Public Utilities Commission's decision to now put off discussions of hydrogen is inconsistent with SB 1383 and the Energy Commission's recommendation.

3. **Renewable hydrogen will likely be essential to reaching deep the decarbonization mandated by SB 350.**

SB 350, furthermore, calls for deep greenhouse gas reductions in California, which will almost surely only be possible with inclusion of renewable hydrogen in the state's energy portfolio. Renewable hydrogen, for one, will be necessary to decarbonize transportation applications that

[14] SB 1383 text: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1383
[15] See 2017 IEPR pp. 285-286. Note the IEPR uses the term "power to gas," which is hydrogen produced via electrolysis using grid electricity or dedicated renewable generation, or this hydrogen synthesized into methane.

batteries cannot address at scale, such as heavy duty trucks, which are responsible for about 20% of on-road vehicle greenhouse gas emissions.[16]

SB 350 also calls for investor owned utilities to procure 50% RPS eligible renewable electricity, which along with large hydro and rooftop solar, will make California's electricity mix predominantly supplied by variable renewables by 2030. Integrating these renewables is a challenge, underscored by CAISO's recent finding that a 3-hour ramp of more than 13,000 MW is needed at the end of the day years before originally anticipated.[17] 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.

4. **Hydrogen produced with renewable electricity will also be essential to integrate high penetrations of renewable generation, including supplying long duration storage.**

Also, as renewable generation and electrification reaches high levels, seasonal storage will become critical. Electrolytic hydrogen produced using renewable electricity and renewable methane derived from electrolytic hydrogen, if they have access to the gas system for transportation and long-term storage, not only can provide what may be the only feasible pathway to achieve energy storage at the terawatt-hour scale,[18] but also have the added benefit of being far more geographically flexible of other bulk storage technologies, such as pumped hydro and compressed air.[19]

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.[20]

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[16] 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
[17] See CAISO's *Renewable Integration Update* presentation at this link: http://www.energy.ca.gov/2018_energypolicy/documents/2018-06-20_workshop/2018-06-20_presentations.php
[18] Source: Fraunhofer Institute
[19] See CHBC's submission to the 2017 IEPR Report Comments titled *Economics of Power-to-Gas.*
[20] See 2017 IEPR Ch. 3 Recommendations, p. 120

IV. Conclusion

The CHBC thanks the Commission for their consideration and looks forward to working together to facilitate adoption of a broad range of renewable gases in California, including renewable hydrogen and renewable methane derived from renewable hydrogen.

Respectfully submitted, **Dated: July 27, 2018**

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