

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

Order Instituting Rulemaking Regarding  
Building Decarbonization.

R. 19-01-011  
(Filed January 31, 2019)

**CHBC REPLY COMMENTS ON ORDER INSTITUTING RULEMAKING  
REGARDING BUILDING DECARBONIZATION**

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Dated: March 26, 2019

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The California Hydrogen Business Council (CHBC)<sup>1</sup> appreciates the opportunity to submit the following reply comments to comments by parties pursuant to the Administrative Law Judge’s (ALJ) *Order Instituting Rulemaking Regarding Building Decarbonization* (“OIR”).

**I. Comments of Public Advocates at the California Public Utilities  
Commission**

We agree with the recommendation by Public Advocates (Cal Advocates) that the PUC “(e)xamine the potential of renewable gas as part of building decarbonization strategy to meet the State’s GHG emissions reduction goals.” (p. 1). We encourage this examination to be broad and to include renewable hydrogen, due to its zero greenhouse gas content, high potential to integrate renewable generation, which will be essential in the 100% renewable and zero carbon

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<sup>1</sup> 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., Airthium, Alameda-Contra Costa Transit District (AC Transit), American Honda Motor Company, Anaerobe Systems, Arriba Energy, Ballard Power Systems, Bay Area Air Quality Management District, Beijing SinoHytec, Black & Veatch, BMW of North America, California Performance Engineering, Cambridge LCF Group, Center for Transportation and the Environment (CTE), CNG Cylinders International, Community Environmental Services, CP Industries, Dash2energy, Eco Energy International, ElDorado National – California, Energy Independence Now (EIN), EPC - Engineering, Procurement & Construction, Ergostech Renewal Energy Solution, EWII Fuel Cells, First Element Fuel, FuelCell Energy, GenCell, General Motors, Geoffrey Budd G&SB Consulting Ltd, Giner ELX, Gladstein, Neandross & Associates, Greenlight Innovation, GTA, H2B2, H2Safe, H2SG Energy Pte, H2Tech Systems, Hitachi Zosen Inova ETOGAS GmbH, HODPros, Hydrogenics, Hydrogenious Technologies, Hydrogen Law, HydrogenXT, HyET - Hydrogen Efficiency Technologies, Hyundai Motor Company, ITM Power, Ivys, Johnson Matthey Fuel Cells, Kontak, KORE Infrastructure, Life Cycle Associates, Linde North America, Longitude 122 West, Loop Energy, Luxfer/GTM Technologies, McPhy Energy, Millennium Reign Energy, Montreux Energy, National Renewable Energy Laboratory (NREL), Natural Gas Fueling Solutions – NGFS, Natural Hydrogen Energy, Nel Hydrogen, New Flyer of America, Next Hydrogen, Noyes Law Corporation, Nuvera Fuel Cells, Pacific Gas and Electric Company - PG&E, PDC Machines, Planet Hydrogen, Plug Power, Port of Long Beach, PowerHouse Energy, Powertech Labs, Primidea Building Solutions, Proton OnSite, RG Associates, Rio Hondo College, Rix Industries, Sacramento Municipal Utility District (SMUD), SAFCell, Schatz Energy Research Center (SERC), Sheldon Research and Consulting, Solar Wind Storage, South Coast Air Quality Management District, Southern California Gas Company, Sumitomo Corporation of Americas, Sunline Transit Agency, T2M Global, Tatsuno North America, The Leighty Foundation, TLM Petro Labor Force, Toyota Motor Sales, True Zero, United Hydrogen Group, US Hybrid, Verde, Vinjamuri Innovations, Volute, WireTough Cylinders, Zero Carbon Energy Solutions.

electricity future, mandated by SB 100, and promising potential to achieve mass scale when produced with electrolysis due to reliance solely on highly flexible and modular technologies for production – i.e. electrolyzers and renewable electricity like solar and wind.

## II. Comments of Environmental Defense Fund

We agree with EDF “that building decarbonization from changes to the gas supply should also be explicitly included in the scope of this proceeding.”<sup>2</sup> EDF states that are “*some limited feasible solutions to supply a building with carbon neutral fuel using the gas system,*” although they do not specify what those solutions are. According to UC Irvine’s National Fuel Cell Research Center (NFCRC), “*hydrogen as an energy carrier appears to be feasible in residential and commercial applications, as well as in microgrids and for cases when long duration or large magnitude storage is required.*”<sup>3</sup> Hydrogen can be used in different residential and commercial applications for example, as an environmentally sustainable cooking fuel relative to conventional cooking fuels typically used in developing countries, such as liquefied petroleum gas, charcoal, and firewood. The use of produced renewable hydrogen via (electrolysis) can reduce carbon emissions between 2.5 and 14 times (0.04 kg CO<sub>2</sub> eq/MJ) compared to firewood (0.1 kg CO<sub>2</sub> eq/MJ) and liquefied petroleum gas (0.57 kg CO<sub>2</sub> eq/MJ).<sup>4</sup> NFCRC also finds that “(i)n residential applications, small fuel cell power plants could be installed for the production of both electricity and heat or hot water for the home.”<sup>5</sup> When renewable hydrogen

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<sup>2</sup> EDF Opening Comments, p. 4

<sup>3</sup> The following sources are cited in *Review Article Hydrogen is essential for sustainability*, Alireza Saeedmanesh, Michael A. Mac Kinnon and Jack Brouwer, 2018:

Prieto-Prado I, Del Río-Gamero B, Gómez-Gotor A,

Pérez-Báez SO: **Water and energy self-supply in isolated areas through renewable energies using hydrogen and water as a double storage system.** *Desalination* 2018, **430**:1–14. <https://doi.org/10.1016/j.desal.2017.12.022>.

Al-Sharafí A, Sahin AZ, Ayar T, Yilbas BS: **Techno-economic •• analysis and optimization of solar and wind energy systems for power generation and hydrogen production in Saudi Arabia.** *Renew Sustain Energy Rev* 2017, **69**:33–49.

<https://doi.org/10.1016/j.rser.2016.11.157>. The authors note “This paper is of outstanding interest as it investigates the potentials of power generation and hydrogen production via solar and wind energy resources at different locations in the Kingdom of Saudi Arabia.”

Sorgulu F, Dincer I: **A renewable source based hydrogen energy system for residential applications.** *Int J Hydrogen Energy* 2018, **43**:5842–5851. <https://doi.org/10.1016/j.ijhydene.2017.10.101>.

Stern AG: **A new sustainable hydrogen clean energy paradigm.** *Int J Hydrogen Energy* 2018, **43**:4244–4255. <https://doi.org/10.1016/j.ijhydene.2017.12.180>.

Ishaq H, Dincer I, Naterer GF: **Performance investigation of an integrated wind energy system for co-generation of power and hydrogen.** *Int J Hydrogen Energy* 2018, **43**:9153–9164. <https://doi.org/10.1016/j.ijhydene.2018.03.139>.

<sup>4</sup> *Review Article Hydrogen is essential for sustainability*, Alireza Saeedmanesh, Michael A. Mac Kinnon and Jack Brouwer, 2018; Source cited for statistics on comparative carbon emissions reduction: Schmidt Rivera XC, Topriska E, Kolokotroni M, Azapagic A: *Environmental sustainability of renewable hydrogen in comparison with conventional cooking fuels.* *J Clean Prod* 2018, **196**:863–879. <https://doi.org/10.1016/j.jclepro.2018.06.033>.

<sup>5</sup> [http://www.nfrcr.uci.edu/3/FUEL\\_CELL\\_INFORMATION/FCexplained/stationary-applications.aspx](http://www.nfrcr.uci.edu/3/FUEL_CELL_INFORMATION/FCexplained/stationary-applications.aspx)

is used in this case, zero greenhouse gas is emitted. NFCRC's has also developed modeling that indicates integrating electrolytic hydrogen into California's energy future will be critical to achieving the state's clean electricity requirements. Their simulations of a 100% renewable electricity grid in California show "that both the power and energy capacity of hydrogen energy storage in current gas infrastructure (pipelines and storage facilities) is the only option that can technically balance renewable power and energy with load on an annual basis."<sup>6</sup>

### III. Comments of PG&E and Southern California Gas Company

We agree with the support expressed by gas utilities PG&E and Southern California Gas Company (So Cal Gas) for renewable gas, including hydrogen, being part of the scope of this proceeding. PG&E states that "*it is important to enhance the stakeholders' understanding of renewable natural gas and hydrogen's role in building decarbonization,*"<sup>7</sup> and that California's long-term GHG reduction goals can be advanced by enabling the use of such renewable gas options in addition to building electrification to meet customers' needs.<sup>8</sup> The utility specifically points out that "*(h)ydrogen or methane produced from electrolyzers can utilize excess renewable electricity and provide a storage resource to help balance the intermittent renewable electric load*" and presents "*an opportunity to replace significant volumes of fossil natural gas and advance California's climate goals.*"<sup>9</sup> Similarly, SoCalGas opines that hydrogen and methanated renewable hydrogen are among the renewable gas options that can be deployed to "*remove carbon from other sectors of the economy while reducing GHG emissions from the building sector.*"<sup>10</sup>

### IV. Conclusion

We look forward to working with the Commission on developing a technology neutral approach to decarbonize the building sector.

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<sup>6</sup> *Review Article Hydrogen is essential for sustainability*, Alireza Saeedmanesh, Michael A. Mac Kinnon and Jack Brouwer, 2018. The authors explain: "The magnitude of hydrogen energy storage compared to existing pumped hydro and to lithium-ion batteries (from complete electrification of the light and medium duty fleet of 21 million vehicles) is the only one sufficient to hourly and seasonally balance load and generation. This fact, together with the lack of self-discharge or evaporation, and separate power and energy scaling that enables cost effective seasonal storage, make hydrogen essential for achieving our zero-emission goals."

<sup>7</sup> PG&E Opening Comments, pp. 3-4

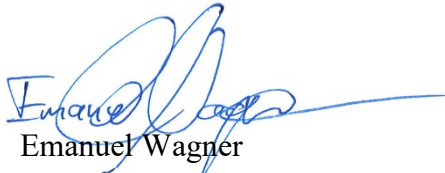
<sup>8</sup> *ibid.*, p. 8

<sup>9</sup> *ibid.* p. 9

<sup>10</sup> So Cal Gas Opening Comments, p. 4

Respectfully submitted,

Dated: March 26, 2019

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

Emanuel Wagner  
Deputy Director  
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