BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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And Related Matters.	Application 18-03-001 Application 18-03-002

COMMENTS BY THE CALIFORNIA HYDROGEN BUSINESS COUNCIL ON THE ASSIGNED COMMISSIONER'S AND ASSIGNED ADMINISTRATIVE LAW JUDGE'S RULING REQUESTING COMMENTS ON ISSUES PERTAINING TO ENERGY STORAGE TECHNOLOGY DIVERSITY

Emanuel Wagner
Deputy Director
California Hydrogen Business Council
18847 Via Sereno
Yorba Linda, CA 92866
310-455-6095
ewagner@californiahydrogen.org

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I. Introduction

The California Hydrogen Business Council ("CHBC") appreciates the opportunity to submit comments in response to the Assigned Commissioner and Administrative Law Judge's Ruling seeking responses from parties on questions related to prioritizing technology diversity in the Assembly Bill 2514 portions of Pacific Gas and Electric Company's, Southern California Edison's, and San Diego Gas and Electric Company's 2018 energy storage solicitations, pursuant to Rule 7.3 of the California Public Utilities Commission's ("Commission") Rules of Practice and Procedure. 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]

II. Background

III. Reponses to Question

A. Question 1: To date, approximately 89% of the contracts executed pursuant to the Commission's Energy Storage Procurement targets established in D.13-10-040 have been lithium ion batteries. There has also been an observed trend that the diversity of technologies bidding into Investor-Owned Utilities' Requests for Offers has become more limited from the 2014 solicitation to the 2016 solicitation.

1.1 Can the Commission's stated goal in D.13-10-040 of transforming the energy storage market be considered achieved if a single energy storage technology comprises the majority of the owned and operated storage systems in PG&E, SCE and SDG&E's service territories? Why or why not?

[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., 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.

Response: No, it will not. First and foremost, battery storage is appropriate only for short duration storage applications of up to about 4 hours, and as the penetration of renewable electricity generation on the grid increases to 50% or beyond, so too will the need for longer duration storage, including seasonal storage. California Energy Commission staff drew this conclusion in a 2015 paper, in which they stated that large scale, long duration storage solutions "will play a very important role in meeting future grid needs in California, including the 13,000 MW ramp expected by California ISO by 2020." Reinforcing this conclusion, the U.S. Department of Energy recently issued a Federal Opportunity Announcement for storage projects that have durations of 10 to 100 hours.[2] Lithium ion technology is not likely to be suitable for addressing this need.

Furthermore, global resource supplies of lithium, as well as cobalt which is used in many lithium-ion batteries, are at risk of constraint, driven by rapidly increasing demand for lithium-ion technology in battery electric transportation and other applications, uncertainty regarding supply of lithium, the ecological and cultural sensitivity of mining in South American regions where the biggest supplies of lithium supplies are located, and the geopolitical strains of regions like the Congo where much of the global supply of cobalt is located.[3] Diversifying storage technologies is one of the prudent approaches that ought to be taken to mitigate these risks.

[2] U.S. Department of Energy Advanced Research Projects Agency-Energy (ARPA-E) Funding Opportunity Announcement *DE-FOA-0001906: Duration Addition to Electricity Storage (Days).* Available on-line at https://arpa-e-foa.energy.gov/#Foaldc931d71c-1e66-4fea-8a27-91860bcd781d July 2, 2018.
[3] See, e.g.: https://www.cell.com/joule/pdf/S2542-4351(17)30044-2.pdf; https://www.bloomberg.com/graphics/2017-lithium-battery-future/

Question 2: Are there any grid or ratepayer-beneficial attributes of energy storage that storage technologies besides lithium ion batteries may adequately provide (i.e. long duration, safety)? If so, what are they? Are these attributes already captured in the utilities' cost-effectiveness valuation methodologies? If so, are they quantitative or qualitative values? Please list the relevant energy storage technology associated with each attribute.

Response: Hydrogen used as storage is an example of a technology that can carry many benefits. For instance, using grid electricity to produce hydrogen via electrolysis is the only known storage solution capable of providing energy storage in the terawatt hours, if geological formations and/or the pipeline system is used.[4] Electrolyzers and fuel cell systems can benefit the grid by load following and because they are flexible to site, unlike other long duration storage options like compressed air and pumped hydro. Current valuation methodologies do not fully account for these attributes. Electroytic hydrogen also has the flexibility of being used for pure storage or for zero emissions vehicle fueling, which is also not accounted for in current electric-utility procurement valuation methodologies. Lastly, state policy focused on advancing hydrogen, including renewable hydrogen, production for transportation (vehicles, rail, marine and port), are not aligned with present procurement priorities.

B. **Question 3: Are there risks to ratepayers and the grid of utility energy storage portfolios comprised predominantly of a single energy storage technology?**

Response: Yes. As previously explained, lack of diversity of storage technologies risks resource supply constraints and lack of cost-effective, reliable storage available

[4] Source: Fraunhofer Institute

to cover the wide range of scenarios in which storage will be needed in a high renewable electricity, high electrification future, including long duration and seasonal applications to which lithium-ion batteries are not well suited.

C. Question 4: If the Commission were to direct the utilities to prioritize technology diversity in their 2018 solicitations, but there are not enough sufficiently cost-effective bids to allow them to meet their 2018 procurement targets, does the 2020 solicitation provide sufficient opportunity for the utilities to procure the remaining capacity to meet their targets in a cost-effective manner?

Response: The CHBC believes the 2020 solicitation would be sufficient, if it is broadened to allow hydrogen storage technologies, including electrolytic hydrogen options, to participate.

D. Question 5: If the Commission were to direct the utilities to procure a minimum amount of non-lithium ion technologies from their 2018 solicitation, what should that minimum threshold be based on, for example a minimum percentage of total capacity procured, a minimum number of energy storage technologies, or another metric/basis?

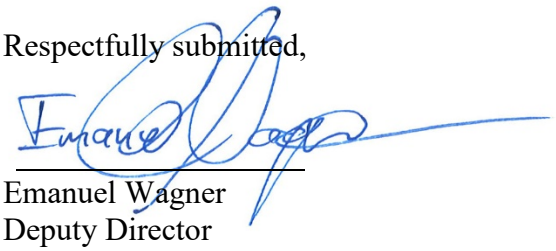
Response: The CHBC supports the Commission issuing a procurement minimum of no less than 70 MW (5% of the total mandate) of utility scale, innovative, long-duration storage technologies that include electrolytic hydrogen.

IV. Conclusion

The CHBC welcomes the opportunity to provide comments in response to the questions raised by the Commission and particularly calls attention to the urgency of technology diversity in energy storage solutions that includes flexible long duration solutions like electrolytic hydrogen, which are needed to ensure cost-effective and reliable electricity.

Dated: August 28, 2018

Respectfully submitted,



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