BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of San Diego Gas and Electric Company (U902E) for Approval of its 2018 Energy Storage Procurement and Investment Plan.	Application 18-02-016 (Filed February 28, 2018)
And Related Matters.	Application 18-03-001 Application 18-03-002

REPLY 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

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The California Hydrogen Business Council[1] ("CHBC") urges the California Public Utilities Commission ("Commission") to adopt a broad view of storage technologies, especially as the

[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 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

need for bulk, long duration storage becomes more pressing. We reiterate our position that first and foremost, battery storage is appropriate only for short duration storage applications of up to about 4 hours. As the National Fuel Cell Research Center has pointed out in their comments,

> *"As the fraction of renewable energy on the grid increases, the need for storage technologies of durations in excess of six hours will become vital."*[2]

The share of renewable electricity generation on the grid mandated to be 60% in just the next 12 years. This is in addition to generation from non-RPS sources like rooftop solar and large hydro, which are both seasonally variable. There will thus be an increased need for longer duration storage, including seasonal storage. As mentioned in our comments:

- California Energy Commission staff also 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.[3]

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.

[2] Comments Of The National Fuel Cell Research Center On The Assigned Commissioner's And Assigned Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. 3

[3] 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/#FoaIdc931d71c-1e66-4fea-8a27-91860bcd781d July 2, 2018.

- To address large scale, bulk, seasonal storage needs, it is possible to use grid electricity to produce hydrogen via electrolysis, thus capable of providing energy storage in the **terawatt hours**, if geological formations and/or the pipeline system is used.[4]

Lithium ion technology is not likely to be suitable for addressing this need, as several parties pointed out, and a technology neutral approach is vital to ensure a reliable, renewable, and affordable electric grid. PG&E commented that

> *"[Li-ion] might not be the best technology for emerging needs (long duration / seasonal storage) and other needs yet to be identified.[5]"*

We concur with comments of the San Diego County Water Authority and City Of San Diego that:

> *"Commission should prioritize technology diversity in its transformation of the energy storage market."*[6]

as well as the SCE comment that:

> *"the Commission has identified the importance of its energy storage policies remaining technology-neutral."*[7]

CHBC also agrees with several parties that there needs to be a fair competition among technologies, including Megawatt Storage Farms, Inc., which stated that:

> *The CPUC should focus on having a fair competition between viable large scale capable, commercially proven storage technologies.*[8]

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[4] Source: Fraunhofer Institute
[5] Pacific Gas And Electric Company's (U 39 E) Opening Comments In Response To Assigned Commissioner's And Assigned Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. 4
[6] Opening Comments Of The San Diego County Water Authority And City Of San Diego On Issues Pertaining To Energy Storage Technology Diversity, p. 3
[7] Comments Of Southern California Edison Company (U 338-E) On Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. 3
[8] Comments Of Megawatt Storage Farms, Inc, p. 12

CESA also stated that:

> *"progress to date in the lithium ion battery space should be celebrated, and disruption to this market sub-class should be avoided"*[9]

However, the storage needs at this stage are ideally suited for smaller scale storage projects, whereas the next decade will see a massive need to increase storage capacity, and the Commission should be forward looking and support technologies that are capable of bulk storage at reasonable cost. As SDG&E commented,

> *"The Commission should also consider the need for longer term/seasonal storage at higher RPS percentages, and from this perspective, be open to approving all technologies permitted by the AB 2514 list of eligible storage technologies in future solicitations."*[10]

While nothing in the language of AB 2514 excludes hydrogen as an eligible technology, the Commission has so far decided to explicitly exclude hydrogen, which the CHBC has strongly opposed and continues to think ought to be changed going forward, so that hydrogen storage is included in the list of eligible storage technologies for future solicitation.

CHBC agrees with CESA that improvements to the selection of other technologies could be achieved:

> *"through improved valuations of diversity in the IOU solicitation process"*[11],

in addition to the strong recommendation for:

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[9] Comments Of The California Energy Storage Alliance To Assigned Commissioner's And Assigned Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. 12

[10] Response Of San Diego Gas & Electric Company (U902-E) To Questions On Energy Storage Technology Diversity Issues, p. 3

[11] Comments Of The California Energy Storage Alliance To Assigned Commissioner's And Assigned Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. X

"a new procurement plan that is incremental to existing AB 2514 procurements for emerging energy storage technologies. This Energy Storage Emerging Technology Procurement Plan ("ES-ETPP" or "ETPP") will address the goals of market transformation in smart ways.[12]"

CHBC also agrees with the statement by Megawatt Storage Farms, Inc. that:

"The attributes of these alternative storage technologies are not captured in the current valuation methodologies because the current approaches are heavily biased towards 4-hour discharge durations as a result of the RA rules. This is arbitrary, unnecessary and makes the playing field grossly off-level."[13]

CHBC wholly disagrees, however, with Megawatt Storage Farms, Inc.'s statement that

"The only viable large-scale alternatives to Li ion are pumped hydro and NGK's NAS system."[14]

As explained, hydrogen energy storage is a viable large-scale storage option, and in fact, has potential to be the largest scale storage technology currently available.

CHBC also calls into question Megawatt Storage Farms, Inc.'s comment that:

"Diversity should not be achieved by selecting unproven, emerging technologies, or technologies with little long-term operating history on the grid, into projects that otherwise would go to Li Ion." [15]

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[12] Comments Of The California Energy Storage Alliance To Assigned Commissioner's And Assigned Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. 7
[13] Comments Of Megawatt Storage Farms, Inc, p. 13
[14] Ibid, p. 10
[15] Ibid, p. 14

Lithium-ion storage was an emerging technology when California started its storage program, and the same can be said of electric vehicles and solar power, when California crafted policy and regulation to support their development. Support for emerging, promising clean technologies, and specifically opening up channels for them to compete on an even playing field with more established incumbent technologies, has a great tradition in California, and has been key to the state's success as an international clean energy and climate protection leader. While CHBC believes that hydrogen energy storage is commercially viable technology, it could be considered emerging in California because regulatory barriers have so far limited its ability to enter into the market. For instance, in addition to the previously mentioned CPUC Decision excluding hydrogen storage, the National Fuel Cell Research Center points out:

> *"In some cases, the unique energy storage features of hydrogen energy storage actually preclude them from participating (e.g., disparate points of charging and discharging interconnection are not allowed)."*[16]

We believe any questions about the technology's viability could and should be addressed in Commission proceedings.

CHBC additionally agrees with Tesla when they state that:

> *"The Commission should also consider whether there are any undue non-technological barriers impeding any storage technologies from participating and winning contracts."*[17]

[16] Comments Of The National Fuel Cell Research Center On The Assigned Commissioner's And Assigned Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p. 5
[17] Comments Of Tesla, Inc. On Assigned Commissioner's And Administrative Law Judge's Ruling Requesting Comments On Issues Pertaining To Energy Storage Technology Diversity, p.8

We urge the CPUC to review those requirements and make changes accordingly to enable hydrogen energy storage to compete.

CHBC also supports SDG&E encouragement of supporting non-lithium technologies outside the Commission process as stated here:

> *"If the Commission believes that non-lithium technologies need encouragement in addition to the existing market processes, it should focus on EPIC RD&D funding to provide such encouragement."*[18]

In conclusion, the CHBC continues to urge the Commission to enable technology diversity in energy storage solutions that includes flexible long duration solutions like hydrogen energy storage and e-hydrogen, which are needed to ensure cost-effective and reliable electricity, and remove any barriers for technology adoption.

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Respectfully submitted,

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[18]Response Of San Diego Gas & Electric Company (U902-E) To Questions On Energy Storage Technology Diversity Issues, p. 3