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CHBC Comments on Draft 2020 Load Management Rulemaking Scoping Memo

Additional submitted attachment is included below.

California Hydrogen Business Council
Hydrogen Means Business in California!
Main Office: 18847 Via Sereno, Yorba Linda, CA 92886
DC Office: 1211 Connecticut Ave NW, Ste 650, Washington, DC 20036
Phone: (310) 455-6095 | Fax: (202) 223-5537
info@californiahydrogen.org | www.californiahydrogen.org

19-OIR-01- CHBC Comments on Draft 2020 Load Management Rulemaking Scoping Memo

January 21, 2020

Dear Commissioners:

The California Hydrogen Business Council (CHBC)[1] welcomes the opportunity to comment on the California Energy Commission's (CEC's) proposed draft of the 2020 Load Management Rulemaking Scoping Memo (Scoping Memo).

We generally support the approach of deploying an array of load management technologies to enable achievement of the state's renewable and carbon neutral energy goals. The load management framework scope should address Resource Adequacy (RA) needs as the Renewable Portfolio Standards (RPS) climb to 100% in California by 2045 per Senate Bill 100[2]. Based on that future RA requirement, the load management framework should also address the magnitude (MW/MWh) and the discharge duration (hours/days/months etc.) needs of storage as a strategic resource to support and balance the grid. We especially and strongly support the CEC's proposal to consider opportunities for long-term (e.g. 48 hours or more) storage of excess renewable generation using technologies that would include zero-carbon, renewably-produced hydrogen (green hydrogen).[3]

We offer the following specific comments:

[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. CHBC Members are listed here: https://www.californiahydrogen.org/aboutus/chbc-members/

[2] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100

[3] p. 4, Draft 2020 Load Management Scoping Memo

1. Long duration storage will be needed in a high renewables future.

Long duration/seasonal storage requirements can be a critical resource in California in addressing load balancing and grid management under peak load conditions under the high renewables future. Electrolytic hydrogen can play a vital role in bulk, seasonal storage and transmission deferral by converting excess renewable electricity, which would otherwise be curtailed, into usable forms of energy. Using excess renewable electricity to power electrolysis, which splits water into hydrogen and oxygen, allows for the hydrogen to be:

a. stored in salt caverns or other storage facilitates,
b. transported through the natural gas grid either via blending or by further converting the hydrogen to renewable methane,
c. transported by other means such as trucks, or
d. used directly at the point of production.

The stored chemical energy can be used to generate electricity via a fuel cell or other generation device, as a clean transportation fuel, or for any other purpose for which hydrogen or methane is used.

The rapid response characteristics of electrolyzers, coupled with bulk storage, can also assist T&D planners in reducing congestion on the transmission lines by lowering the electric load on the system. Responsive systems like electrolyzers can potentially delay or even eliminate the need for additional transmission line infrastructure (transmission deferral).[4]

Hydrogen storage can also help defer future T&D investments based on the locational load profile. The scope of this proceeding should tie in to the current CPUC Resource Adequacy proceeding [5] and the CAISO energy storage and transmission system planning initiatives that would influence long term storage and T&D system needs to support future load needs and costs.

[4] Novel Electrolyzer Applications: Providing More Than Just Hydrogen, NREL, 2014, www.nrel.gov/docs/fy14osti/61758.pdf
[5] https://www.cpuc.ca.gov/RA/

2. **Hydrogen produced by electrolysis with renewable or zero carbon electricity holds a key to reaching the two major goals the Scoping memo identifies as critical to California's pioneering climate effort – carbon free electricity as mandated by SB 100 and transitioning to zero emission transportation**.

Electrolysis is a highly flexible and scalable technology that absorbs excess renewable generation, which is not usable on the grid, to produce hydrogen. This can help eliminate the curtailment that is occurring increasingly as more renewables penetrate the grid. Electrolysis can also improve the economics of renewable electricity development, which will be essential to reaching SB 100's carbon free electricity mandate. The produced renewable hydrogen can be stored in massive quantities with geographic flexibility and used when needed for a variety of end uses, one of which is zero carbon electricity generation, via either thermal power plants or zero emissions stationary fuel cells. This will be needed to manage peak loads and seasonal requirements in an increasingly renewable electricity future and it can also play a key role in microgrids and local load management needs. UC Irvine's research has shown electrolyzers on their campus microgrid could optimize solar generation, increasing campus solar energy used by a factor of ten.[6]

Another end use for green electrolytic hydrogen is to provide zero carbon fuel for zero emissions hydrogen fuel cell electric vehicles, which are a cornerstone of California's ZEV policies and are needed for applications in which battery electric solutions have major limitations on their own, such as long haul, heavy duty vehicles, transit buses in territories with challenging terrain, long distances, or limitations on charging infrastructure feasibility, as well as light duty ZEVs where plugging in at home is not simple, long commutes are required, or fast refueling times are needed.

[6] https://www.energymanagertoday.com/uc-irvine-power-gas-storage-performs-lithium-ion-batteries-0168751/

3. **Green hydrogen storage can also help advance the state's load management goals of increasing peak efficiency and demand efficiency in cost effective, equitable ways by providing decarbonized fuel for building end uses that offset the electricity demand in this sector.**

Residential, commercial and industrial buildings consume the vast majority of California's electricity,[7] and while the transportation sector promises to use a larger share with the advancement of battery electric vehicles, the building sector will likely continue to be a major consumer for the near future, compounded by growing interest in electrifying building end uses. Offsetting some of that need by decarbonizing gas end uses can help ease the burden on the electricity system, as well as provide greater energy resilience during planned and unplanned power shutoffs.

Numerous experts are advocating for increasing the share of renewable gas – including hydrogen - in the building sector, along with electrification, as an approach to decarbonizing the sector. E3's study on *Residential Building Decarbonization in California* suggests that close to half new single-family homes and a third of multi-family homes would potentially have increased energy bills of $100 or more a year, if they are built all electric.[8] The report specifically recommends that California ought to presently pursue developing both electrification *and* renewable gas pathways in the near-term because of the fact that both depend on nascent technology markets.[9] A recent ICF study (2019)[10] to evaluate the role of gas utilities in a decarbonized world studied that the high cost of building electrification would likely "crowd out" other cost-effective alternatives to help reduce building related emissions. The analysis further points out that the annual cost per household under technology neutral decarbonization is cheaper than full residential electrification (the annual estimated cost per

[7] Source: CEC, as reported by CalMatters https://calmatters.org/environment/2016/04/share-of-total-electricity-consumption/
[8] p. 69, *Residential Building Decarbonization in California*, E3; April 2019
[9] p. 2, *Building Electrification in California*, E3; April 2019 https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf
[10] ICF webinar on the analysis is available at: https://www.icf.com/resources/webinars/2019/gas-utilities-in-a-decarbonizing-world

house hold increased by $1,420 per customer under residential electrification versus $1,200 per customer under technology neutral decarbonization scenario).[11] RMI recently reported that hydrogen can be used for a number of applications, including electricity and heat, despite the fact that "*misconceptions about hydrogen abound*," and "*haters are expressing doubt over the development of hydrogen resources, fearing that it competes with electrification and battery technology*," when in fact, "*this concern doesn't reflect reality… With its zero-carbon potential and the role it can play in increasing demand for renewable energy, hydrogen has an important role in our energy transition and is a key complement to electrification.*" Furthermore, the International Energy Agency stated in a recent report that "*With declining costs for solar PV and wind generation, building electrolysers at locations with excellent renewable resource conditions could become a low-cost supply option for hydrogen, even after taking into account the transmission and distribution costs of transporting hydrogen from (often remote) renewables locations to the end-users".*[12] They go on to declare "*now is the time to scale up technologies and bring down costs to allow hydrogen to become widely used… But for hydrogen to make a significant contribution to clean energy transitions, it needs to be adopted in sectors where it is almost completely absent, such as transport, buildings and power generation."*[13]

Some building types in California, including commercial and industrial building inventories, can be particularly hard to decarbonize with "full electrification" due to their energy intensive attributes and exponential costs to upgrade electric transmission and distribution infrastructure. According to the Lawrence Berkley National Lab (LBNL,2018)[14], *"while incremental changes in specific buildings are unlikely to have impacts, extensive changes in large industrial facilities, or an accretion of smaller changes in the same area, could require distribution system upgrades*" leading to higher cost of electricity services.

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[11] Slide 17 of the ICF webinar available at: https://www.icf.com/resources/webinars/2019/gas-utilities-in-a-decarbonizing-world
[12] https://www.iea.org/hydrogen2019/
[13] See *Future of Hydrogen* Summary, IEA, https://www.iea.org/hydrogen2019/
[14] http://ipu.msu.edu/wp-content/uploads/2018/04/LBNL-Electrification-of-Buildings-2018.pdf

A technology neutral approach to building decarbonization is also prudent, given the virtually impossible task of currently calculating a realistic future cost comparison between all- electric homes and those that rely on renewable gas for some uses because of the uncertainty of wildfire impacts on future electricity rates. It is also critical for policymakers to consider the reliability, safety, and public health concerns related to increased reliance on the electricity grid, given its vulnerability with respect to disasters like wildfires and earthquakes, as well as the need for solutions that can supply clean energy 24/7 under all circumstances.

Hydrogen as a strategy for decarbonizing building end uses is being pursued in Europe, for example:

- In the United Kingdom (U.K.), the HyDeploy Project plans to blend up to 20% hydrogen as part of their decarbonization efforts.[15] One of the anchor projects is taking place at Keele University, which is exploring hydrogen blending into its private gas network beginning in 2019 to reduce carbon emissions from heating buildings.[16] Blending hydrogen with natural gas across the U.K. is estimated to reduce 6 million tons of carbon annually, the equivalent of taking 2.5 million cars off the roads.[17] Leeds, one of the largest cities in the U.K., also launched the Leeds H21 City Gate hydrogen project[18] in 2016, targeting the conversion of the existing natural gas supply and distribution system to deliver hydrogen to consumers.
- Similarly, eastern Germany is soon to begin blending 20% hydrogen produced by renewable electricity into the gas distribution grid. This fall, 400 heating systems and other customer devices will be installed to demonstrate hydrogen's compatibility with household appliances.[19]

[15] https://networks.online/gphsn/news/1000904/trial-explore-blending-hydrogen-gas-network
[16] https://networks.online/gphsn/news/1000904/trial-explore-blending-hydrogen-gas-network
[17] https://www.telegraph.co.uk/business/2018/01/06/hydrogen/
[18] https://www.northerngasnetworks.co.uk/2016/07/12/watch-our-h21-leeds-city-gate-film/
[19] https://www.eon.com/en/about-us/media/press-release/2019/hydrogen-levels-in-german-gas-distribution-system-to-be-raised-to-20-percent-for-the-first-time.html

We appreciate consideration of these comments and look forward to working with the Commission on further understanding the role of hydrogen in load management in California's carbon free electricity future.

Respectfully,

Emanuel Wagner
Deputy Director
California Hydrogen Business Council