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Comments by the CHBC on Staff Workshop for the Initial Public Workshop for Comments on Long Duration Energy Storage Scenarios

Additional submitted attachment is included below.

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Comments by the California Hydrogen Business Council on Staff Workshop for the Initial Public Workshop for Comments on Long Duration Energy Storage Scenarios

December 17, 2020

I. Introduction

The California Hydrogen Business Council (CHBC)[1] is pleased to submit comments on the California Energy Commission's December 3, 2020 *Staff Workshop for the Initial Public Workshop for Comments on Long Duration Energy Storage Scenarios* ("Workshop"). We are glad to see the Commission addressing Long Term Energy Storage (LTES) in a comprehensive manner, and we look forward to working with the UC Merced and E3 teams on the development of LTES scenarios that will help achieve the state's goals.

Our main points include:

A. The CHBC supports the inclusion of green electrolytic hydrogen in the mix of technologies to be evaluated for long term energy storage (LTES). Green electrolytic hydrogen provides a valuable, scalable, geographically flexible long duration storage option and provides cross sector/market benefits other technologies cannot.

B. The LTES project team recognizes the limitations of the current RESOLVE model, in particular as it relates to LDES technologies. We look forward to working with the researchers and E3 to refine the model and improve its capabilities relates to LTES scenarios.

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

C. The CHBC encourages LTES scenarios to include any technology that stores energy for 6 hours or longer and that as part of this effort, modeling include technologies that can store energy over the time frame and at the scale needed to meet seasonal demand requirements and multi-day shortfalls in production from variable renewable resources.

II. Comments

A. The CHBC supports the inclusion of green electrolytic hydrogen in the mix of technologies to be evaluated for long term energy storage (LTES). Green electrolytic hydrogen provides a valuable, scalable, geographically flexible long duration storage option and provides cross sector/market benefits other technologies cannot.

SB 1369 mandated that state agencies consider green electrolytic hydrogen as a storage resource, among other uses. The Energy Commission is taking further steps to implement this statute by including green electrolytic hydrogen in its current evaluation of LTES. Green electrolytic hydrogen is particularly well suited for LTES as it can be stored for long durations in mass quantities, especially if it has access to salt caverns and/or the underground gas carrier system. This is because the technology is not subject to drought conditions like pumped hydro or as many geographical constraints (e.g. transmission access, natural resource sites) as pumped hydro or compressed air. A report by DNV GL identifies compressed hydrogen using subsurface storage (salt caverns and depleted hydrocarbon fields) as the most cost-effective solution for seasonal storage in a zero-carbon electricity system that relies largely on variable solar and wind.[2] Numerous other researchers encourage hydrogen storage as an important resource in a high renewable generation energy future, such as UCI, which finds that the capacity for hydrogen as a long duration and seasonal storage solution using the current California gas system is a critical complement to other storage solutions like batteries that are

[2] https://www.dnvgl.com/publications/the-promise-of-seasonal-storage-168761

more suitable for shorter duration requirements.[3] A recently released report by the bank HSBC advocates for hydrogen storage to manage curtailment, as variable renewable generation becomes an increasing issue[4]. These and others studies point to the fact that green electrolytic hydrogen can and should play a valuable role in California's LTES scenarios.

The CHBC further agree with researchers that green electrolytic hydrogen, along with renewable hydrogen produced from bioenergy, have uses in other sectors of the economy, and scaling green electrolytic hydrogen up for LTES will have cross sector benefits to market segment such as transportation and hard to decarbonize heavy industry. Including these benefits in the overall analysis of LTES will ensure these benefits are recognized and incorporated into future state planning and policies.

B. The SB 100 project team recognizes the limitations of the current RESOLVE model as it relates to LTES technologies. We look forward to working with the Energy Commission and researchers to refine and improve modeling capabilities related to LTES scenarios.

The researchers rightly acknowledge the RESOLVE model, which is currently informing assumptions about resources to be selected for SB 100 implementation and LDES, does not show hydrogen as an option. The CHBC would like to point out that preliminary analysis by UC Irvine shows that if hydrogen (and methane derived from it) are inserted into the model using biomethane as a proxy resource for injected hydrogen and synthetic methane, the model does in fact select hydrogen. It does so when hydrogen reaches a cost widely forecasted to be achieved by electrolytic hydrogen by 2030 or sooner ($2/kg or $16/MMBTU) - and does so all the more when optimistic pricing for electrolytic hydrogen is inserted into the model. This selection of hydrogen, in turn, significantly reduces the need for battery storage, thermal

[3] https://www.californiahydrogen.org/wp-content/uploads/2018/11/20181106-ESNA-CHBC-HESWorkshop_Brouwer.pdf
[4] Renewables can make hydrogen green | Insights | HSBC

capacity retirement, and curtailment.[5] The recently released draft Joint Agency report on SB 100 implementation also recognizes the limits of the RESOLVE model and advocates for deeper examination of long duration storage and hydrogen technology as among next steps.[6] We encourage the Energy Commission to make a parallel effort as it pursues its LTES program.

C. The CHBC encourages LTES scenarios to include any technology that stores energy for 6 hours or longer and that as part of this effort, modeling include technologies that can store energy over the time frame and at the scale needed to meet seasonal demand requirements and multi-day shortfalls in production from variable renewable resources.

The CHBC supports a technology inclusive approach to LTES modeling and program planning that examines and supports all technologies that can store energy for more durations of than 6 hours. This includes durations of multiple hours, multiple days (e.g. to address planned and unplanned shutoffs), and multiple months (e.g. to address seasonal demands). This is important to both encourage technology neutral planning, as well as to address the full range of cases for which storage will be needed to ensure reliable electricity supply. Understanding and developing such solutions will be especially needed, as California transitions to an increasingly variable renewable electricity portfolio and grapples with increasing wildfires and extreme weather events related to climate change. The urgency is all the greater with the state simultaneously transitioning to carbon neutrality economy wide, which will require zero carbon alternatives to the fossil natural gas storage and generation currently relied upon to manage firm power and seasonal requirements. Hydrogen is uniquely capable of supplying storage at mass scale for a wide range of duration requirements, including seasonal. This ought to be reflected in the state's modeling efforts.

[5] For a further explanation of this graphic and concept, please see the presentation on behalf of CHBC by Dr. Jeffrey Reed, Chief Scientist – Renewable Fuels and Energy Storage, Advanced Power and Energy Program, UC Irvine, given on July 21 at the CPUC Track 1B Workshop on Gas System Reliability. Approx. 2:22 https://cpuc.webex.com/recordingservice/sites/cpuc/recording/play/8f41736f0ab34b13aeb0a16dd3bb2329 Password: Gasplanning123

[6] See, e.g., p. 108: https://www.energy.ca.gov/event/workshop/2020-12/notice-senate-bill-100-draft-report-workshop

CONCLUSION

The CHBC appreciates the Energy Commission's consideration of these comments and looks forward to working with you to accelerate LTES development in California and to better understand the keyways hydrogen can enable this critical achievement.

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