

DOCKETED

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CHBC EPIC Investment Plan Scoping Comments

Additional submitted attachment is included below.

California Energy Commission
1516 9th Street
Sacramento, CA 95814

July 15, 2021

RE: Electric Program Investment Charge 2021-2025 Investment Plan Scoping – Hydrogen Technology

The California Hydrogen Business Council (CHBC)¹ appreciates the invitation to present in the Electric Program Investment Charge (EPIC) 2021-2025 Investment Plan Scoping workshop on hydrogen technology and respectfully submits the following comments in response to the workshop. In summary, we propose the following:

1. **Expand research and demonstration projects to assist in the commercialization of hydrogen produced through the thermal conversion of biomass.**
2. **Expand research and demonstration projects which evaluate Long Duration Energy Storage opportunities for hydrogen in depleted oil fields, rock formations, and in new, existing, and abandoned pipelines.**

I. INTRODUCTION

The CHBC applauds CEC's work in administering the EPIC program. The EPIC program has been instrumental in funding the research and development of innovative technologies that have helped California significantly reduce greenhouse gas (GHG) emissions. It is imperative the EPIC program continue these efforts by committing to research and development of new and emerging zero and low carbon technologies, such as hydrogen, that offer multiple benefits and solutions across market sectors.

Hydrogen is a diverse energy carrier that stands to bridge the gap between California's climate goals and the state's current progress in meeting those goals. Hydrogen is a clean-burning, viable, and

¹ The CHBC is comprised of over 120 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 help the state meet its decarbonization goals. **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/>

scalable solution that reduces reliance on fossil fuels, is a firm and dispatchable energy source, can be stored for long durations, is easily transportable as a liquid or gas, is a zero-emission fuel when used in fuel cells, and represents a tremendous economic engine, job creator, and export opportunity for California. The world's leading economies in Europe are accelerating the pace at which hydrogen is being integrated into their power, transportation, heavy-industry, and gas pipeline distribution markets.² California has the capacity to lead the nation on the integration of hydrogen into the state's economy due to an abundance of renewable resources—like wind, solar, and biomass—which can be converted to clean, renewable energy to help meet the state's climate goals. To fully capture the value of “intermittent” resources such as wind and solar, California must explore new, long duration energy storage (LDES) opportunities that will store this energy in large quantities and allow for the firm dispatch of these resources anytime and anywhere they are needed.

The CHBC respectfully recommends the CEC consider committing EPIC funds towards the opportunities outlined below.

II. DISCUSSION

a. **Expand research and demonstration projects to assist in the commercialization of hydrogen produced through the thermal conversion of biomass.**

Hydrogen is the most abundant and versatile molecule that can be produced and deployed as a clean fuel. Today, technologies exist to produce hydrogen from a variety of feedstocks, including solar, wind, and biomass.³ The CHBC supports hydrogen production from renewable feedstocks, including the thermal conversion of biomass. The thermal conversion of biomass to hydrogen has tremendous potential because it can be deployed across multiple sectors.⁴ The process creates clean energy that can be dispatched or stored by turning a would-be waste product into renewable energy.⁵ Although hydrogen

² <https://fuelcellsworks.com/news/european-commission-unveils-its-hydrogen-strategy/>.

³ “Hydrogen Production.” <https://www.californiahydrogen.org/resources/hydrogen-faq/#S31>.

⁴ <https://www.forbes.com/sites/pikeresearch/2020/04/22/dont-forget-about-biomass-gasification-for-hydrogen/?sh=341db703724f>.

⁵ Sponsor comments from AB 322 (2021), California Senate Energy, Utilities, and Communication Committee Analysis, Bioenergy Association of California.

production through thermal biomass conversion is available today, more can be done to further demonstrate and commercialize the emerging technology, bring down costs and identify new pathways for conversion which will eliminate the burning of a valuable feedstock that could otherwise be turned into clean renewable energy. The CHBC respectfully recommends the CEC expand and augment research and demonstration projects on thermal conversion pathways of biomass to hydrogen in the 2021-2025 EPIC Investment Plan.

b. Expand research and demonstration projects which evaluate Long Duration Energy Storage opportunities for hydrogen in depleted oil fields, rock formations and new, existing, and abandoned pipelines.

California's abundance of clean renewable energy produced from wind and solar, have been growing exponentially, and must continue to grow to support the state's decarbonization goals. As wind and solar have grown, California's over-supply of renewable power that occurs when California's weather is most suitable for wind and solar generation⁶ has also grown. Over-supply results in resource curtailment, which is the intentional reduction of energy that could be produced from these resources.⁷ In 2018, the California Independent System Operator (CAISO) reported that approximately 461 GWh of solar and wind energy was curtailed that year.⁸ That means 461 GWh of solar and wind energy was lost and Californians relied on fossil fuels to make up for renewable energy that could otherwise have been stored and redeployed when needed. In 2019, CAISO data show a significant increase of over 700 GWh of curtailed solar and wind power and up to as much as 12,000 GWh are expected to be curtailed by 2030. This year, in 2021, the CAISO hit a record of over 300MWh of curtailed renewables in March.⁹

Hydrogen stored in large quantities can serve as a firm dispatchable renewable resource.¹⁰

California is facing an increasing need to deploy more and more solar and wind resources. To balance the intermittent production of wind and solar resources with the needs of the electric grid, utility-scale LDES

⁶ Denholm, P., O'Connell, M., Brinkman, G., Jorgenson, J. "Overgeneration from Solar Energy in California: A Field Guide to the Duck Chart." (2015). <https://www.nrel.gov/docs/fy16osti/65023.pdf>.

⁷ Id.

⁸ <http://www.aiso.com/informed/Pages/ManagingOversupply.aspx>.

⁹ [California ISO - Managing Oversupply \(caiso.com\)](https://www.aiso.com/informed/Pages/ManagingOversupply.aspx)

¹⁰ When produced from renewable resources.

is required. With the passage of SB 100¹¹, setting the goal of 100% carbon-free electricity by 2045, and the signing of Executive Order B-55-182 to achieve carbon neutrality by 2045,¹² a major focus for California to achieve these goals should be the deployment of utility-scale LDES.

There are a host of LDES options that present the potential to store large volumes of renewable hydrogen including rock formations, depleted oil fields, and pipelines. These options are not subject to drought conditions and could potentially store hydrogen in large volumes for long durations. Depleted oil fields, rock formations and pipelines show tremendous potential for the LDES of hydrogen based on previous studies.¹³ Depleted Oil fields are being utilized in Texas as viable options for LDES.¹⁴ And, in England, a pipeline storage project of 400 MW is under construction.¹⁵ California will have an increasing need for LDES of firm dispatchable resources, such as renewable hydrogen, to achieve the state's decarbonization goals. Research and demonstration projects conducted through the EPIC program on the LDES potential of rock formations, depleted oil fields, and pipelines provide a potential means for maximizing the capture of these intermittent resources and shifting that energy to periods of non-production and other market sectors. The CHBC respectfully recommends the CEC include LDES in the 2021-2025 Investment Plan, in particular, LDES possibilities for hydrogen in depleted oil fields, rock formations and pipelines.

III. CONCLUSION

The CHBC appreciates the opportunity to submit comments on the 2021-2025 Investment Plan Scoping for Hydrogen Technology and respectfully requests considerations of the aforementioned recommendations. The CHBC encourages the CEC to engage stakeholders throughout the plan scoping and looks forward to assisting the CEC in any way our organization is able.

¹¹ https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100.

¹² <https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>.

¹³ [5030aece27ab4701808c08c0b8873e97.pdf](https://www.power-technology.com/features/featurecould-depleted-oil-wells-be-the-next-step-in-energy-storage-5680002/) (dnvgl.com); [Renewables can make hydrogen green | Insight | HSBC Holdings plc](https://www.power-technology.com/features/featurecould-depleted-oil-wells-be-the-next-step-in-energy-storage-5680002/).

¹⁴ <https://www.power-technology.com/features/featurecould-depleted-oil-wells-be-the-next-step-in-energy-storage-5680002/>.

¹⁵ <https://ieefa.org/highview-power-says-its-long-duration-energy-storage-pipeline-totals-400mw-4gwh/>.

Respectfully Submitted,

A handwritten signature in black ink, appearing to be "A. J. H.", written in a cursive style.

Policy Director
California Hydrogen Business Council