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Additional submitted attachment is included below.

California Hydrogen Business Council Comments on IEPR Update Workshops on Hydrogen Supply, Infrastructure, and Fuel Cell Electric Vehicle Market Status

July 23, 2020

I. Introduction

The California Hydrogen Business Council (CHBC) ¹ welcomes the opportunity to comment on the July 2 IEPR Update workshops focused on hydrogen supply, infrastructure and fuel cell electric vehicle market status. These comments are in addition to those we previously submitted on the light-duty and heavy-duty ZEV market status workshops. Our new points are summarized below and elaborated on in the Comments section that follows.

- **We greatly appreciate Commissioner Monahan and others emphasizing that zero emissions electric vehicles include hydrogen fuel cell electric vehicles (FCEVs), not only battery electric vehicles, and encourage this to be reflected in the 2020 IEPR Update and its recommendations.**
- **Because the Clean Transportation Program funding authorized by AB 8 is the only current policy mechanism that provides FCEV OEMs the forward looking certainty they require to do their critical part in meeting the 5 million ZEV goal of Executive Order B-48-18, we urge the Energy Commission to join ARB in calling for an extension of this program beyond its 2023 sunset date.**

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/>

- **The Energy Commission ought to recommend policy support to accelerate low and zero carbon hydrogen, which as Bloomberg and others pointed out is increasingly recognized as a promising pathway to decarbonizing not only transportation, but also other challenging sectors, particularly as low cost renewable electricity, falling technology costs, and policies combine to enable economies of scale.**
- **International commitments to produce hydrogen renewably are on the rise, spurred by carbon neutrality targets and low renewable electricity costs. California should seize the moment to collaborate with other global frontrunners to lead this major clean energy transformation and the job growth, public health benefits, and environmental protection that come with it.**

II. Comments

The following comments provide further details on the CHBC's primary points summarized above.

- A. We greatly appreciate Commissioner Monahan and others emphasizing that zero emissions electric vehicles include hydrogen fuel cell electric vehicles (FCEVs), not only battery electric vehicles, and encourage this to be reflected in the 2020 IEPR Update and its recommendations.**

The CHBC welcomes the constructive discussion that took place in this workshop. We very much appreciate the emphasis that electric zero emission vehicles include both battery and fuel cell electric technologies. As Wayne Leighty from Shell articulated during the workshop, the primary focus should remain on customer value proposition, rather than on vehicle type or class. We strongly believe that FCEV and BEV technologies should be viewed as complementary. Each are necessary and provide particular strengths to enable achievement of the state's criteria pollutant and greenhouse gas goals across vehicle classes and sectors.

The presence of numerous companies on the workshop panels and public comment throughout this and other recent IEPR transportation workshops makes clear that there is robust and

growing interest in California for FCEVs and hydrogen fueling. As panelist Dave Edwards pointed out, doubts about private investment should be allayed by major projects like the \$150 million renewable hydrogen production facility that Air Liquide is building to serve the Western states' hydrogen transportation market. The fact that private investment has been significant even with relatively modest public support was underscored by Leighty's point that ARB analysis shows 6% of public funding has leveraged 94% of private capital investment in FCEV and hydrogen fueling advancement.

The need for continued focus on hydrogen FCEV and fueling infrastructure as part of the state's ZEV effort is particularly urgent now. Never has protecting people's lungs from air pollution, which is predominantly caused by vehicle emissions throughout the state, been more critical than under the threat of COVID-19. Numerous studies show that those especially at risk of harmful impacts from both vehicular pollution and coronavirus are disadvantaged, low income communities. It is critical to give citizens under this dual threat access to zero emissions vehicles and buses, and replace conventional diesel trucks with zero emissions trucks to lower the particulate emissions that are leading to heightened risk of respiratory and other illnesses. Nearly all multi-unit dwelling residents – and roughly half of Californians - cannot plug in easily at home.² For these citizens, hydrogen FCEVs can present a more feasible option than BEVs. Many lower income Californians also use or rely on public transit, and as explained in our comments on the IEPR HD ZEV workshop, FCEBs are projected to become the cheapest bus option by 2027. Hydrogen fuel cell electric trucks also offer fast refueling times, low weight, and a 1:1 replacement option for diesel trucks, making them critical to transitioning this vehicle class to zero emissions.

This is just a sample of how hydrogen FCEV solutions stand to play important roles in the state, complement BEVs, and enable California to reach its important clean air, climate, public health, and equity goals. We hope this information will be included in the 2020 IEPR Update and reflected in its recommendations.

² California Energy Commission, 2019. *Final 2019 Integrated Energy Policy Report- Clean Version*, p. 99
<https://efiling.energy.ca.gov/getdocument.aspx?tn=232922>

- B. Because the Clean Transportation Program funding authorized by AB 8 is the only current policy mechanism that provides FCEV OEMs the forward looking certainty they require to do their critical part to meet the 5 million ZEV goal of Executive Order B-48-18, we urge the Energy Commission to join ARB in calling for an extension of this program beyond its 2023 sunset date.**

Of all the policies California has put in place to help pioneer the launch of the FCEV market, AB 8 funding for fueling infrastructure, in particular, has provided the long term certainty and scale of support needed to give FCEV OEMs the confidence to invest in the California market. Executive Order B-18-48 expanded the AB 8 goal of 100 stations to 200 stations, but the legislature did not act on the Governor's call for funding to support this goal, an inconsistency that has impaired FCEV OEMs' ability to plan for future market development in California. Since then, CARB enacted the HRI capacity credit program, which has succeeded in expanding station capacity and reducing fueling costs. This support is invaluable, but does not on its own provide the forward looking certainty that OEMs require. ARB staff in their report on ZEV programs, per the direction of SB 498, recognized the need for ongoing infrastructure support for ZEVs and for continuation of the funding authorized by AB 8 beyond its 2023 sunset date. Specifically, they state the following among their recommendations:

"Both electric vehicle and hydrogen refueling infrastructure investment will continue to be needed after 2023, when the funding sunsets, to continue closing the gap between needed ZEV refueling infrastructure and the State's ZEV deployment targets.^{3,4} Support is critical to ensure that stations are distributed throughout the State to serve all markets and to allow the ZEV market to mature sufficiently for infrastructure to become a sustainable business model."⁵

³ Bedir, et al., 2018. California Energy Commission Staff Report CEC-600-2018-001. March 2018. "California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025."

<https://efiling.energy.ca.gov/GetDocument.aspx?tn=224521&DocumentContentId=55071>.

⁴ CARB, 2018. July 2018. "2018 Annual Evaluation of Fuel Cell Electric Vehicle Deployment & Hydrogen Fuel Station Network Development." https://ww3.arb.ca.gov/msprog/zevprog/ab8/ab8_report_2018_print.pdf.

⁵ CARB, December 2019. "Draft: Assessment of CARB's Zero-Emission Vehicle Programs Per Senate Bill 498" <https://ww2.arb.ca.gov/sites/default/files/2019-12/SB%20498%20Report%20Draft%20121719.pdf>

We urge the Energy Commission to echo this among the recommendations in the transportation section of the 2020 IEPR Update.

- C. The Energy Commission ought to recommend policy support to accelerate low and zero carbon hydrogen production, which as Bloomberg and others pointed out is increasingly recognized as a promising pathway to decarbonizing not only transportation, but also other challenging sectors, particularly as low cost renewable electricity, falling technology costs, and policies combine to enable economies of scale.**

The Bloomberg presentation highlighted that hydrogen made from renewable sources can be a cost competitive zero carbon fuel resource within the next decade, across transportation applications, as well as for heat used in buildings and industry, and feedstock for chemicals and other products.⁶ This is echoed by several reports from around the world, and here in California, UC Irvine recently released a roadmap analysis for renewable hydrogen production in the state, which concluded that “with continued policy support, the **renewable hydrogen sector can achieve fuel-economy adjusted price parity with conventional fuel by the mid 2020’s.**”⁷ This is key to catalyzing demand at scale for renewable hydrogen in the transportation sector and beyond.

The CHBC urges the Energy Commission to call for supporting clean hydrogen production at scale to enable fuel switching to low and zero carbon resources in transportation applications, as well as across sectors to enable California to reach its goal of a carbon neutrality economy-wide. Specific policies we ask that you include in your IEPR Update recommendations to accelerate this are:

- 1. Establish a Renewable Gas Standard** that requires each gas corporation in California to procure at least 20% of its gas from renewable sources, including renewable and green

⁶ Bloomberg, July 2020, *Hydrogen Economy Outlook*, CEC IEPR Commissioner Workshop, Slide 2

⁷ UCI, June 2020, *Renewable Hydrogen Production Roadmap for California*, p. 7

http://www.a pep.uci.edu/White_Papers_Renewable_Hydrogen_Production_Roadmap_For_California_June_2020.html

electrolytic hydrogen, by 2030, and that offers long-term contracts to attract stable investment.

2. **Adopt a Strategic Plan for accelerating the production and use of renewable and green electrolytic hydrogen** in California, that includes among other elements a strategy for advancing renewable hydrogen as a fuel for firm renewable power generation.
3. **Establish near and long-term energy storage targets, including technologies that produce green electrolytic hydrogen** at the gigawatt scale to achieve cost competitiveness.
4. **Direct future cap and trade revenue to fund programs that incentivize renewable and green electrolytic hydrogen market development through programs like grants or financing support, as have been employed in the dairy sector.** Specifically, the ARB should be encouraged to direct cap-and-trade revenue to support and incentivize accelerated adoption of renewable gas, including renewable hydrogen. As part of this program, additional incentives could be provided to buy renewable hydrogen for large gas users who have been particularly hard hit by the COVID-19 economic downturn, to help ensure their economic recovery also protects the climate.
5. **Call for green electrolytic hydrogen to be considered a zero carbon-emitting storage and power generation resource for purposes of implementing SB 100 and the Executive Order on carbon neutrality,** in order to provide system reliability, enable higher levels of renewable power integration into the electricity grid, and ultimately advance toward carbon neutrality in the electricity sector.
6. **Establish a critical consumption program that encourages hydrogen production to support grid reliability and integration of renewable generation.**
7. **Call for electrical corporations to file a petition at the Federal Energy Regulatory Commission to file tariffs for the removal of the noncoincident peak demand charge.**
8. **Encourage the Department of General Services to fuel switch from natural gas to renewable gas, including renewable hydrogen, as part of their decarbonization strategy at existing buildings,** especially those that are high energy consumers and connected to natural gas infrastructure (e.g. prisons). This could be implemented as a

series of pilot projects that demonstrate large scale building decarbonization with renewable hydrogen and other types of renewable gas.

We also encourage that as policies be implemented, they advance social justice by opening access to the benefits of clean hydrogen, including local job opportunities and public health and environmental protection, to all.

D. International commitments to produce hydrogen renewably are on the rise, spurred by carbon neutrality targets and low renewable electricity costs. California should seize the moment to collaborate with other global frontrunners to lead this major clean energy transformation and the job growth, public health benefits, and environmental protection that come with it.

Commissioner Monahan asked for examples of other countries who are leading the way on commitments to expanding green hydrogen development. Several countries have roadmaps and plans, and major funding is also being dedicated to this effort. For example:

- Last month, **Germany** announced its National Hydrogen Strategy that commits 9 billion euros to developing green hydrogen, in addition to about 2.5 billion euros committed previously through other programs.⁸ The German gas operators also envision converting 5900 km of pipeline to hydrogen, with 1200 km already in the planning stage for completion by 2030 and nearly all of it existing pipeline.⁹
- The **European Union** announced that clean hydrogen would be a pillar of its 750 billion euro green economic recovery program.^{10,11}

⁸ German Federal Government, June 2020. *The National Hydrogen Strategy*, p. 3

https://www.bmbf.de/files/bmwi_Nationale%20Wasserstoffstrategie_Enq_s01.pdf

⁹ <https://www.rechargenews.com/transition/german-pipeline-operators-present-plan-for-world-s-largest-hydrogen-grid/2-1-810731>

¹⁰ <https://www.reuters.com/article/us-eu-energy-hydrogen/six-eu-countries-lead-push-for-clean-hydrogen-support-idUSKBN23M18G>

¹¹ https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1257

- In **France**, 3.5 billion euros are being invested in the H2V Product, which aims to produce 200,000 tons of certified renewable hydrogen using existing natural gas transport infrastructure, which is projected to create 12,000 jobs.¹²
- **Saudi Arabia** is advancing a \$5 billion electrolysis project powered by 4 GW of solar and wind energy that will make hydrogen for green ammonia production. This project is due to come online in 2025.¹³
- In **Australia**, the ARENA program¹⁴ has made uptake of renewable hydrogen one of its top investment priorities,¹⁵ with \$44 million in research and development funding already granted.¹⁶ The H2-Hub¹⁷ in Gladstone, Queensland is a multi-billion dollar project on a 171-hectare industrial site near existing energy export infrastructure being developed by The Hydrogen Utility, which aims to include electrolyzer capacity of up to 3,000 MW for production of renewable hydrogen and 5,000 tonnes of daily production of green ammonia. This is coupled with a AUD 4.2 million hydrogen injection facility that will blend hydrogen with natural gas in the pipeline and ultimately convert the pipeline to 100% hydrogen, with a vision of ultimately converting to all hydrogen.
- In the **UK**, several green hydrogen projects are underway to support the national carbon neutrality target. Large scale projects include the Gigastack project, which is developing a 100 MW electrolyzer powered by wind to decarbonize a refinery.¹⁸ And Project Centurion, which is seeking to demonstrate a 100MW electrolytic hydrogen storage system to produce low carbon hydrogen for heat, decarbonization of industry, and transportation fuel.¹⁹
- **New Zealand's** *Green Hydrogen Strategy - Green Paper*¹⁹ presents the New Zealand Government's vision to harness the hydrogen opportunity for a sustainable and resilient

¹² <https://hydrogeneurope.eu/member/h2v-product>; <http://h2vproduct.net/en/h2v-industry-home/>

¹³ <https://www.energyvoice.com/otherenergy/250565/air-products-green-hydrogen/>

¹⁴ Webinar presentation, Slide 22

¹⁵ <https://arena.gov.au/blog/renewable-hydrogen-projects-receive-new-funding/>

¹⁶ <https://arena.gov.au/news/arena-gets-cracking-on-commercial-scale-hydrogen/>

¹⁷ <http://statements.qld.gov.au/Statement/2020/2/27/eye-on-gladstone-for-proposed-gigawattscale-green-hydrogen-and-ammonia-development>

¹⁸ <https://www.greencarcongress.com/2020/02/20200219-gigastack.html>

¹⁹ <https://www.greencarcongress.com/2018/09/20180930-centurion.html>

energy future for New Zealand”²⁰ and includes a framework for deploying renewable hydrogen as a core pathway to reduce greenhouse gas emissions across sectors.

The IEA maintains a database that tracks projects and policies, which is a resource for more comprehensive lists.²¹

III. Conclusion

The CHBC appreciates your consideration of these comments and looks forward to working with you to better understand the market status of FCEVs and hydrogen fueling, the policies that can unlock their full potential, and achieve California’s clean air, clean energy, climate, and equity goals.

Regards,



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²⁰ p. 11, *Green Hydrogen Strategy – A Vision for Hydrogen in New Zealand*, New Zealand Government; September 2019
<https://www.mbie.govt.nz/dmsdocument/6798-a-vision-for-hydrogen-in-new-zealand-green-paper>

²¹ <https://www.iea.org/reports/hydrogen-projects-database>