CALIFORNIA HYDROGEN BUSINESS COUNCIL

Hydrogen Means Business in California!

18847 Via Sereno
Yorba Linda, CA 92886
Phone: (310) 455-6095 | Fax: (202) 223-5537
info@californiahydrogen.org | www.californiahydrogen.org

California Air Resources Board
1001 I Street
Sacramento, CA 95814

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RE: 2022 Scoping Plan Update – Scenario Concepts Technical Workshop

I. INTRODUCTION

The California Hydrogen Business Council (CHBC)[1] welcomes the opportunity to comment on the California Air Resources Board (CARB) 2022 Scoping Update – Scenario Concepts Technical Workshop. The CHBC previously submitted comments on the 2022 Scoping Plan Development Workshop held on June 8, 2021, where a more detailed description of our preferred modeling approach and inputs can be found.

The CHBC respectfully replies to the Scenario Concepts Technical Workshop with recommendations on data inputs and scenario assumptions below. In general, we are relatively unfamiliar with the Energy + Environmental Economics (E3) PATHWAYS model in so far as what inputs are allowed, how hydrogen versus other fuels are assessed, etc. With a higher level of understanding, we and other stakeholders could make more informed recommendations to the modelling exercise. The CHBC hopes to coordinate with E3 to gain a better understanding of the model, and thereafter, defining the inputs, and serving as a resource throughout the scoping plan development process. For these reasons, the CHBC requests E3 engages with stakeholders to discuss modeling inputs for all sectors covered by the PATHWAYS model.

II. DISCUSSION

a. Hydrogen as a decarbonizing Energy Vector

The CHBC believes renewable hydrogen can contribute cost-effectively, broadly and in a timely way to the state's decarbonization goals. This Scoping Plan exercise presents the best and most

[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/

immediate opportunity to evaluate the potential the hydrogen energy vector can play in achieving the state's goals.

To truly evaluate this potential, E3 and CARB must develop aggressive hydrogen scenarios that test the fuels potential. These should include scenarios that evaluate hydrogen at very low production costs, such as those called out in the federal Earthshot goals, $1/kg production costs within a decade. Using this cost, if modelled accurately, will demonstrate the value hydrogen can bring to a decarbonizing economy. To this end, E3 and CARB should not spend resources justifying how the industry gets to $1/kg. The exercise at hand is to evaluate what happens when we get there, and how it compares to other scenarios. If the results are compelling, and we fully expect they will be, policymakers can put in place the necessary steps (policies) to get there.

One example would be the transportation sector. E3 and CARB should seize this opportunity to evaluate a larger, more aggressive consumer uptake of fuel cell electric vehicles (FCEV) and what carbon, air quality and cost benefits come with this. This same scenario should include an increasing and much larger number of hydrogen refueling centers across the state, and a price of hydrogen fuel at parity and/or below that of traditional petroleum fuels or even electricity when the full utility cost-of-service model reflects the true costs of system upgrades to serve the battery electric vehicle (BEV) market and from a grid with an increasingly higher percentages of renewables.

In summary, E3 and CARB have an opportunity to truly assess the macro benefits hydrogen can bring to economic decarbonization. To do so, inputs must be bold to assess potential. The CHBC makes recommendations below in this regard, but also stresses the importance of gaining a better understanding of the E3 model and how it works so a more well-informed set of inputs can be recommended.

b. Transportation

To meet California's stated decarbonization goals,[2] the Scoping Plan should be inclusive of all technologies available that work to decarbonize the transportation sector so that the state is not reliant on

[2] Referencing SB 32, AB 197, EO B-55-18, and N-79-20.

one technology. A modeling example from the Scenario Concepts Technical Workshop illustrated approximately a 65 percent BEV and 10 percent FCEV scenario by 2050. However, this projection appears to leave out the reality that over 50 percent of Californians live in multi-unit dwellings[3] where charging a BEV is not feasible (among other obstacles related to charging). Californians must have another choice for consumer light duty transportation. FCEVs are another option for Californians that require short refueling times, must travel long distances for work or recreation, do not have easy and convenient access to EV charging, affordability (FCEVs to reach cost parity with internal combustion engine vehicles (ICE) within the decade[4]), and a smooth 1:1 transition between traditional ICE vehicles and zero-emission vehicles (ZEV). Therefore, the CHBC respectfully recommends E3 incorporate a higher FCEV uptake by consumers. We recommend a 50 percent FCEV consumer uptake scenario at a minimum by 2045. Further, any uptake in FCEVs will need to be aligned with an increasing number of hydrogen refueling stations. The CHBC respectfully recommends an increasing number of hydrogen refueling stations in the scenario that reflect at or above 1,000 stations by 2030. Heavy Duty (HD) transportation (trucks) should follow a similar pattern of aggressive uptake by commercial enterprises in the state and be reflected in the modelling. Finally, the E3 PATHWAYS model should include a declining cost of hydrogen per kilogram down to the Department of Energy's Earthshot $1/kg goal by 2030, a declining carbon content of hydrogen fuel that tracks the grid, and another that seeks to accelerate this fuel's decarbonization glidepath.

c. Power Sector

Meeting California's aggressive SB 100[5] goals will require more than just wind, solar and batteries. Specifically, the CHBC recommends modeling a scenario in the Scoping Plan that is reflective of capturing the large amount of curtailed energy going to waste currently throughout the state and capturing a large percentage of that energy as hydrogen. Such a scenario may assume changes to current market design that allow wholesale market access for electrolytic hydrogen production using very low-cost electricity. Modeling a scenario where electrolytic hydrogen producers have access to wholesale markets that allows the sale of excess electrolytic hydrogen back to the grid, and into sectors

[3] https://energyinnovation.org/wp-content/uploads/2020/09/Increasing-Electric-Vehicle-Charging-at-Multi-Unit-Dwngs_FINAL3.pdf
[4] https://blog.ballard.com/fuel-cell-price-drop.
[5] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100.

outside of power generation should lead to a calculated output of low hydrogen production costs, like the $1 per kilogram projection in the Department of Energy's Hydrogen Earthshot.[6] These electrolytic hydrogen resources will be used to balance the grid with firm renewable (hydrogen) power, provide other valuable ancillary services to the grid, smooth renewable power production and allow for the continued economic deployment of additional renewable power resources and potentially generate renewable hydrogen for other sectors of the economy.

An additional solution to curtailment of renewable resources during peak hours and low production due to seasonal changes is the long duration energy storage (LDES) of hydrogen. The PATHWAYS model should include hydrogen as part of an LDES option for storage longer than eight hours. The modeling should encompass all feasible hydrogen storage options like rock formations, depleted oil fields, and pipelines. These options are not subject to drought conditions and could potentially store hydrogen in very large volumes for long durations especially compared to battery storage. The modeling should reflect the longevity of storage within these three mediums and the ability to dispatch hydrogen from these resources.

d. Gas and Pipeline Distribution

The CHBC recommends aggressive hydrogen pricing to evaluate the potential the energy vector can have on decarbonizing the gas pipeline distribution system. In this sector, decarbonized hydrogen's potential will be reflected in the cost of the fuels production, delivery and end use as compared to other renewable energy alternatives. The state's pipeline distribution system is a nearly ubiquitous and exceptionally reliable energy delivery system. The state's ability to retain this system in a decarbonized economy means increased resiliency in energy delivery and massive potential savings to consumers and commercial enterprises from the cost of replacing it with something else that may be more costly and/or less reliable.

To fully evaluate the potential of the gas grid, scenarios should be developed that reduce the cost of hydrogen over time, down to the Earthshot goals at a minimum, integrate blends of up to 20 percent renewable hydrogen in the gas grid near-term, and assume further down the gas grid's decarbonization glidepath the production and injection of renewable methane made from renewable hydrogen. The

[6] https://www.energy.gov/eere/fuelcells/hydrogen-shot.

scenarios should be setup such that the decarbonization of the gas grid is on a parallel track with the SB 100 goals assigned to the electric grid. The CHBC recommends that E3 and CARB move past how the market gets to $1/kg hydrogen, but rather, include this production cost of renewable hydrogen in the scenario modeling and evaluate the results. If the results are favorable, as we expect they will be, policymakers will need to evaluate what steps are required to achieve these inputs in the market that will result in the desired carbon reduction goals.

III. CONCLUSION

The CHBC appreciates the opportunity to submit comments on the 2022 Scoping Plan – Scenario Concepts Technical Workshop. To ensure a thorough modeling product, the CHBC encourages the E3 PATHWAYS team to coordinate with stakeholders on the detailed workings of the model and what inputs are possible. This will allow stakeholders to provide better, more well-informed inputs and allow for the best possible assessment of various technological pathways to achieve the state's decarbonization goals. We look forward to working with the CARB and E3 team on this effort.

Respectfully Submitted,

Sara Fitzsimon Nelson, J.D.
Policy Director
California Hydrogen Business Council