CALIFORNIA HYDROGEN BUSINESS COUNCIL

Hydrogen Means Business in California!

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California Air Resources Board
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Re: Scoping Plan June 8 – June 10 Workshop Comments

I. INTRODUCTION

The California Hydrogen Business Council (CHBC)[1] welcomes the opportunity to comment on the California Air Resources Board (CARB) June 8 – June 10 Scoping Plan Workshop. The CHBC applauds CARB's leadership and work towards meeting California's carbon neutral climate goals. While the workshops presented a good amount of new modeling since the 2017 Scoping Plan, this next Scoping Plan must include aggressive scenarios that evaluate 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 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 are accelerating the pace at which hydrogen is being integrated into their power, transportation, heavy-industry, and gas pipeline distribution markets. California has long been a leader on environmental policy, and currently has among the most ambitious economy-wide decarbonization goals in the world. To achieve these goals, California must engage in aggressive decarbonization planning and modeling exercises that use "out-of-the-box" scenarios wherever possible to demonstrate the full value and potential of hydrogen in reaching the state's goals. Integrating hydrogen into the economic fabric of the state will help scale the hydrogen industry, create new job opportunities, provide career transition pathways for fossil fuel industry workers, spur innovation and investment.

[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/

Modeling in the 2022 Scoping Plan should include scenarios that demonstrate what is possible, not what is commercially available today. For example, the achievement of the Department of Energy's "Earthshot" goals, which include $1/kg ($8/MMBTU) for renewable hydrogen production by the end of the decade[2]. As stated in a report issued by UCI's Advanced Power and Energy Program (APEP), *"The Potential Impact of Renewable Gaseous Fuel on Optimizing the California Renewable Portfolio -- RESOLVE Model Scenario Analysis[3]"*, a growing number of forecasts are projecting that green hydrogen[4] cost could reach levels as low as $1/kg by 2050 with some projecting that cost point by 2030.[5,6] Utilizing these cost assumptions in the 2022 Scoping Plan modeling scenarios is important, and will provide a better assessment of the capability and versatility hydrogen may provide in helping attain the state's decarbonization goals. Results using these assumptions will illustrate the full range of benefits associated with hydrogen and provide guidance to policymakers regarding next steps, stakeholders regarding viable options, and investors looking to build out hydrogen production, hydrogen delivery systems and hydrogen refueling infrastructure for multiple end-uses. The California Hydrogen Business Council (CHBC) respectfully recommends the California Air Resources Board consider the modeling recommendations made within to ensure California has the best information available to address its greenhouse gas (GHG) emission reduction goals and respond to the climate crisis with the urgency and foresight it so greatly deserves.

II. THE TRANSPORTATION SECTOR

California has successfully reduced greenhouse gas (GHG) emissions below 1990 levels by consistently evaluating past policies and incorporating new technologies in the state's air quality and climate plans.[7] However, California's transportation sector, which makes up 41% of the state's GHG

[2] https://www.energy.gov/articles/secretary-granholm-launches-hydrogen-energy-earthshot-accelerate-breakthroughs-toward-net
[3] Impact_of_Renewable_Gasesous_Fuels_on_Grid_Resource_Optimization_Using_RESOLVE.pdf (uci.edu)
[4] The SB 100 joint agency report expressly mentions "green hydrogen" which is not defined at this time. The CHBC will use the term "green hydrogen" in the power sector section of our comments for consistency. The CHBC supports the following definition for green hydrogen: "Green hydrogen means hydrogen produced by a process that has a carbon intensity score as determined by the State Board that is equal to or less than the carbon intensity score of any RPS eligible resource."
[5] Bloomberg New Energy Finance, Hydrogen Economy Outlook, Key Messages, p.4; March 2020 https://data.bloomberglp.com/professional/sites/24/BNEF-Hydrogen-Economy-Outlook-Key-Messages-30-Mar-2020.pdf
[6] Using analysis by McKinsey, the Hydrogen Council's Path to Hydrogen Competitiveness – A Cost Perspective, on p. 15, concludes: "Within five to ten years – driven by strong reductions in electrolyzer capex of about 70 to 80 per cent and falling renewables' levelized costs of energy (LCOE) – renewable hydrogen costs could drop to about USD 1 to 1.50 per kg in optimal locations, and roughly USD 2 to 3 per kg under average conditions."
[7] https://ww2.arb.ca.gov/news/climate-pollutants-fall-below-1990-levels firsttime#:~:text=SACRAMENTO%20%E2%80%93%20The%20California%20Air%20Resources,gallons%20of%20gasoline%20a%20year.

emissions, will break the pattern of surpassing decarbonization goals if more aggressive, and technology inclusive goals are not considered.[8] Currently, California has a goal of five million zero emission vehicles (ZEV) on the road by 2030[9], and 100 percent zero-emission vehicle sales for new passenger vehicles and drayage trucks by 2035, and heavy-duty vehicles by 2045.[10] The CHBC feels it important to note ZEVs include both fuel cell electric vehicles (FCEV) and battery electric vehicles (BEV).

The CHBC agrees that transitioning to a ZEV future will improve public health, reduce transportation costs for Californians, expand economic development and create jobs. We agree that with the right modeling, planning and an inclusive state-wide strategy for a sustainable hydrogen economy, Californians can realize the benefits of renewable[11] hydrogen in the transportation sector.

The CHBC respectfully recommends CARB's 2022 Scoping Plan include modeling that ensures California not only reaches its five million ZEV goal but supports all the state's drivers that will have to make the switch from petroleum fueled vehicles to ZEVs. In the 2022 Scoping Plan, the CHBC encourages CARB to consider the following modeling recommendations, including scenarios that assume "Earthshot" renewable hydrogen pricing by 2030.

A. Modeling the Self-Sustainability of a ZEV Market

The CHBC encourages CARB to model the cost to the state and its residents to achieve self-sustainability for a ZEV market using a high BEV scenario, a mix of BEV and FCEVs, and a high FCEV scenario. The FCEV inclusive scenarios should incorporate CARB's self-sustainability findings in the 2020 FCEV market report,[12] incorporate "Earthshot" pricing in one or more scenarios which assume the production of renewable hydrogen of $1/kg by 2030, a milestone of 1,000 hydrogen

[8] https://ww2.arb.ca.gov/news/climate-pollutants-fall-below-1990-levels-first-time#:~:text=SACRAMENTO%20%E2%80%93%20The%20California%20Air%20Resources,gallons%20of%20gasoline%20a%20year.
[9] Executive Order B-48-18; https://www.ca.gov/archive/gov39/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/index.html
[10] Executive Order N-79-20; https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf
[11] The CHBC will use the term "renewable hydrogen" generally in our transportation sector comments because where it is currently defined in statute it is applied to transportation fuels. Green hydrogen, which remains undefined at this time, will be used generally in our power and pipeline distribution comments which follow.
[12] https://ww2.arb.ca.gov/sites/default/files/2020-09/ab8_report_2020.pdf

refueling stations[13] state-wide, and the expansion of the hydrogen refueling infrastructure (HRI) credit to the medium and heavy-duty market segments.

The CHBC supports continued state investment in ZEV infrastructure with a focus on leveraging private investment to achieve the goal of a self-sustaining market. Renewable hydrogen refueling station (HRS) developers have demonstrated and continue to call for additional HRS development that leverages both public and private capital to ultimately create a sustainable (no subsidy) zero-emission market sooner, and we believe more cost effectively than the current high-volume deployments of primarily publicly funded (state funds and rate base) EV charging stations. The CHBC encourages CARB to assess the self-sustainability costs of a BEV market, a FCEV market, and a mix of the two in this Scoping Plan. The CHBC believes that an increased focus on light, medium and heavy-duty, and off-road FCEV deployments and HRS infrastructure will provide a more cost-effective and accessible path for decarbonizing the transportation sector. We encourage CARB to include "Earthshot" pricing for renewable hydrogen in its modeling of ZEV transportation scenarios; doing so will demonstrate the full potential renewable hydrogen has to offer the transportation sector and contribution to California's decarbonization goals.

In its 2020 Annual Hydrogen Evaluation update, CARB finds that the FCEV market may soon accelerate out of the earliest market development phase, and that the shift to broader consumer adoption is tied to expanded and accelerated station network deployment[14]. The CHBC cannot overstate the importance of continued hydrogen refueling station (HRS) funding across all transportation sectors while leveraging the private capital markets. Doing so provides confidence to both vehicle manufacturers and customers in the stability of the FCEV market, which will be key to enabling FCEVs and will play an important role in helping California meet its GHG and air quality goals. Increased and reliable state funding for renewable HRS infrastructure from a portfolio of sustained funding sources, including the Low Carbon Fuel Standard (LCFS), Hydrogen Refueling Infrastructure Program and the Clean Transportation Program is necessary to scale hydrogen stations for every class of vehicle. The CHBC encourages CARB to reflect cost reductions in its modeling of the transportation sector that will

[13] https://cafcp.org/blog/california-fuel-cell-revolution-vision-2030
[14] 2020 Annual Evaluation of Fuel Cell Electric Vehicle Deployment & Hydrogen Fuel Station Network Development (ca.gov), pg. xiv

be achieved over time due to accumulated experience as additional stations are installed, and due to the economies of scale associated with higher capacity stations. CARB will need to take the lead in demonstrating the value of FCEVs in the Scoping Plan process and should include in transportation sector modeling the conclusions from the 2020 Annual Hydrogen Update Report[15].

As part of the self-sustainability market assessment, the CHBC encourages CARB to include a scenario which incorporates the expansion of the hydrogen refueling infrastructure (HRI) capacity credit to the medium and heavy-duty truck market. The HRI for the light-duty market has proven very successful in encouraging private capital investment in the buildout of the state's current renewable hydrogen refueling network. Extension of the capacity credit to the heavy and medium-duty trucking sector is expected to garner similar, if not better results. We encourage CARB to include a scenario for the transportation sector that incorporates an extension of the current HRI credit to the medium and heavy-duty tucking sector in its ZEV market modeling.

B. Ensuring Equity in the State's Transition to 100% ZEVs

The CHBC encourages CARB to model the impact on low-income communities and the state in requiring these communities to transition to BEVs versus FCEVs as a low carbon, zero-emission mode of transportation. Modeling should include the costs and losses in local tax revenue noted here that would not otherwise be incurred by a ZEV transition using FCEVs: (1) some measure of customer convenience related to extended refueling times (or inconvenience), (2) the cost to homeowners (and/or the state) of retrofitting single family and multi-unit dwellings with electric charging, (3) further deployments of EV charging infrastructure throughout these communities at public locations, (4) an estimated cost to utility ratepayers to upgrade service for EV charging applications, and, (5) the loss in tax revenue from local retail convenience and refueling locations if not repurposed with renewable hydrogen refueling as petroleum phases out.

While BEVs share an important solution for light duty zero-emissions mobility, they will not be as effective in serving low-income communities in comparison to FCEVs. More than 80% of BEV

[15] Ibid.

drivers charge at home due to convenience and cost effectiveness.[16] However, many Californians, especially those living in low-income communities, reside in homes where BEV charging is not feasible, convenient, and/or affordable. Nearly half of all homes in the state are not single detached units with garage access, and over 50 percent of Californians live in multi-unit dwellings.[17] Moreover, low-income people are most likely to live in rental units where BEV charging is either unavailable, limited by parking spaces and/or cost prohibitive to install. FCEVs will be key to enabling equitable and affordable access to ZEVs because multi-unit dwellings and on-street parking do not typically provide convenient, cost-effective access to EV charging.

Centralized renewable hydrogen refueling is the more pragmatic and convenient ZEV fueling option for many Californians, including low-income drivers. Renewable hydrogen refueling for FCEVs is centralized and convenient, it requires no up-front cost by customers, and is developing under a familiar retail distribution model which has evolved over decades of customer experience to maximize convenience, access to amenities, and other related services. Further, the addition of zero emission renewable hydrogen fuel to retail distribution centers requires no financial investment from the communities they serve. These centers provide similar properties in terms of speed and convenience as today's petroleum refueling model and stand to serve the largest number of consumers with the highest level of convenience. To ensure that driving a ZEV will be equitably available to all California drivers, state policy should support the advancement of FCEVs and renewable hydrogen fueling centers, including renewable hydrogen refueling centers in low-income communities. We encourage CARB to include such modeling in the current Scoping Plan to demonstrate the value of renewable hydrogen as a zero-emission fuel and solution to decarbonizing the state's transportation sector, including, improved access and convenience for low-income communities.

The CHBC is committed to assisting CARB is any way to evaluate renewable hydrogen scenario and modeling inputs for the 2021 scoping plan. The CHBC offers our diverse membership as resources for CARB as the 2022 Scoping Plan is drafted.

[16] https://www.energy.gov/eere/electricvehicles/charging-home
[17] https://energyinnovation.org/wp-content/uploads/2020/09/Increasing-Electric-Vehicle-Charging-at-Multi-Unit-Dwellings_FINAL3.pdf

III. THE POWER AND GAS SECTOR

The CHBC acknowledges the progress California has made in reducing GHG emissions from the power sector by 40 percent since 2001. This progress is encouraging, but to reach the state's 2030 and 2045 goals, important challenges that grow exponentially must be addressed. More complete and comprehensive resource modeling is needed to understand the value of additional emerging energy vectors, such as hydrogen.

In the June 8 CARB Scoping Plan workshop, the California Energy Commission (CEC) in its overview of the SB-100 Joint Agency report noted that to reach 60 percent renewable power by 2030 and 100 percent renewable power by 2045, California's electric grid would need to triple in capacity.[18] This transition will undoubtedly strain the reliability of the electric grid and challenge stakeholder's ability to keep pace with necessary additions of renewable power capacity. The challenge is daunting, and it will require a comprehensive modeling of "all-available-options" for California to have the best and most complete view of which available and emerging technologies are best suited to achieve the state's carbon reduction goals and retain grid reliability during all hours. To assist in achieving these ambitious goals, the CHBC recommends the following be included in the modeling analysis for the 2022 Scoping Plan.

A. Modeling of Emerging Technologies

The SB 100 Joint Agency Report[19] recommends further study of emerging technology to meet electric system supply and resiliency requirements, including green hydrogen.[20] The CHBC supports this recommendation and encourages CARB to use the Scoping Plan process to more thoroughly evaluate the role of emerging technologies, including green, electrolytic, renewable and low-carbon hydrogen for power generation, long-duration energy storage (LDES) and the ability of electrolyzer

[18] https://ww2.arb.ca.gov/sites/default/files/2021-06/cec_sp_kickoff-electricity_june2021.pdf
[19] TN237167_20210315T110256_2021 SB 100 Joint Agency Report.pdf
[20] The joint agency report expressly mentions "green hydrogen" which is not defined at this time. The CHBC will use the term "green hydrogen" in this section for consistency. The CHBC supports the following definition for green hydrogen: "Green hydrogen means hydrogen produced by a process that has a carbon intensity score as determined by the State Board that is equal to or less than the carbon intensity score of any RPS eligible resource."

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operations to provide grid services such as demand response, resource adequacy and other ancillary services.

The CHBC encourages CARB to go further than using today's commercially available technology in this scenario. Rather, take a bold approach and assume "Earthshot" cost assumptions as scenario inputs for green hydrogen, $1/kg. "Earthshot" goals are achievable with the right mix of policy incentives in place to develop technology, increase scale, and lower costs. For example, very low electrolytic hydrogen production costs can be justified if electrolytic hydrogen producers are allowed access to the wholesale electric markets. Access to these markets enable lower cost electricity as compared to conventional retail rates resulting in lower cost hydrogen. These producers will then help the state make better use of renewable generation by reducing renewable curtailments and grid congestion by encouraging deployment in areas with renewable over-generation. Access also opens up additional revenue streams by providing developers the ability to sell into the resource adequacy, capacity and ancillary services markets, all of which contribute significantly to lowering the cost of electrolytic hydrogen production. Including a scenario that assumes wholesale market access, and/or "Earthshot" pricing for green hydrogen will demonstrate the full potential of green hydrogen at scale. Should the modeling results prove compelling, it could have a significant impact on the role electrolytic hydrogen plays in future state policy.

B. Modeling Hydrogen as a Firm and/or Dispatchable Zero Carbon RPS Eligible Resource

The CHBC recommends CARB include modeling scenarios designed to *"evaluate and consider ways to better assess the impacts of less-proven technologies that could significantly impact a 2045 resource mix and total cost"* as recommended in the SB-100 Joint Agency Report[21]. For example, scenarios focused on zero-carbon firm power resources must go beyond a "no combustion" assessment (using not only fuel cells for power generation) and evaluate green hydrogen blends in gas turbines, for example blends of 30%, 50% and 100% green hydrogen to serve select periods. Hydrogen combustion is one of the technologies mentioned as potentially represented by the "generic dispatchable" and "generic baseload" resources in the Joint Agency Report. The CHBC asserts that hydrogen made from

[21] Ibid. Pg. 19

renewable, and zero carbon resources holds great promise in providing firm dispatchable, decarbonized power that can be deployed today if regulatory barriers can be removed such as adding green hydrogen to the list of RPS Eligible Resources. Greater deployment of green hydrogen also presents many economic opportunities for California, due to its high potential for a rapid downward cost trajectory and for creating and retaining good, green jobs in the state. We therefore recommend CARB consider modeling green hydrogen made from zero carbon resources in the context of the 2022 Scoping Plan as a firm and/or dispatchable RPS eligible power resource.

The justification for this scenario is reinforced by the Joint Agency Report's conclusion that *"Increased Resource Diversity Lowers Overall Costs"*[22]. The CHBC agrees with the report's conclusion that resource diversity decreases overall cost and that zero carbon resources, and particularly green hydrogen, hold promise to significantly contribute to reductions in cost. UC Irvine, citing multiple analysts, reports in a recent White Paper that $60/MWh is a mid-range 2030 cost estimate for electricity production from green hydrogen[23] and is also within the forecast range for methanated green hydrogen by 2035.[24] The UC Irvine analysis also shows that the RESOLVE model starts selecting zero-carbon gas at significant levels at this price, and to some extent at pricing as high as $135/MWh. The CHBC would again encourage CARB to include a scenario that reflects aggressive, "Earthshot" type production costs for green hydrogen in the 2022 Scoping Plan analysis to further assess the fuels decarbonization potential and better inform policy makers.

C. Modeling Hydrogen as a Long Duration Storage Resource

The CHBC strongly agrees with the Joint Agencies SB-100 Report recommendation that *"Future work should better capture the impact and value of resources that are either not represented or not well valued in the current modeling framework"* and that specifically these should include hydrogen and long duration storage, which is not adequately captured in modeling efforts to date. The CHBC supports scenario analysis that includes electrolytic hydrogen in the mix of technologies evaluated for

[22] Ibid. Pg. 16
[23] Jeffrey Reed, PhD, UC Irvine, Impact_of_Renewable_Gasesous_Fuels_on_Grid_Resource_Optimization_Using_RESOLVE.pdf (uci.edu) Note this White Paper presents future pricing estimates for electrolytic fuels in kilograms (kg) and Million Metric British thermal units (MMBtu). At 60% efficiency for conversion, there are 5.69 MMBtu per MWh. This leads to their mid-range 2030 cost projection of $16/MMBtu being equal to $60/MWh. This would be the cost using existing resources (so no generation capex recovery).
[24] Jeffrey Reed, PhD, UC Irvine, Impact_of_Renewable_Gasesous_Fuels_on_Grid_Resource_Optimization_Using_RESOLVE.pdf (uci.edu)

long term energy storage (LTES). Electrolytic hydrogen provides a valuable, scalable, geographically flexible long duration storage option--on the scale of days, months, and years--and provides cross sector/market benefits other technologies cannot.

Hydrogen is particularly well suited for LTES as it can be stored for long durations in mass quantities, especially if there is access to salt caverns and/or pipelines. LTES is not subject to drought conditions like 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.[25] 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 more suitable for shorter duration requirements.[26] A report released by the bank HSBC advocates for hydrogen storage to manage curtailment, as variable renewable generation becomes an increasing issue.[27] These and other studies point to the fact that green hydrogen can and should play a valuable role in California's LTES scenarios.

The CHBC encourages CARB to evaluate LTES scenarios and include any technologies that stores energy for six or more hours and that as part of this effort, modeling includes 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. This includes durations of multiple hours, multiple days (e.g. to address planned and unplanned shutoff events), 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

[25] The promise of seasonal storage DNV
[26] https://www.californiahydrogen.org/wp-content/uploads/2018/11/20181106-ESNA-CHBC-HESWorkshop_Brouwer.pdf
[27] https://www.hsbc.com/insight/topics/renewables-can-make-hydrogen-green

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. Green hydrogen is uniquely capable of supplying storage at mass scale for a wide range of duration requirements, including seasonal. The CHBC highly recommends CARB model green hydrogen as an LTES resource in the 2022 Scoping Plan using aggressive cost assumptions such as those mentioned above.

D. Modeling Carbon Neutral Gas Procurement

California has existing natural gas pipeline infrastructure that is transitioning to lower carbon fuels, like blends of green hydrogen and renewable gas, to reduce GHG emissions. The CPUC recently stated in the Alternate Proposed Decision of the R.20-05-003 proceeding "Finding of Fact" that a "fossil fuel using at least a 30 percent green hydrogen blend reduces GHG emissions."[28] The CHBC agrees that a fossil fuel/green hydrogen blend does indeed reduce emissions and would therefore recommend modeling the GHG reduction of blends of 10, 20 and 30 percent. The CHBC is aware the California Energy Commission is currently conducting research on renewable hydrogen injection into the gas system; however, the CHBC recommends CARB model the impacts of green hydrogen on the natural gas system using these blend percentages to assess decarbonization potential utilizing green hydrogen at "Earthshot" pricing. This analysis could be taken further to include renewable methane, made from green hydrogen in increasing percentages.

Modeling a CPUC implemented renewable/green gas injection tariff for the existing gas pipeline system is highly recommended. CPUC Rulemaking R.13-02-008, currently underway is contemplating participation by state's gas utilities in decarbonizing California's gas pipeline system. We recommend CARB model the impacts of renewable/green gas blending and the potential benefits to the state's decarbonization goals.

[28] R.20-05-003, apd AT PG. 81.

E. Modeling the Role of Microgrids Utilizing Renewable Fuels

CARB should consider in the context of the 2022 Scoping Plan modeling the important role hydrogen fuel cells and electrolyzers can play in microgrid systems in California as essential providers of long duration energy storage, as flexible zero emission and GHG free generation resources, and in terms of grid support services. Fuel cells emit zero criteria pollutants, and electrolyzers can produce hydrogen from renewable electricity that make it GHG free over its lifecycle. There are many microgrids that use hydrogen technology in operation today, such as the Stone Edge Farm in Sonoma, the Massachusetts Clean Energy project that integrates renewable power-sourced hydrogen storage into its microgrid system,[29] and the Dunsfold Park microgrid project in the UK, which includes a 1.5 MW hydrogen fuel cell microgrid, using green hydrogen sourced from bioenergy, that is capable of powering 2500 homes.[30] Microgrid systems appropriately modeled as a zero emission, GHG free sources of energy, that enhance grid reliability and assist in meeting California's climate and energy resilience goals will provide policymakers insight into what next steps could be taken to further integrate hydrogen fuel cell microgrids into California's decarbonized future.

CARB should also consider modeling these systems as if they have access to the wholesale electric market. Modeling results should further highlight the benefits of these systems under this market design and provide policymakers valuable insight into the utility of these systems under these market conditions. Current regulations do not allow behind-the-meter resources direct wholesale access, thus depriving microgrids of a valuable revenue stream the technology could access. Demonstrating the value of wholesale market access will provide valuable insight into the potential that could be unlocked through this technology given the right electric market design. The CHBC recommends CARB consider the inclusion of microgrids in power system modeling using a wholesale market access approach for this GHG and emissions free technology.

[29] http://verdellc.com/Main_Press/press_solar40.html
[30] https://www.dunsfoldpark.com/news/afc-energy-commences-feed-on-landmark-hydrogen-fuel-cell-micro-grid-in-surrey-at-dunsfoldpark.html

The CHBC encourages CARB to model the role that green hydrogen can play in reducing emissions associated with backup power generation for resiliency applications, including microgrids, backup power generation during Public Safety Power Shutoff (PSPS) events, and others. With the increased frequency of PSPS events owing to California's increasing wildfire risks, electricity customers have increasingly been adopting backup diesel generation systems. Modeling fuel cell systems using green hydrogen in a backup generation scenario are expected to produce cost effective results given the right inputs, i.e. Earthshot pricing for hydrogen. The CHBC believes this modeling will inform policymakers on the viability and versatility of fuel cell microgrids using green hydrogen and their use in backup generation.

The CHBC is committed to coordinating with CARB and the CPUC on identifying aggressive modeling goals for California's transition to a resilient, 100 percent zero-emission power sector. The CHBC offers our diverse membership as resources for CARB as the 2022 Scoping Plan is drafted.

IV. EQUITY AND ENVIRONMENTAL JUSTICE

The CHBC is appreciative of CARB's commitment to equity and environmental justice throughout the workshops and into the 2022 Scoping Plan. The CHBC is supportive of all efforts to include stakeholders from California's most vulnerable communities and encourages CARB to include these community members' concerns in the 2022 Scoping Plan drafting. Ensuring California has a sustainable and effective plan to meet its decarbonization and air quality goals is key to keeping the state's most vulnerable communities safe and healthy.

V. CONCLUSION

The CHBC is encouraged by the progress made in California to decarbonize across all sectors of the economy and recognizes this progress would not have been made without the leadership and efforts of CARB and other key California state agencies in coordination with stakeholders. California must update its stated decarbonization and air quality goals to lead the nation, and the world in tackling climate change and as a necessary tool in mitigating the swath of climate driven natural disasters that have and will continue to plague California at an accelerated pace if not abated.

The CHBC would note it is imperative CARB continue making every effort to engage stakeholders throughout the 2022 Scoping Plan process as they have done thus far. Stakeholders will be keen to understand the details of how conclusions and recommendations are formed. Engagement must embrace transparency throughout the process including but not limited to modeling inputs and assumptions. Stakeholder engagement and input on these parameters will be important in gaining broad acceptance and validation results and it ensures everyone has "skin-in-the-game".

The CHBC appreciates CARB's leadership role in the Scoping Plan process. We believe there is no more qualified institution to take on this important task. The CHBC is appreciative of this opportunity to comment on CARB's 2022 Scoping Plan workshops. We look forward to working with CARB, partnering state agencies, and other stakeholders throughout the process.

Sincerely,

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