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[submitted electronically]

RE: Electric Hydrogen Comments on Joint Agency Kickoff Workshop to initiate the development of a comprehensive report on hydrogen as called for in SB 1075

Electric Hydrogen (EH2) appreciates the opportunity to provide feedback to the California Air Resources Board (CARB) regarding the Senate Bill (SB) 1075 Joint Agency Workshop held on September 5, 2023. SB 1075 requires CARB, in consultation with the California Energy Commission (CEC), California Public Utilities Commission (CPUC), and the California Workforce and Development Board, to develop a comprehensive report on hydrogen. Within this report, a wide variety of elements will be included, such as the creation of a hydrogen policy structure, uses for hydrogen, transportation of hydrogen, and life cycle emissions and air quality impact evaluations.

California has already recognized the pivotal role that hydrogen will play in the state's decarbonization efforts. As prominently emphasized in CARB's 2022 Scoping Plan, the attainment of carbon neutrality hinges upon the expansion of clean hydrogen to address hard-to-electrify end uses. The SB 1075 Report serves as a platform for shaping the utilization of hydrogen in California and provides a forum for discussing numerous significant elements that will guide the trajectory of the hydrogen economy in the state.

Since California aims to leverage hydrogen for decarbonization, it is imperative that policies are instituted to ensure that hydrogen indeed reduces life cycle emissions in comparison to conventional fuels. With this in mind, EH2 encourages CARB to include both the attributional and consequential emissions impacts of using grid electricity in the life cycle analysis for electrolytic hydrogen production.

About Electric Hydrogen

Electric Hydrogen (EH2) is a deep decarbonization company pioneering low-cost, high-efficiency, fossil-free hydrogen electrolyzer systems. Focusing on industrial applications of hydrogen in steel, ammonia, and freight transport, our goal is to help

eliminate more than 30% of global greenhouse gas (GHG) emissions from hard-to-electrify industries.

EH2 is headquartered in San Carlos, CA, and Natick, MA. We recently announced our 1.2 gigawatt per year factory as well as our first public customer for our 100 megawatt (MW) system and will begin scaling our production of PEM electrolyzers later this year.

The Life Cycle Analysis for electrolytic hydrogen should include the emissions impact of using grid electricity.

It is essential that the Life Cycle Analysis for electrolytic hydrogen encompasses an assessment of the real emissions impacts of utilizing grid electricity for electrolysis.

During the workshop, public commentators voiced apprehensions that hydrogen might not effectively mitigate carbon emissions and that disadvantaged and vulnerable communities (DACs) could continue to bear the brunt of air pollution stemming from hydrogen production and usage. These concerns underscore the necessity for California to establish a hydrogen economy that instills public confidence through substantial emissions reduction.

EH2 maintains a firm belief that hydrogen can be generated and utilized in a manner that demonstrably curtails carbon emissions, and we are encouraged by the inclusion of a life cycle analysis of hydrogen emissions within the SB 1075 Report. The 2022 Scoping Plan currently includes three methods of hydrogen production to meet California goals: electrolysis powered from zero-carbon electricity, steam methane reformation (SMR) of biomethane, and biomass gasification with CCS (BECCS). In the Scoping Plan, the use of SMR is phased out by 2045. An important component of the SB 1075 lifecycle analysis will be analyzing the emissions from the production of hydrogen across these three sources.

For electrolytic hydrogen, the use of exclusively behind-the-meter (BTM) or "off-grid" renewable energy sources guarantees the utilization of zero-carbon electricity, resulting in minimal to zero emissions during hydrogen production. However, it is unlikely that all electrolytic hydrogen will be produced using 100% off-grid generation, and California will have to consider the use of grid electricity for hydrogen production. This hydrogen production is likely to be matched with renewable energy using book-and-claim accounting mechanisms with renewable energy credits (RECs) in order to meet clean energy requirements.

At the same time, actual emissions from hydrogen production and consumption will greatly vary depending on whether hydrogen is produced during hours the California grid is being powered by renewables versus the hours where there is greater fossil fuel use. There is a growing consensus that hourly matching of RECs to grid-tied electrolyzer load is key to minimizing emissions, a conclusion shared by all of the studies that have analyzed the long-term impacts of grid-based hydrogen production.

For example, studies from the Princeton Zero Lab[1] and MIT[2] conclude that matching renewable energy supply with hydrogen production on an annual basis will lead to significant long-run system-level emissions.

The SB 1075 Report should explore these findings in the California context. EH2 therefore recommends outlining emissions impacts from grid-powered electrolysis and evaluating emissions reductions from hourly matching with renewable production in the life cycle analysis, either as a sensitivity case or within the primary analysis.

Conclusion

Electric Hydrogen (EH2) remains committed to supporting California's ambitious decarbonization efforts through the responsible and sustainable use of hydrogen. We look forward to continuing to work with the joint agencies on the SB 1075 report.

Sincerely,

/s/ Paul Wilkins
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Vice President for Policy and Government Engagement
Electric Hydrogen

[1] Ricks, Wilson, Xu, Qingyu, & Jenkins, Jesse D. (2023). *Minimizing emissions from grid-based hydrogen production in the United States*. Environmental Research Letters. https://iopscience.iop.org/article/10.1088/1748-9326/acacb5/meta

[2] Zeyen, Elisabeth, Riepin, Iegor, & Brown, Tom. (2022). *Hourly versus annually matched renewable supply for electrolytic hydrogen* (0.1). Zenodo. https://doi.org/10.5281/zenodo.7457441