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Electric Hydrogen (EH2) Comments on the Draft Solicitation Concept for Large-Scale Centralized Hydrogen Production

Additional submitted attachment is included below.

June 9, 2023

California Energy Commission
Docket No. 22-ERDD-03
715 P Street
Sacramento, California 95814

RE: Electric Hydrogen's Comments on the Draft Solicitation Concept for Large-Scale Centralized Hydrogen Production

Electric Hydrogen (EH2) appreciates the opportunity to submit comments to the California Energy Commission (CEC) on the Draft Solicitation Concept for Large-Scale Centralized Hydrogen Production.

EH2 strongly supports the CEC focusing on large-scale hydrogen production via electrolysis. In order to decarbonize hard-to-decarbonize sectors, including heavy industry, ammonia production, and heavy-duty transportation, clean hydrogen production will have to achieve scale, not only to produce enough hydrogen to serve these sectors but also to provide this fuel at a cost-competitive price.

EH2 appreciates the CEC's commitment to scaling electrolytic hydrogen production and believes that the Large Scale Hydrogen Production Program can play a critical role in de-risking initial commercial-scale projects. To ensure the success of the program, EH2 recommends two key changes to the draft solicitation concept:

- Hydrogen Production Requirements Should Allow for Flexibility
- Provide Flexibility in the Sourcing of Water

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 GHG emissions from hard-to-electrify industries.
EH2 is headquartered in San Carlos, CA, and Natick, MA, with production and R&D facilities in Devens, MA, and San Jose, CA.

Hydrogen Production Requirements Should Allow for Flexibility:

Grant Funding Opportunity (GFO) requirements should be designed so that hydrogen can be produced with renewable energy which is inherently intermittent. As such, the CEC should prioritize projects that can ramp to match the variable nature of renewables. This is important to ensure that the hydrogen produced is truly clean. Recent research from Wilson Ricks at the Princeton Zero Lab has shown that grid-connected electrolytic hydrogen can actually increase emissions relative to gray hydrogen produced via steam methane reformation of natural gas unless environmental safeguards like hourly temporal matching and regionality are required of grid-connected electrolysis projects.[1] In order to be truly green, hydrogen production has to be flexible to match (whether behind the meter or grid-connected) the variable nature of renewable generation. It follows that the CEC should allow for flexibility in the minimum amount of hydrogen produced daily. This could be achieved by averaging daily hydrogen production or by setting eligibility based on a minimum electrolyzer nameplate capacity.

Provide Flexibility in the Sourcing of Water:

EH2 applauds the CEC's desire to promote water conservation in energy production. To understand electrolytic hydrogen production's impact on water usage, it is important to compare it to other hydrogen production pathways. 99% of the 10 million metric tons of hydrogen produced today in the US is produced via steam methane reformation (SMR) of natural gas. SMR production of hydrogen uses 13 to 18 kg of water per kg of hydrogen produced. Electrolytic production of hydrogen from PEM electrolyzers powered with renewable electricity utilizes 9 to 10 kg of water per kg of hydrogen produced.[2]

As of 2020, 766,604 tons of hydrogen were produced in California via SMR.[3] Replacing all of California's current fossil hydrogen production with electrolytic hydrogen production powered by renewables would reduce water consumption from hydrogen production in California by up to 50% - 6,899,436,000 kg of water annually.

Given electrolytic hydrogen production's favorable water consumption profile relative to the incumbent hydrogen production pathway, EH2 recommends the CEC provide flexibility in sourcing water. While recycled or reused water should be utilized where practicable, there may be optimal locations for hydrogen production that lack access to

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[1] Wilson Ricks et al, "Minimizing emissions from grid-based hydrogen production in the United States," *Environmental Research Letters,* 18 014025, 2023, www.iopscience.iop.org/article/10.1088/1748-9326/acacb5/pdf

[2] "Hydrogen Debarbonization Pathways: A Lifecycle Assessment," Hydrogen Council, January 2021, https://hydrogencouncil.com/wp-content/uploads/2021/01/Hydrogen-Council-Report_Decarbonization-Pathways_Part-1-Lifecycle-Assessment.pdf

[3] Harris Gilani et al, "Introduction to the Hydrogen Market in California," University of California Berkeley, September 2020, https://bof.fire.ca.gov/media/10190/introduction-to-the-hydrogen-market-in-california-draft-for-comment_ada.pdf

recycled or reused water. As such the CEC should allow for mixing of water sources where recycled or reused water is not available in sufficient quantity and should waive the requirement for projects in locations where recycled or reused water is not readily available.

Answers to Solicitation Questions

1. **Are the Project Elements in Section 4 of this document realistic, reasonable, and feasible?**

   As discussed above, hydrogen production and water requirements should allow for more flexibility. EH2 recommends modifications to these elements which are detailed above.

5. **Is four years a feasible project timeline? If grant awardees were CEQA-ready (see CEQA in Section 4) but need to obtain regulatory approvals, permitting, and zoning during the project, is a 4-year timeframe feasible for completion? If not, what is the recommended term for a funded project?**

   EH2 understands the importance of ensuring that projects receiving CEC funds are completed in a timely manner. However, the majority of jurisdictions in California have little or no experience permitting hydrogen projects, particularly electrolytic hydrogen projects, and the permitting process can be easily delayed. Additionally, delays related to electric utility interconnection are becoming more common and can be hard to predict and plan for.

   Given the chance of delays being faced by large-scale hydrogen projects, EH2 recommends extending the 4-year timeframe. Alternatively, if the CEC prefers to keep the timeline, funding recipients should be able to pursue extensions for delays outside of their control. Recipients could submit extension requests via the quarterly progress reports that will be submitted to the CEC.

Conclusion

EH2 is fully committed to helping advance California's climate goals and believes clean hydrogen will play a critical role in this transition. However, much work needs to be done to support transitioning hydrogen production from being reliant on fossil fuels to being driven by renewable energy. These CEC funding opportunities are an important tool to help scale electrolytic hydrogen production, and EH2 encourages the CEC to allow for flexibility in water sourcing and daily hydrogen production in order to ensure a successful GFO.

Sincerely,

/s/ Paul Wilkins

Paul Wilkins
Vice President for Policy and Government Engagement
Electric Hydrogen