RE: Response to U.S. Department of Energy Clean Hydrogen Production Standard Draft Guidance

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RE: Response to U.S. Department of Energy Clean Hydrogen Production Standard Draft Guidance

H2U Technologies[1] submits this response to the U.S. Department of Energy's (DOE's) Draft Guidance document for a Clean Hydrogen Production Standard (CHPS),[2] developed to meet the requirements of the Infrastructure Investment and Jobs Act of 2021, also known as the Bipartisan Infrastructure Law (BIL), Section 40315.[3]

H2U Technologies is a California-based developer of low-capital cost, iridium-free proton exchange membrane (PEM) electrolyzers that are particularly suited for pairing with renewable energy sources. We leverage our ultra-high speed Catalyst Discovery Engine™ (CDE™) to develop low-cost non-iridium catalysts for use in our electrolyzer systems. The world-class technology featured in our products stems from ten years of research and development at Caltech, funded by the U.S. Department of Energy.

Overall, H2U supports the DOE's approach to create an effective initial standard for the carbon intensity of clean hydrogen production. Establishing a life cycle assessment methodology for evaluating hydrogen production promotes technology neutrality and feedstock diversity which will allow for a robust development of the hydrogen industry in the United States. However, setting the boundary as well-to-gate excludes substantial emissions associated with distribution and storage of hydrogen. To better capture the life-cycle emissions associated with the full fuel pathway, H2U recommends that the DOE extends the downstream boundary limit to include emissions associated with transportation and storage of hydrogen. To further enhance the CHPS, H2U also believes that renewable energy certificates (RECs) and power purchase agreements (PPAs) should be allowable in characterizing the intensity of electricity emissions for grid-connected hydrogen production, but clear rules will need to be developed and implemented.

In the following sections, we outline our rationale for supporting the CHPS and provide considerations for further development.

[1] See https://www.h2utechnologies.com
[2] See https://www.hydrogen.energy.gov/pdfs/clean-hydrogen-production-standard.pdf
[3] See https://www.congress.gov/bill/117th-congress/house-bill/3684/text

H2U COMMENTS:

1. **Expanding the Downstream Boundary Limit to Include Emissions Associated with Storage and Transportation Improves Impact on Climate Goals**

Using a life cycle assessment (LCA) to determine the carbon intensity of hydrogen fuels supports sustainable reductions in greenhouse gas (GHG) emissions. This non-ambiguous approach lowers the opportunity for market distortion and unfair competition and facilitates the development of a credible clean hydrogen market. The establishment of an LCA methodology also reduces ambiguity for developers as it outlines clear carbon intensity thresholds rather than relying on the often-subjective color-based approach for classifying production technologies.

The suggested well-to-gate methodology includes GHG emissions arising upstream of the point of production, which can contribute to the final emissions profile of a hydrogen production pathway. Therefore, the use of a well-to-gate methodology helps reduce market misrepresentations by accurately capturing the upstream GHG emissions of fuels. However, setting a boundary limit at the point of production (at gate) excludes substantial downstream emissions associated with storage and transportation to the consumption location. Hydrogen is a very small molecule and can therefore easily leak into the atmosphere during transportation and storage. Recent research from the Environmental Defense Fund[4] suggests that when leaked in the atmosphere, hydrogen can have significant warming effects. Excluding these downstream emissions from the LCA gives an incomplete picture of the climate impacts of hydrogen and hinders U.S. ability to meet its climate goals. H2U suggests that the DOE include these downstream emissions in the LCA methodology to more accurately determine the emissions associated with the hydrogen fuel pathway.

2. **Collaboration with the International Partnership for Hydrogen in the Economy Will Allow for U.S. Integration with Global Hydrogen Markets**

The methodology employed by the International Partnership for Hydrogen in the Economy (IPHE) was developed through a collaboration with 21 countries and is aligned with international best practices. Collaborating with the IPHE will enable the U.S.'s developing domestic clean hydrogen market to integrate more easily with global hydrogen markets. While the current working paper[5] employs a well-to-gate LCA, it also states that

[4] See https://acp.copernicus.org/articles/22/9349/2022/
[5] See https://www.iphe.net/iphe-working-paper-methodology-doc-oct-2021

emissions associated with hydrogen infrastructure past the point of production, including that of transportation and storage, will be considered in separate documents. As outlined previously, H2U believes that including GHG emissions downstream will be important for the U.S. to meet its climate goals. We suggest that the DOE collaborates with the IPHE to ensure that LCA analyses both domestically and internationally include some downstream Scope 3 emissions. This will ensure that, globally, the hydrogen market will be held accountable for GHG emissions throughout the fuel pathway. With alignment of the methodologies, the U.S. hydrogen market will have an advantage of being aligned with internationally agreed-upon approaches from its inception.

3. Use of RECs and PPAs in the Near-Term Will Allow for the Growth of the Hydrogen Market Until Greater Infrastructure Exists

H2U strongly believes that CHPS should allow RECs and virtual PPAs to be used in characterizing the intensity of electricity emissions for grid-connected hydrogen production. Overall, H2U is supportive of a clean hydrogen economy that relies on renewable electricity sources. However, the existing infrastructure and mechanisms today are insufficiently mature and cannot track and account for the physical delivery of renewable electricity to grid-connected green hydrogen production. Therefore, in the near-term[6] H2U supports a "book-&-claim" approach in which RECs can be used to satisfy the "renewable" component of grid-connected hydrogen production. By uncoupling the renewable electricity from the production of hydrogen, this will provide flexibility for producers and end-users. This flexibility is especially important as green hydrogen is in the ramp-up phase and policies are still being developed. Furthermore, it helps to overcome near-term barriers to large-scale infrastructure development.

As the hydrogen market continues to develop and green hydrogen gets a strong foothold, the DOE should consider developing further rules related to traceability, reporting, and verification that can track real-time grid injection and withdrawal points. H2U supports the creation of a "mass balancing" principle that links renewable electricity with the respective physical delivery. Establishment of a physical link between renewable generation and grid-connected hydrogen production makes it easy to verify the cleanliness of the hydrogen produced. At this point, further policy considerations such as additionality, deliverability, temporal correlation, and geographical connection should be explored. These policies should

[6] Defined as today through 2030 or until sufficient infrastructure and mechanisms are in place.

be developed with careful consideration so as not to disrupt the growth of the nascent green hydrogen industry. H2U supports the development of an initiative to develop this plan with input from policymakers, industry, and interested stakeholders and would welcome the opportunity to support this effort.

CONCLUSION:

H2U supports the initial CHPS guidance and believes it will contribute substantially toward the realization of U.S. climate goals. To further improve the standard, H2U suggests including downstream emissions associated with storage and transportation in the LCA methodology. A flexible CHPS standard in the near-term that allows for RECs and PPAs will allow for the continued development of a robust, clean hydrogen market in the U.S. We appreciate the opportunity to provide comments and welcome opportunities to continue to engage as the CHPS is finalized. Please do not hesitate to contact us with any questions.

Respectfully submitted,

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