ANTORA

U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

November 14, 2022

Re: Comments for the Clean Hydrogen Production Standard Draft Guidance

On behalf of Antora Energy, I respectfully submit the attached comments to the Department of the Energy in response to the development of the Clean Hydrogen Production Standard Draft Guidance.

We appreciate the opportunity to respond and would welcome the opportunity to participate in any stakeholder engagement as the agency further crafts this important guidance. Thank you for your time and your consideration.

Sincerely,

Justin Briggs, PhD
Co-Founder and Chief Operating Officer

Section 3 Implementation Question (c):

Should renewable energy credits, power purchase agreements, or other market structures be allowable in characterizing the intensity of electricity emissions for hydrogen production? Should any requirements be placed on these instruments if they are allowed to be accounted for as a source of clean electricity (e.g. restrictions on time of generation, time of use, or regional considerations)? What are the pros and cons of allowing different schemes? How should these instruments be structured (e.g. time of generation, time of use, or regional considerations) if they are allowed for use?

Antora requests that the DOE specify in guidance an important clarification regarding Scope 2 greenhouse gas emissions, namely that the DOE account for Scope 2 emissions resulting from grid-sourced electricity using either hourly electricity grid emissions data or renewable energy certificates from temporally- and spatially-matched low-carbon generation. Failure to use such hourly emissions or tightly matched certifications could result in false claims of emission reductions and in many cases even directly subsidize dramatic increases in greenhouse gas emissions. For example, a hydrogen producer might contract for additional renewable electricity that is produced at times or

locations where renewable electricity has already saturated the grid, resulting in renewable generation that fails to produce additional emissions reductions. At the same time,, the same company could serve the incremental electric load for hydrogen production by increasing generation from emissions-intensive electricity at the times and locations where the hydrogen load actually occurs. Given the desire to operate hydrogen electrolyzers at high load factors and that baseload power prices are lowest in regions of the U.S. with coal-based electric production, it is likely that significant hydrogen production will occur in a way that increases emissions in this manner. A recent study[1] from Princeton's ZERO Lab on hydrogen production with grid-connected electrolysis rigorously confirms this intuition that a lack of hourly and spatial matching could directly incentivize large increases in CO2 emissions.
As such, we respectfully suggest that:

1. Scope 2 emissions measurement for grid-sourced electricity be based on **hourly average emissions factors**; and that
2. Indirect (i.e. book-and-claim) accounting mechanisms are limited to **hourly-matched generation from a local generator**.

Using this type of hourly carbon intensity accounting properly captures the actual emissions intensity of a given industrial or manufacturing facility and will incentive investments in infrastructure that actually reduce emissions.

For grid-sourced electricity, we recommend that guidelines are established that incorporate measurements and/or estimates of the hourly average emissions intensity of electricity for the local grid. We recommend an hourly basis for accounting as it incorporates sufficient resolution to capture the important time-variable features of a grid with significant generation from variable wind and solar resources. An hourly accounting basis is also tractable from a compliance standpoint and further increases in temporal fidelity beyond hourly resolution are unlikely to yield meaningful benefit but impose additional compliance complexity. Multiple methodologies for assessing hourly electricity emissions intensity are in use and being developed in national laboratories, universities, and industry. While in years past an annual average carbon intensity of electricity, reflective of the varying sources of electric power, was suitable for Scope 2 emissions assessments, the grid is rapidly changing and this approach is no longer adequate. In parts of the grid where renewable power is abundant, average emissions factors at times may be at or near zero, whereas at times when renewables are not available, emissions may be significantly higher than the annual average. Requiring an hourly emissions factor to calculate emissions reflects the strong and increasing importance of the temporal variance of emissions on the grid. Preserving this signal of variable emissions factors will properly incentivize investment in production strategies that align power consumption with low-carbon power generation and ultimately reduce greenhouse gas emissions.

Likewise, requiring any indirect or book-and-claim accounting mechanisms (such as renewable energy certificates or zero-carbon energy certificates) to meet hourly matching requirements from a local resource will ensure carbon reduction claims match reality and preserve the incentive to invest in systems that align power consumption with low-carbon power generation. Ignoring such an hourly matching requirement would be harmful, and could even result in facilities increasing net emissions while claiming public funding.

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[1] Enabling grid-based hydrogen production with low embodied emissions in the United States.


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