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Submitted electronically via: Cleanh2standard@ee.doe.gov

RE: U.S. Department of Energy Clean Hydrogen Production Standard (CHPS) Draft Guidance

Hy Stor Energy LP and its subsidiary Mississippi Clean Hydrogen Hub LLC (collectively referred to as "Hy Stor Energy") hereby provide comments on the U.S. Department of Energy ("DOE") Clean Hydrogen Production Standard ("CHPS") Draft Guidance issued on September 22, 2022 ("Draft Guidance"). As detailed below, Hy Stor Energy supports some of the Draft Guidance, but Hy Stor Energy has some significant concerns with the Draft Guidance as well.

Hy Stor Energy and its Interest in the CHPS

Hy Stor Energy, a company headquartered in Jackson, MS, was formed for the purpose of developing and advancing renewable hydrogen production, storage, and delivery at commercial scale in the United States. Hy Stor Energy's first major project, the Mississippi Clean Hydrogen Hub, is under active development with over 60,000 acres of land in sixteen (16) Mississippi counties and two Louisiana parishes under Hy Stor Energy's control, and four salt domes fully permitted for underground hydrogen storage. The Mississippi Clean Hydrogen Hub will produce green hydrogen through an electrolysis process powered by onsite solar or other renewable energy resources that will result in no carbon emissions. The green hydrogen will then be stored in salt domes for later delivery to industrial, transportation and utility customers via rail, truck, ship or pipelines. Further information about Hy Stor Energy and its plans is available at https://hystorenergy.com/.

The Mississippi Clean Hydrogen Hub will be a first-of-its-kind renewable hydrogen hub. It will be as much as ten times larger than any other green hydrogen project under consideration in the United States and would be one of the largest in the world. On November 7, 2022, Hy Stor Energy submitted a Concept Paper to the DOE to begin the process to have the Mississippi Clean Hydrogen Hub designated as a "Regional Clean Hydrogen Hub" under Section 40314 of the recently-enacted Infrastructure Investment and Jobs Act, also known as the Bipartisan Infrastructure Law ("BIL"). Pending regulatory approvals and equipment availability, the construction of the hub's first phase is planned to begin in 2023. Assuming this schedule is maintained, the hub would be in commercial service by late 2025 or early 2026.

Comments on the Proposed CHPS

Hy Stor Energy appreciates the opportunity to comment on the Draft Guidance. Hy Stor Energy supports some components of the Draft Guidance. Hy Stor Energy is a member of trade organizations that will submit comments in support of the Draft Guidance, including the Fuel Cell & Hydrogen Energy Association, American Clean Power Association, Clean Energy Buyers Association, and the Green Hydrogen Organization, and Hy Stor Energy will not duplicate these

trade organizations' comments herein. Hy Stor Energy provides below separate comments on its concerns with the Draft Guidance.

A. DOE Must Not Give Blue Hydrogen an Advantage Over Green Hydrogen

Hy Stor Energy is concerned that as proposed, the CHPS could confer an unfair advantage upon hydrogen produced by fossil fuels ("blue" hydrogen). The Mississippi Clean Hydrogen Hub will produce hydrogen through electrolysis powered by onsite solar or other renewable energy resources, each yielding "green" hydrogen. In addition, Hy Stor Energy has committed to meet the "Green Hydrogen Standard" developed by the Green Hydrogen Organisation, which includes a more stringent initial target for lifecycle greenhouse gas emissions than the proposed CHPS would target. Accordingly, Hy Stor Energy's Mississippi Clean Hydrogen Hub will be able to meet the requirements of the CHPS as proposed, but Hy Stor Energy urges DOE to establish a CHPS that does not tilt the playing field in favor of blue hydrogen.

Hy Stor Energy recognizes DOE must abide by the directives in the BIL when developing the proposed CHPS. Specifically, the CHPS must "support clean hydrogen production from each source described in [42 U.S.C. § 16154(e)(2)]," which includes, but is not limited to, fossil fuels with carbon capture, utilization, and sequestration ("CCUS"); hydrogen-carrier fuels (including ethanol and methanol); renewable energy resources, including biomass; and nuclear energy.[1] Elsewhere, DOE, recognizing that the CHPS is not a regulatory standard, explains that, with respect to Regional Clean Hydrogen Hubs ("Hubs"), DOE can select projects "that do *not* meet the CHPS so long as DOE selects projects that 'demonstrably aid the achievement' of the CHPS by mitigating emissions as much as possible across the supply chain (*e.g.*, through aggressive carbon capture onsite, measures to mitigate fugitive methane emissions, or use of clean electricity)."[2]

Through DOE's effort to support hydrogen production from a variety of sources, including fossil fuels, the CHPS may exacerbate advantages blue hydrogen may currently enjoy vis-à-vis green hydrogen. A recent American Petroleum Institute study concluded that the economics of hydrogen production in the U.S. will continue to support blue hydrogen over green hydrogen, even with technological improvements in green hydrogen production.[3] According to the study, the production of green hydrogen will become less costly over time, but will still be more than twice as expensive as that of blue hydrogen in 2050.[4] Hy Stor Energy does not support a CHPS that allows blue hydrogen to be considered the functional equivalent for decarbonization purposes to green hydrogen that in fact is produced without any associated carbon emissions. Blue hydrogen projects already have a cost advantage over green hydrogen projects; providing blue hydrogen projects an opportunity to qualify as "clean hydrogen" projects, while certainly helpful to blue hydrogen projects, sacrifices achievement of the fundamental objective of moving toward a

[1] Draft Guidance at 1.
[2] *Id.* at 2.
[3] The Potential Role of Blue Hydrogen in Low-Carbon Energy Markets in the US, commissioned by American Petroleum Institute, available at https://www.api.org/~/media/Files/News/2022/10/12/API-ICF-Hydrogen-Report.
[4] *Id.*

hydrogen economy – the drastic reduction of carbon emissions produced by use of fossil fuels (even with CCUS being part of the equation).

Hy Stor Energy anticipates that some parties may offer comments on the CHPS in support of an initial target for lifecycle greenhouse gas emissions *greater* than 4.0 kgCO2e/kgH2. Hy Stor Energy strongly opposes any such comments. Hy Stor Energy views the 4.0 kgCO2e/kgH2 initial target proposed by DOE as an upper-limit target, and Hy Stor Energy is hopeful that the initial target will be lowered below 4.0 kgCO2e/kgH2 when DOE revises the CHPS within 5 years, as required by the BIL.[5]

B. DOE Must Ensure That Renewable Energy Credits ("RECs"), Power Purchase Agreements ("PPAs"), and Other Market Structures are Accountable, Regional, and Include Requirements for Temporal Matching

Hy Stor Energy supports the use of RECs, PPAs, and other market structures as an important tool in the United States' path to decarbonization. However, recent modeling suggests that unbundled RECs and annual electricity matching do not drive "effective emissions reductions," and can even increase emissions compared to the status quo.[6] Thus, to "encourage stakeholders to reduce lifecycle emissions to the greatest extent possible,"[7] DOE must put parameters on the use of RECs, PPAs, and other market structures when determining the intensity of electricity emissions for hydrogen production. Accordingly, DOE must consider the following:

1. Additionality

DOE must ensure that the power a hydrogen producer is utilizing, whether through a PPA or on-site generation, represents *additional* clean electricity that would not have been otherwise generated without the investment of the producer. DOE must consider additionality to ensure that electrolyzer loads are contracting new clean generation that would not otherwise exist to offset the grid emissions induced by the new load. This approach is supported by our global partners in Europe, and the DOE must ensure that the United States is not an outlier.

2. Regionality

Regionality refers to the geographic boundary within which the electrolyzer and the clean power being used to power the electrolyzer are located. The DOE must define narrow regional boundaries to provide for greater emissions reductions. Hy Stor Energy supports DOE adopting a requirement that the electrolyzer be in the same region as the renewable project that it claims as the source of electricity. Hydrogen producers should not be able to purchase clean energy in one community while increasing pollution in another community.

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[5] Draft Guidance at 6.
[6] Wilson Ricks, Qingyu Xu, & Jesse D. Jenkins, Enabling grid-based hydrogen production with low embodied emissions in the United States, Andlinger Century for Energy and the Environment, Princeton University (2022), available at https://zenodo.org/record/7183516#.Y2z8vXbMKUk.
[7] Draft Guidance at 6.

3. Temporal Matching

The more granular the time period that is required for hydrogen producers to offset their energy usage with renewable energy, the greater the likelihood that hydrogen producers are truly offsetting induced emissions from grid-powered electrolyzers with clean energy operating at the same time. Recent studies have shown that temporal matching on an annual basis is ineffective at reducing electrolyzer emissions and enables hydrogen sources with very high consequential emissions.[8] Therefore, Hy Stor Energy supports hourly matching of electrolyzer load and renewable generation.

To be sure, some of the proposals discussed above are not achievable currently due to existing technology, however, Hy Stor Energy urges DOE to continue to assess the feasibility of the proposals to advance the goal of reducing emissions and supporting a clean hydrogen economy. Hy Stor Energy encourages DOE to continue collaboratively engaging with stakeholders to evaluate DOE's approach to RECs, PPAs, and other market structures before any approach is chosen by DOE.

Conclusion

Hy Stor Energy has made significant progress in achieving its vision of building a comprehensive hydrogen hub centered in the State of Mississippi that will deliver green hydrogen to power the transition to clean energy and the decarbonization of industries such as transportation, power generation and steelmaking in the Gulf Coast region. The Mississippi Clean Energy Hub project has the support of local and state officials, community groups, suppliers, and potential customers, and Hy Story Energy is poised to bring the Mississippi Clean Hydrogen Hub online in the next few years.

Hy Stor Energy appreciates the DOE's efforts to advance the CHPS, and in the interest of promoting the fastest possible transition to a lower carbon future, Hy Stor Energy hopes DOE will account for its comments when finalizing the CHPS.

[8] Wilson Ricks, Qingyu Xu, & Jesse D. Jenkins, Enabling grid-based hydrogen production with low embodied emissions in the United States, Andlinger Century for Energy and the Environment, Princeton University (2022), available at https://zenodo.org/record/7183516#.Y2z8vXbMKUk.