Bloomenergy®

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Connecticut Green Bank
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SUBMITTED ELECTRONICALLY

Public Request for Written Comments

Re: Comments of Bloom Energy to the Hydrogen Task Force

Bloom Energy Corporation ("Bloom Energy") hereby respectfully submits the following comments in response to the November 8, 2022 Public Request for Written Comments regarding the Hydrogen Task Force's ongoing efforts as it pertains to Special Act No. 22-8. Bloom Energy appreciates the opportunity to provide written input on the subject.

About Bloom Energy

Bloom Energy is a manufacturer of solid oxide fuel cell technology that utilizes an electrochemical process to power non-combustion microgrids as well as advanced electrolyzer systems capable of converting renewable electricity into renewable hydrogen. Our solid oxide fuel cells and electrolyzers are designed in a modular fault-tolerant format that provides mission critical reliability with no downtime for maintenance. Bloom Energy has installed over 700 of its non-combustion solid oxide fuel cell systems for customers in thirteen U.S. states as well as in Japan, South Korea, and India, including over 60 systems operating in Connecticut. Our systems have proven resilient through outages caused by hurricanes, winter storms, earthquakes, forest fires, and other extreme weather and natural disasters.

Defining Clean Hydrogen

1. *Based on Federal guidance in the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, clean hydrogen is defined as hydrogen that is produced through a process that results in a lifecycle greenhouse gas emissions rate of not greater than 4 kilograms of CO2e per kilogram of hydrogen and with less than 2 kilograms of CO2e per kilogram of hydrogen at the point of production. Do you believe that Connecticut should pursue a more stringent definition for clean hydrogen than the one that has been established by the Federal government? If so, why? If not, why not?*

Bloom Energy recommends consistent language be adopted at the broadest scale possible and is therefore supportive of utilizing the Federal government's definition of clean hydrogen. Consistent definitions are essential to clarity in this developing sector and will enable more participation in federal tax incentives and innovation programs benefiting Connecticut ratepayers.

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Stakeholder Engagement and Equity

2. *When and how should the state of Connecticut engage with environmental justice and disadvantaged communities throughout the clean hydrogen planning and development process? What steps can the state take to support EJ and disadvantaged communities engagement in these processes?*

Bloom Energy strongly encourages public education on hydrogen, and other emerging technologies, and particularly the involvement of environmental justice and disadvantaged communities as early as possible in the clean hydrogen planning and development process. As an organization, we have invested time and effort to supporting these efforts, particularly in the northeast, and are eager to see the State of Connecticut enhance the involvement of this essential stakeholder group. Environmental justice communities can greatly benefit from improved air quality, reduced energy rates, and added electric reliability that can result from proper integration of clean hydrogen into the energy sector of Connecticut. This is particularly essential as the electric grid becomes more dependent on intermittent renewables such as wind and solar, increasing the need for long term and seasonal energy storage to mitigate the need for fossil fuel power plants to meet growing electric peak energy demand which may be non-coincident with renewable energy production. Non-combustion fuel cells powered by clean hydrogen provide baseload electricity without greenhouse gas (GHG) or air pollution emissions and support the grid in the context of the growing development of intermittent resources.

3. *What steps should the state of Connecticut take to ensure that the clean hydrogen economy provides equitable benefits for environmental justice and disadvantaged communities?*

Bloom Energy encourages building a foundation of clear scientific education for the public and transparent project development processes directly involving local communities. Further understanding equitable benefits for disadvantaged communities requires robust, direct engagement with impacted communities, which we strongly support.

Hydrogen End-Uses

4. *The Hydrogen Task Force has been exploring hydrogen end uses including: critical facilities, aviation, cargo ships, material handling equipment, long-haul heavy duty trucks, fuel cells for peak power generation, high heat industrial processes, buses, ferries, rail, hydrogen blending in pipelines, and light-duty vehicles. How should the state address differing stakeholder perspectives about hydrogen end use prioritization? Which specific end uses are of greatest concern, and why? What actions can or should the state take to continue to solicit stakeholder feedback?*

Bloom Energy would like to call attention to a notable omission in terms of hydrogen end use: the potential for clean hydrogen to act as an energy storage mechanism for renewable energy capable of indefinite durations. Hydrogen is perhaps the most viable option for long-duration storage of intermittent renewables, when excess generation exceeds immediate demand and balancing the grid requires storing renewable electrons for days, weeks, or months, and then discharging during times of peak demand and low renewable energy production. Because hydrogen can be stored indefinitely and then converted back into zero-emissions electricity via fuel cells when and where it is needed, electrolysis enables the massive buildout of renewables that is critical for addressing climate change. In this scenario, renewable energy that would otherwise be curtailed when it exceeds immediate demand (as well as the capacity of short-term batteries) is stored as a molecule and then converted back into electricity as real-time needs of the

electric grid demand. In the context of a regional grid like ISO-NE, hydrogen could be generated from excess renewables located hundreds of miles from a load center during peak production but low demand and then conveyed to fuel cells where needed to serve local demand, either at a later point in time or in order to alleviate transmission constraints at the point of renewable generation.

Hydrogen Supply

5. *If local (in-state) hydrogen supply is expected to limit in-state hydrogen end use applications, should the state consider the role of hydrogen imports in meeting supply needs?*

Yes, there are benefits available from clean hydrogen regardless of where production occurs so long as the definition of clean hydrogen is consistent across states.

Hydrogen Infrastructure

6. *What additional processes should the state consider to ensure that use of pipeline infrastructure for hydrogen transport is implemented safely, and supports community and climate goals?*

There is considerable precedent for hydrogen pipeline and transportation infrastructure, both nationally and internationally. For example, in the Gulf Coast region of the US, merchant hydrogen producers own and operate approximately 1,600 miles of dedicated hydrogen pipelines primarily for use at petroleum refineries and chemical plants[1]. Today in Hawaii, hydrogen makes up 15% of the natural gas consumed by residential and industrial customers on the island of Oahu[2]. Internationally, countries such as Japan, South Korea and Australia are heavily investing in the hydrogen deployment with the intent to decarbonize their energy and transportation sectors.

Safety with any gas is always a concern but modern engineering principles, material design, building codes, and safety trainings can mitigate much of the concern hydrogen presents just as society has adapted to the inherent risks of more commonly used fuels (natural gas, propane, gasoline, and diesel). Standards and codes organizations such as the National Fire Protection Association (NFPA), American Society of Mechanical Engineers (ASME), and American Society of Testing Materials (ASTM) already have regulations regarding hydrogen operations and should be looked to as technical resources for safe implementation. Through a variety of efforts at National Labs, the US Department of Energy (DOE) also is providing substantial scientific research to support community and climate goals in the hydrogen sector.

7. *What enabling infrastructure do you believe is highest priority for the state to pursue to support the development of Connecticut's hydrogen economy, and why?*

Hydrogen blending standards and interconnection to gas pipeline infrastructure, where safe to do so, could immediately aid in the decarbonization of the existing natural gas system as continued electrification efforts for heating and transportation expand and gradually offset combustion end uses. These mechanisms will enable reductions in the environmental impact of fossil fuels while repurposing

[1] https://www.energy.gov/eere/fuelcells/hydrogen-pipelines
[2] https://www.hawaiigas.com/clean-energy/decarbonization

already available infrastructure. Bloom Energy encourages non-combustion approaches to electricity generation by fuel cells as they provide the most efficient means of generating power[3].

Hydrogen Funding and Policy Activities

8. *What portions of the hydrogen value chain (uses, sources, transport, storage) would be most benefited by further development of additional policy or regulatory guidance? Why, and what gaps should these policies be seeking to address?*

Bloom Energy recommends considering legislative updates and regulatory frameworks which enable more widespread use of clean hydrogen for non-combustion distributed energy resources and seasonal energy storage of renewable electricity. This includes the addition of hydrogen generated from carbon free energy sources such as wind, solar, and nuclear to be Renewable Portfolio Standard (RPS) Class I eligible under Connecticut statute[4] and establishing protocols (tariffs, metering, infrastructure, blending guidance, etc.) for hydrogen to be used in the energy sector, particularly in decarbonization of the existing natural gas system and long-term energy storage to aid in further electric grid decarbonization.

9. *Federal funding is hoped to represent a significant portion of hydrogen funding but is not expected to meet all funding needs. Which hydrogen investments (infrastructure, manufacturing, end use equipment, workforce training, etc.) would be the most important for the state to consider funding? Why?*

Bloom Energy agrees with the path that is being taken by the Task Force that all of these investments need to be looked at holistically to support the growth of the hydrogen industry here in Connecticut. We do not have any further insight into which investments should be considered most important at this time.

10. *What are the best mechanisms for state agencies to gain visibility into federal funding opportunities pursued by individual commercial actors or other organizations? What actions can the state take to support these applications?*

Bloom does not presently have insight to share on this item.

11. *What federal funding opportunities have stakeholders applied to? Are these formula grants or competitive? Are these opportunities hydrogen-related? Do stakeholders have lessons learned to share based on the application or implementation process?*

Of particular note are multiple federal initiatives launched in 2022 including the US DOE's Hydrogen Hubs, the Inflation Reduction Act's (IRA) Investment Tax Credit (ITC) for hydrogen related infrastructure (fuel cells, electrolyzers, etc.) and Production Tax Credits (PTC) for clean hydrogen.

[3] Compared to the Heat Rates of traditional combustion sources for electric power generation such as coal, petroleum, natural gas and nuclear, Bloom's Energy Servers more effectively convert fuel to electricity on a btu per kWh basis even when compared with natural gas combined cycle turbines. See https://www.eia.gov/electricity/annual/html/epa_08_02.html and https://www.bloomenergy.com/wp-content/uploads/bloom-energy-server-2022.pdf for data used in comparison statement.

[4] CT §16-1(a)(20): https://www.cga.ct.gov/current/pub/chap_277.htm#sec_16-1

Conclusion

Thank you for your consideration of these comments and for supporting the robust stakeholder process that is underway to guide the future of hydrogen in Connecticut. Please do not hesitate to reach out if we can provide additional information.

Sincerely,

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