Bloomenergy™

February 1, 2021

Via Electronic Mail

Hon. Patrick Woodcock
Chair, Energy Efficiency Advisory Council
Commissioner, Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: 2022 – 2024 Three-Year Energy Efficiency Plan

Dear Commissioner Woodcock,

Bloom Energy Corporation ("Bloom Energy") hereby respectfully submits to the Energy Efficiency Advisory Council (EEAC or the "Council") comments regarding development of the 2022-2024 Three-Year Energy Efficiency Plan for the Mass Save programs.

About Bloom Energy

Bloom Energy is a manufacturer of solid oxide fuel cell systems that generate electricity through an electrochemical process without combustion. Therefore, these systems do not produce local "criteria" air pollutants associated with combustion technologies, nor do they consume or discharge water. Bloom's Energy Servers are designed in a modular fault-tolerant format that provides mission critical reliability with no downtime for maintenance. Bloom's systems have proven resilient through disruptive events including hurricanes, earthquakes, utility outages, physical damage, and fire damage. As a result, Bloom Energy Servers are used by many of the world's leading companies to increase energy efficiency, secure their critical business processes from the risk of utility outages, and reduce dependence on high-polluting backup generators.

Background

As the Council considers the future of energy efficiency in Massachusetts, it should take great pride in both the efficiency gains and the important co-benefits that fuel cell projects installed with Mass Save program support have brought to Massachusetts thus far. In addition to greenhouse gas reductions, these include increased community preparedness and resilience, energy cost savings, and, critically, reduced combustion-related air pollution.

Local Air Pollutants

The stated purpose of the energy efficiency planning process is to maximize economic benefits in a way that helps to "achieve the Commonwealth's energy, climate, and environmental goals." Bloom Energy's experience in Massachusetts demonstrates that deploying fuel cells is a cost effective way to further these efforts by reducing both electricity demand and greenhouse gas emissions, and indeed our systems have helped to reduce demand on the electricity grid across the Commonwealth.

Because fuel cells are non-combustion electricity generators, they also reduce harmful local air pollutants such as SO_2, NO_x and particulate patter (PM) by over 99% compared to combustion alternatives.[1] The health benefits of these reductions, particularly to lower-income communities, cannot be overstated.

When deployed as part of a microgrid, our fuel cells insulate customers from power outages and eliminate the need for diesel backup generators. While it's clear that many businesses simply cannot withstand interruptions to the power grid, diesel generators are perhaps the dirtiest and most harmful sources of backup power, yet they remain ubiquitous. Alternatively, customers who install fuel cell microgrids receive superior resiliency while producing far fewer GHG emissions and virtually no local air pollution.

A wave of recent studies has shown that local combustion-related pollutants like NO_x, SO_2, and PM are far more harmful to human health than previously believed, and that the greatest impacts occur disproportionately in lower-income communities. This research demonstrates that:

- Combustion-related air pollution may be as harmful to human lungs as smoking cigarettes;[2]
- Particulate matter is the largest environmental health risk factor in the nation, and the resulting health impacts are borne disproportionately by economically-disadvantaged communities;[3]
- Combustion-related air pollution increases preterm birth risks.[4]

As we learn that the health impacts of COVID-19 are significantly exacerbated by poor air quality,[5] pollution-reducing co-benefits that complement carbon reductions have rightly garnered additional attention in recent months. Mass General Brigham, which is on the front lines in the fight against the pandemic, has installed Bloom Energy Servers at four separate locations, underscoring the need for both resilient and clean power.

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[1] Based on electricity grid emissions data from EPA eGRID, Bloom's solid oxide fuel cells reduce SO_2 by 100% and NO_x by at least 99.7% compared to non-baseload generation.

[2] Wang M, Aaron CP, Madrigano J, et al. Association Between Long-term Exposure to Ambient Air Pollution and Change in Quantitatively Assessed Emphysema and Lung Function. *JAMA.* 2019;322(6):546–556. doi:10.1001/jama.2019.10255; Aubrey, Allison. Air Pollution May Be As Harmful To Your Lungs As Smoking Cigarettes, Study Finds. NPR. 13 August 2019. https://www.npr.org/sections/health-shots/2019/08/13/750581235/air-pollution-may-be-as-harmful-to-your-lungs-as-smoking-cigarettes-study-finds

[3] Tessum et al. Inequity in consumption of goods and services adds to racial–ethnic disparities in air pollution exposure. *PNAS March 26*, 2019 116 (13) 6001-6006; first published March 11, 2019 https://doi.org/10.1073/pnas.1818859116

[4] Mendola, P. et al. *"Air pollution and preterm birth: Do air pollution changes over time influence risk in consecutive pregnancies among low-risk women?"* International Journal of Environmental Research and Public Health, 2019. https://www.nih.gov/news-events/news-releases/nih-study-suggests-higher-air-pollution-exposure-during-second-pregnancy-may-increase-preterm-birth-risk#:~:text=Pregnant%20women%20who%20are%20exposed,Environmental%20Research%20and%20Public%20Health.

[5] Wu, X., Nethery, R., Sabath, M., Braun, D., & Dominici, F. Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. Science Advances, November 2020. https://advances.sciencemag.org/content/6/45/eabd4049/tab-pdf

The potential for energy efficiency programs to promote co-benefits while continuing to drive reductions in GHG emissions has never been more clear. In fact, *the economic and health benefits associated with reducing NO_x and PM emissions have been found to exceed the economic and health benefits of reducing GHG emissions on a per ton basis*.[6] In the same study, the New York University Institute for Policy Integrity determined that "because DER use often displaces the use of traditional, fossil-fuel-fired generators, the substitution reduces emissions of many air pollutants, including greenhouse gases and local pollutants such as particulate matter, SO_2, and NO_x, which can contribute to climate change, worsen human health, impair ecosystems, harm crops, and make it harder for workers to be productive. Furthermore, DERs can be particularly valuable if they avoid local air pollution imposed on populations that are especially vulnerable to this pollution, such as low-income communities and communities of color."[7]

As Massachusetts continues to be a leader in energy efficiency programs, ensuring that the benefits are felt evenly across society must be a primary objective. We know, for example, that industrial facilities, disproportionally located in lower-income communities, turn to diesel generators when the power goes out, with no regulatory mechanism to discourage on-site combustion of petroleum. The reduction in greenhouse gases that have traditionally been the sole focus of these programs are felt everywhere, but the communities housing both diesel generators and large grid-scale combustion generation continue to bear the brunt of the human health impacts of harmful local air pollutants. A myopic focus on global pollutants has dramatic local implications.

Community Reliance on Resilient Power

In addition to increasing energy efficiency and reducing local air pollution, fuel cell microgrid installations across Massachusetts offer tremendous value to the communities in which they are located. Microgrids provide needed resilience against interruptions in electricity supply; in the case of our installations at several Stop & Shop supermarkets, this means that these local grocery stores can continue to operate in their communities indefinitely through blackouts caused by severe weather, system failures or other issues that have become increasingly commonplace.

During the August 2020 tropical storm that swept through parts of the northeast, fuel cell-powered microgrids operated without failure through twenty-six separate outages. Among the customers who would have otherwise lost power were the telecommunications facility that houses the 911 call center for much of Long Island, as well as a pharmaceutical plant that was developing and is now manufacturing COVID-19 vaccines. In addition to Bloom Energy's microgrids at Mass General Brigham healthcare facilities and Stop & Shop supermarkets, our Massachusetts installations include Home Depot stores and other customers that are proving to be "critical facilities" amid the pandemic. These and other projects were developed with support from the Mass Save program, which has helped customers and their communities realize the range of efficiency and co-benefits that fuel cells bring to bear. The need for resilient power options is becoming increasingly clear as we tackle the dual challenges of the pandemic and an increase in climate change-induced weather extremes. The value

[6] Institute for Policy Integrity, New York University School of Law, "How States Can Value Pollution Reductions from Distributed Energy Resources" July 2018, available at: https://policyintegrity.org/files/publications/E_Value_Brief_-_v2.pdf
[7] Id.

provided by technologies that enable greater resiliency while simultaneously reducing demand on the electricity grid should not be overlooked.

Conclusion

As the Commonwealth has implemented its nation-leading energy efficiency programs over the past several years, the program administrators have recognized and helped customers to realize the benefits of fuel cells as part of a comprehensive and aggressive efficiency strategy. Robust engagement has been a hallmark of the EEAC stakeholder outreach regarding development of the three-year plans, and the Council's approach for 2022-2024 is following this precedent. We encourage the Council to continue to value the range of benefits of highly efficient, non-combustion fuel cells. In addition to reducing load and therefore serving a vital purpose of the Energy Efficiency Plan, the current paradigm in Massachusetts allows fuel cells to provide cost savings, significantly reduce CO_2 emissions compared to grid power, increase resiliency against outages, and effectively eliminate local air pollutants.

We appreciate the opportunity to provide input on this proceeding. Thank you in advance for your consideration of these comments. Please do not hesitate to reach out if I can provide additional information.

Sincerely,

/S/ Jordan Garfinkle

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