



March 15<sup>th</sup>, 2023

Cheryl Laskowski  
Chief of Transportation Fuels Branch  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

**RE: Bloom Energy Comments Regarding Potential Changes to the Low Carbon Fuel Standard**

Dear Ms. Laskowski,

Thank you for the opportunity to submit comments in response to the February 22, 2023 Public Workshop regarding potential changes to the Low Carbon Fuel Standard ("LCFS") program.

Bloom Energy's mission is to make clean, reliable energy affordable for everyone. Bloom Energy is a provider of solid oxide fuel cells ("SOFC") for power generation and electrolyzers ("SOEC") for hydrogen technology. Bloom Energy's SOFCs use an electrochemical, non-combustion process to generate clean, highly efficient power on-site from biogas, natural gas, renewable natural gas, or renewable hydrogen, or blends of these fuels. With over 300 issued technology patents and nearly 1000 installations worldwide, Bloom Energy is a leader in dependable, clean energy generation and resiliency.

Bloom Energy's modular design, high efficiency, and ability to utilize biogas without the significant upgrading required for pipeline injection, allows for smaller and remotely located biogas projects to make the most efficient use of this valuable form of renewable energy, producing more electricity for equivalent volumes of biogas than other available technologies. Its electrochemical process produces far fewer criteria pollutants than competing technologies that rely on combustion. Our SOFCs also require virtually no water during operation, mitigating water supply concerns in many areas across the country.

As you consider comments on this round of rulemaking, Bloom Energy would like to offer the following comments in support of the program's objectives and guiding principles to achieve California's methane reduction targets and meet the needs of the transportation energy demand of the future.

**Carbon Intensity**

Bloom Energy commends CARB on the success of the LCFS program in growing low carbon fuels and stimulating low carbon innovation. Furthermore, Bloom Energy also commends CARB on building on the success to accelerate decarbonization of California's transportation sector by targeting a 30% Carbon Intensity ("CI") reduction by 2030. However, we recommend a more progressive carbon intensity (CI) reduction to 40%, which would be more in line with the emissions reductions necessary to reach near-term benchmarks. As proposed by CARB in the February 2023 workshop presentation, Bloom Energy agrees that a near-term step-down in compliance target stringency would ensure a steady price signal for credits in the market to support ongoing investment.

### **Avoided Methane Crediting**

Bloom Energy does not support the proposal to phase out avoided emission credits. Biogas to electricity projects through scalable, efficient, non-combustion technologies provide valuable benefits in eliminating methane emissions and generating reliable clean, firm, renewable electricity. Methane emissions are a significant cause of climate change. Phasing out avoided methane credits would have the unintended consequence of leaving remote and/or smaller farms or digesters undeveloped, a stranded resource emitting methane. These smaller/remote farms or digesters are not biomethane project candidates due to their size and proximity to pipelines for injection.

A highly efficient, non-combustion and modular electricity generation technology meets the needs of these small/remote farms and developing biogas to electricity projects in these locations would deliver valuable methane reductions and valuable clean, firm electricity that can be delivered to meet transportation energy demand around the clock. Avoided methane credits are critical to leveraging these resources and developing such projects.

### **Consideration for total environmental impact**

Furthermore, and related to electricity generation, Bloom Energy encourages CARB to reward market participants in the LCFS Program for achieving environmental results beyond carbon reductions, as part of its CI scoring calculation. Reductions, including criteria air pollutant emission reductions and water use reductions warrant consideration as part of the calculation methodology. Calculations of the economic and health benefits associated with reducing NOx and PM emissions have been found to exceed the economic and health benefits of reducing GHG emissions on a per ton basis<sup>1</sup>.

A regular cadence of newly released studies continues to indicate that local combustion related air pollutants have far more serious and harmful consequences to human health and the environment than previously understood, including recent findings that:

- Combustion related air pollution may be as harmful to your lungs as smoking cigarettes<sup>2</sup>;
- Combustion related air pollution increases preterm birth risk<sup>3</sup>;
- Particulate matter is the largest environmental health risk factor in the nation, and the resulting health impacts are borne disproportionately by disadvantaged communities<sup>4</sup>;

The following is just one illustrative example of how CARB can incent local air pollution reduction from varying means of addressing biogas. While a non-combustion fuel cell would produce only 0.00043 grams/mmBtu of

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<sup>1</sup> 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/publications/detail/how-states-can-value-pollution-reductions-from-distributed-energy-resources>

<sup>2</sup> 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>

<sup>3</sup> 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://pubmed.ncbi.nlm.nih.gov/31547235/>

<sup>4</sup> 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>

SOx, combustion-based electricity generation would produce 0.27 grams/mmBtu of SOx. With respect to NOx, a non-combustion fuel cell would produce 0.44 grams/mmBtu, and biogas combustion-based electricity generation would produce 385 grams/mmBtu. Using those emissions factors for an illustrative biogas-to-electricity project with 58,000 mmBtu of available biogas and inputting the corresponding emissions into EPA's Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA)<sup>5</sup> results in \$1.3 to \$3M of air quality driven health benefits for non-combustion fuel cell over combustion-based generation or flaring. The midpoint of this range (\$2.4M) effectively translates to ~\$38 / mmBtu of health benefits for this illustrative project.

In consideration of these significant benefits, Bloom strongly encourages CARB to include a mechanism that appropriately considers criteria air pollutant emission and water use reductions in CI scoring for electrical generation from biogas and natural gas, across all pathways.

### **Book and Claim changes**

Bloom Energy is strong believer in a level playing field for pathways that rely on the same feedstock under the LCFS program. Biogas to electricity generation projects have been limited to the WECC region, consistent with California's RPS. Bloom Energy is encouraged by CARB's desire to align the biogas to biomethane pathway with RPS and CPUC 1440 program (CPUC section 651(b)(3)), starting in 2028. However, Bloom urges CARB to (a) treat the biogas to hydrogen pathway the same way; and (b) give all three pathways the same sunset date for a national Book and Claim. Bloom Energy understands this means expanding the eligible regions for biogas to electricity beyond WECC for a period of time, but this change is necessary to ensure a level playing field.

Additionally, Bloom recommends that CARB update the LCFS rules for biogas to electricity pathways to allow for electricity generation and biomethane production that are not co-located. Specifically, where electricity generation is used for EV charging at the same site, allow the project to utilize directed biomethane (from a biogas source) as a power generation fuel provided that the biogas source is located within the same eligible region as a co-located biogas to electricity would be. This additional flexibility would allow many more biogas to electricity projects to participate and would provide for greater deployment of biomethane-fueled microgrids at EV charging stations. Of course, this would also serve as a solution to the significant grid capacity issues associated with large scale deployment of charging infrastructure across the State.

Bloom Energy appreciates the opportunity to offer its comments on the proposals from the workshop. We look forward to working together with CARB and all stakeholders to continue the success of the LCFS program.

Sincerely,

/S/

Marisa Blackshire  
Sr Director, Environmental Compliance and Health & Safety

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<sup>5</sup> <https://www.epa.gov/cobra>