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Bloom Energy Comments on the Draft 2018 IEPR Update, Volume II

Additional submitted attachment is included below.

Bloomenergy

November 1, 2018

Chair Robert Weisenmiller
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Comments on the Draft 2018 IEPR Update, Volume II

Dear Chair Weisenmiller,

Bloom Energy[1] (Bloom) appreciates the opportunity to provide these comments on the Draft 2018 Integrated Energy Policy Report (IEPR) Update, Volume II. We value the California Energy Commission's ("Commission") leadership with the IEPR to provide "policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety."[2] Highly efficient, non-combustion fuel cells can help the Commission meet these ambitious and laudable goals.

Summary of Recommendations

Non-combustion fuel cells provide multiple air quality, resiliency, GHG reduction, and flexibility benefits. To realize these opportunities, Bloom suggests the following additions to the current IEPR draft:

1. Establish fuel cells as eligible for new and existing incentive programs that utilize renewable gas for building decarbonization.
2. Include fuel cells with storage as the preferred generation resource to power ZEV charging as proposed by IEPR.
3. Prioritize fuel cells over dirtier, less-efficient technologies—such as diesel generators—during de-energization and other emergency events.
4. Underscore how fuel cells deployed in microgrids are a perfect complement to intermittent renewables, such as solar and wind.

Bloom's subsequent comments will focus on specific areas where the current draft can be updated to achieve these outcomes.

[1] Bloom Energy develops on-site distributed generation using innovative fuel cell energy technology that utilizes natural gas or biogas. Our unique on-site power generation systems utilize an innovative new fuel cell energy technology with roots in NASA's Mars program. Derived from a common sand-like powder, and leveraging breakthrough advances in materials science, our technology is able to produce clean, reliable, affordable energy, practically anywhere, from a wide range of renewable energy sources or traditional fuels. Our Energy Servers® are among the most efficient energy generators on the planet; providing for significantly reduced electricity costs and dramatically reduced greenhouse gas emissions. By generating power on-site, where it is consumed, Bloom Energy offers increased electrical reliability and improved energy security, providing a clear path to energy independence.

[2] Public Resources Code §25301(a)).

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Chapter 1: Building Decarbonization

Recommendation: To decarbonize buildings across the state, new and existing CEC incentive programs should take a technology-neutral approach that allows non-combustion fuel cells that use renewable gas to be eligible.

Bloom Energy strongly agrees with the Commission that “Renewable gas can be part of the solution to reducing GHG emissions from buildings, but the role is likely to be constrained by limitations on renewable gas availability, cost, and ongoing methane leakage concerns.”[3] Non-combustion fuel cells running on renewable gas generate net carbon zero electricity—providing distributed, baseload power that helps California meet SB 100’s ambitious goals. As a distributed energy resource, fuel cells can be located at the methane source, whether a waste water treatment plant, agricultural location, municipal solid waste facility, or landfill. Because of their high efficiencies, fuel cells can generate more renewable electricity from the limited sources of renewable gas. Additionally, fuel cells provide substantial air quality benefits. For example, Bloom fuel cells virtually eliminate emissions of criteria air pollutants including NOx, SOx, CO, VOCs, and particulate matter that are associated with traditional combustion and diesel back-up configurations while providing onsite power 24x7x365. The result is a significantly lower air emissions profile as compared to combustion-based distributed or central station power generation—reducing localized impacts in disadvantaged and vulnerable communities.

Fuel cells are an excellent technology to aid the state in reaching its building decarbonization goals. Market distortions in the renewable gas sector, however, currently prevent the state from realizing these benefits. As a recent report by the California Council on Science and Technology concluded: “The current value of the Federal and State incentives far exceeds the market value of the biomethane. **Financial incentives through the California Low Carbon Fuel Standard (LCFS) and the Federal Renewable Fuel Standard (RFS) programs can be a factor of up to 18 times greater than the commodity value of the biomethane itself** [emphasis added].”[4] This market distortion makes it uneconomical for non-transportation end users, such as building owners and operators looking to install non-combustion, electricity generating fuel cells, to source California renewable gas for their projects. In sum, the RFS and LCFS have skewed the renewable gas market toward pipeline injection for transportation use, leading to renewable gas utilization by higher emission combustion technologies that contribute to California’s air quality challenges.

Given this reality, we applaud the Commission for highlighting that “Financial incentives specific to renewable gas use in buildings do not exist in California at this time.”[5] Senate Bill 1477 provides an excellent opportunity to address a portion of the current renewable gas market distortions by directing California Public Utilities Commission (CPUC) and the Commission to create upstream and downstream incentive programs that would use $50 million from gas corporation cap-and-trade revenue annually to ease installation of GHG emission reduction technologies in

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[3] Page 18.
[4] https://ccst.us/publications/2018/2018biomethane.pdf, pg 79
[5] Page 31.

buildings. Given their multiple benefits, the most electrically efficient, non-combustion technologies like fuel cells that use renewable gas should be eligible for this incentive program.

Chapter 3: Increasing flexibility to incorporate renewables

Recommendation: The IEPR should explicitly include the benefits of incorporating fuel cells with storage and the benefits of fuel cells to generate electricity for ZEV charging.

The current IEPR draft discusses the flexibility benefits of pairing storage with natural gas-fired generation.[6] Non-combustion fuel cells—which are a cleaner and more efficient generation technology than natural gas fired power plants—can also be paired with storage to facilitate peak shaving and load shifting.

Bloom supports the state's goal to electrify the transportation sector and Governor Brown's executive order to deploy five million ZEVs by 2030. Stationary, non-combustion fuel cells can be a key resource to efficiently generate the 1 gigawatt of power that the Commission forecasts will be demanded by these ZEVs during peak commute times by 2025.[7] In addition to virtually eliminating criteria air pollutants, Bloom fuel cells natively produce DC power which can be used to directly charge the DC batteries of EVs, which helps reduce efficiency losses during ZEV charging.

As fuel cells can be pivotal to helping achieve the state's EV charging and renewable energy goals, they should be listed as a preferred technology for ZEV charging as defined in the IEPR.

Chapter 5: Climate Adaptation and Resiliency

Recommendations:

- Fuel cells should be prioritized over dirtier, less-efficient technologies—such as diesel generators—during de-energization and other emergency events.
- Fuel cells should be explicitly mentioned as an ideal component of microgrids that perfectly complement intermittent renewables, such as solar and wind.

The current IEPR draft encourages the installation of backup generators while simultaneously acknowledging that "generators are also powered by carbon-intensive fuels like diesel, leading to considering lower GHG-emitting alternatives."[8] Non-combustion fuel cells can provide both primary and back-up power, with virtually no criteria air pollutants and lower GHG emissions, more efficiently than other stationary electricity generating technologies—see Figures 1 and 2. Bloom fuel cells are being installed at data centers, hospitals, telecom facilities, and at other sites in California and, because these systems can island from the grid during grid outages, can obviate the need for back-up generators. As such, they should be prioritized in the IEPR.

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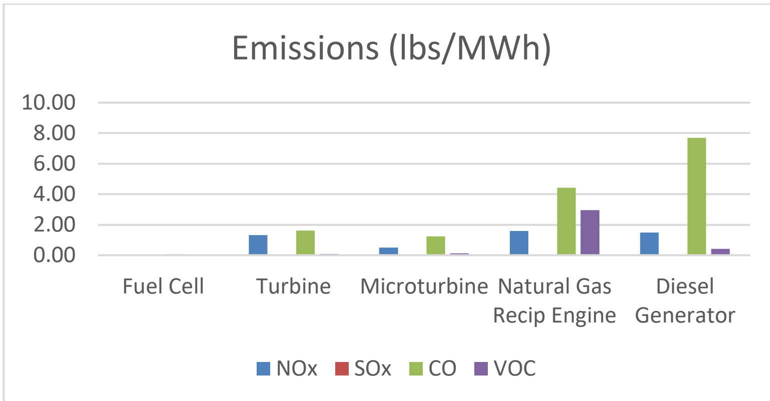
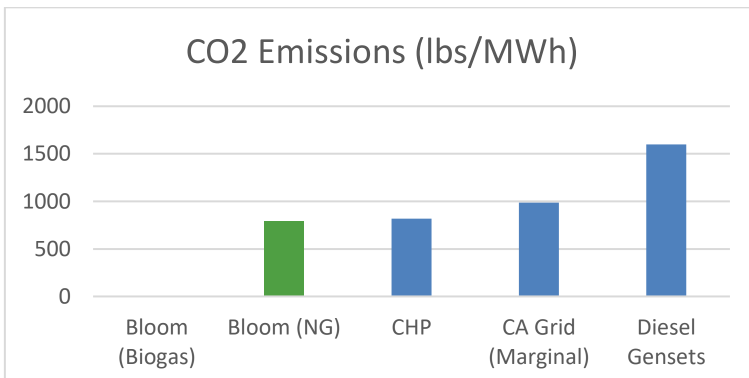
[6] Page 101.
[7] Page 108.
[8] Page 169.

Figure 1



[9]

Figure 2



[10]

Relatedly, the current draft extolls the virtues of microgrids and distributed energy resources in helping vulnerable communities adapt to climate change, including high wind events that require utilities to cut off energy and more extreme wildfires that

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[9] See Appendix A for Sources.

[10] "Bloom Energy Server ES5-300kW," Bloom Energy, https://bloomenergy.com/datasheets/energy-server-es5-300kw; "Combined Heat and Power Catalog: CHP Program," New York State Energy Research and Development Authority, https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt0000005wxi5EAA; EPA eGRID: https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid; "Catalogue of CHP Technologies" https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_2._technology_characterization_-_reciprocating_internal_combustion_engines.pdf.

threaten grid infrastructure.[11] The draft profiles solar and storage as a solution to these challenges. Fuel cells have been overlooked in this context, as fuel cells can operate indefinitely and are not limited by storage capacity. Fuel cells serve as the always-on backbone for microgrids that integrate numerous distributed energy resources such as solar, wind, and batteries at large scale which can operate indefinitely, providing truly resilient power. With fuel cells, these microgrids are flexible: functioning as a standalone electrical grid that can connect and interacts with the utility grid. Additionally, undergrounded gas supply lines reduce vulnerability to accidents caused by high-wind events, such as trees falling on power lines, as compared to traditional grid infrastructure. Bloom encourages the Commission to give these benefits equal treatment in the IEPR.

Conclusion

We thank the Commission for the opportunity to provide feedback and reiterate that highly efficient, non-combustion fuel cells should be an integral component of the Commission’s continuing efforts to chart a resilient, prosperous, sustainable, and equitable energy future for all Californians.

Respectfully,

Erin Grizard
Senior Director, Regulatory and Government Affairs

Sam Schabacker
Policy Manager

Appendix A: Criteria Air Pollution Sources

Fuel Cells: https://bloomenergy.com/datasheets/energy-server-es5-300kw
Turbine: NOX: https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_1._introduction.pdf, pg 1-6; VOC and CO: https://www.energy.gov/sites/prod/files/2016/09/f33/CHP-Gas%20Turbine.pdf, pg 4
Microturbine: https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_1._introduction.pdf, pg 1-6; CO and NOX: https://www.energy.gov/sites/prod/files/2016/09/f33/CHP-Microturbines_0.pdf, pg 4
Recip Engine: NOx low level: https://www.epa.gov/sites/production/files/2015-07/documents/catalog_of_chp_technologies_section_1._introduction.pdf, page 1-6; Nox high level: https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt0000005wxi5EAA, page 451; VOC and CO: https://www.energy.gov/sites/prod/files/2016/09/f33/CHP-Recip%20Engines.pdf, pg 4
Diesel Gensets: Emissions factors from NSPS standards and AP-42 for 2014 or later diesel genset >751 HP: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwjFl5mLl-3dAhXdFjQIHVNqCtwQFjAAegQIChAC&url=https%3A%2F%2Fwww.epa.gov%2Fsites%2Fproduction%2Ffiles%2F2016-07%2Fengines_ci_pte_calculator_version_1.0_0.xlsx&usg=AOvVaw0vJz3y-losGperFpB9EGpD