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Bloom Energy Comments on Draft IEPR

Additional submitted attachment is included below.

Bloomenergy

November 13, 2017

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

Re: Draft Integrated Energy Policy Report (IEPR)

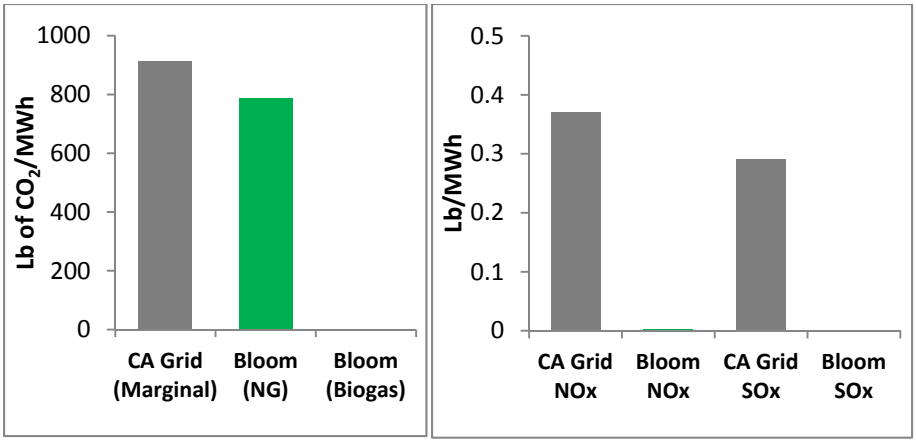
Dear Chair Weisenmiller,

Bloom Energy (Bloom) appreciates the opportunity to provide these comments on the Draft IEPR. We focus our comments below on Chapter 4 regarding distributed energy resources on the grid and Chapter 9 regarding renewable gas.

Chapter 4: Accelerating the Use of Distributed Energy Resources on the California Grid

All-electric fuel cells are a unique clean distributed electricity resource and should be included in the Commission's consideration of policies to spur the deployment of distributed energy resources. Bloom is a provider of a breakthrough all-electric solid oxide fuel cell technology that produces reliable power using a highly resilient and environmentally superior non-combustion process that converts methane to electricity with the highest commercially available electrical efficiency. Bloom's fuel cells are fuel flexible and can operate on either natural gas or renewable gas. The fuel cells can operate using pipeline-injected renewable gas or directly at the location where the renewable gas is generated. In addition, our all-electric solution allows fuel cell systems to be deployed at sites where it is not necessary to match an on-site thermal load thereby expanding the opportunities available to address energy needs with clean, reliable distributed generation. With more than 180 MW installed across over 420 sites in California, Bloom has a proven technology with a strong track record of providing cost competitive, clean, reliable energy solutions.

By virtue of the non-combustion electrochemical conversion process, Bloom Energy Servers virtually eliminate emissions of air pollutants that are associated with combustion. The result is a significantly lower air emissions profile as compared to combustion-based distributed or central station power generation. Importantly, on any fuel source, Bloom Energy Servers reduce CO_2 emissions compared to the grid. Bloom's CO_2 emissions per MWh are about 20% lower than the California marginal emissions rate when run on natural gas and are zero emission on RNG. These environmental benefits combined with high electrical efficiency and energy density make Bloom Energy Servers ideally suited to meet the energy needs of commercial and industrial customers across the State.



Bloom supports the Commission's recommendations for continued development of a microgrid roadmap to enable increased deployment of these integrated energy systems across the state. We agree with the working definition cited in the IEPR, that is: *"a small, self-contained electricity system with the ability to manage critical customer resources, provide services for the utility grid operator, disconnect from the grid when the need arises, and provide the customer and utility different levels of critical support when the need exists".*[1] This attribute-based definition provides technology providers and their customers with maximum flexibility to design and customize a system that matches their specific energy needs. As can be seen from the examples in Table 11, microgrids can vary in the number and type of technologies incorporated into the integrated system.[2] The roadmap should serve the purpose of investigating and overcoming barriers to deploying multiple technologies at one location in an integrated and critical load-serving fashion rather than pre-determining what combination of technologies constitutes a microgrid.

Chapter 9: Renewable Gas

Bloom strongly supports the State's efforts to capture methane from waste stream sources and make it available as a renewable fuel. The need to capture methane from all available sources is a critical issue as the State seeks solutions to climate change. Our comments on Chapter 9 speak to specific provisions in the "On-site or grid connected electricity generation," "Economic assessment of renewable gas end uses," and Recommendations sections.

On-site or grid connected electricity generation

"Fuel cells are another more electrically efficient alternative to gas combustion electricity generation technologies, producing zero air emissions and having a quick start-up. Fuel cells can be more capital cost-intensive, though, and are less tolerant to biogas contaminants, requiring higher quality gas cleaning."[3]

[1] Draft IEPR, Chapter 4, page 132.
[2] Draft IEPR, Chapter 4, page 133.
[3] Draft IEPR, Chapter 9, page 273.

Bloom appreciates staff's inclusion of fuel cells as a class of technology that is able to efficiently generate electricity from renewable gas with negligible air pollution impact. While it is true that fuel cells are less tolerant to biogas contaminants than combustion technologies, they are able operate with a significant percentage of CO_2 in the fuel. Pretreatment of the fuel to remove contaminants other than CO_2 can be done at a fraction of the cost of upgrading biogas for pipeline injection which requires very low CO_2 levels. This coupled with the fact that fuel cells emit near zero short-term and criteria pollutants make them a promising non-combustion technology for biogas to energy conversion directly where biogas is produced (e.g. at a dairy, landfill, or wastewater treatment plant). These simultaneous benefits are especially relevant as the Air Resources Board and local air districts work to address air quality challenges in local communities.

Economic Assessment of Renewable Gas End Uses

"A proposed strategy is to produce both electricity and fuel, hedging the long-term certainty benefits of electricity generation against the more volatile high-revenue potential of fuel production. However, as discussed in Chapter 1, "Changes in Electricity Market Structure," long-term contracts are not available in the electricity sector, except when required of utilities such as under the BioMAT program."[4]

Bloom agrees that long-term electricity generation contracts support project financing and that a successful strategy for project development should include offtake contracts in the electricity and transportation fuel markets. It is important to note that renewable gas contracts for electricity generation can be for either onsite electricity generation or pipeline renewable gas contracts (for electricity generation end use at another location) and both types of contract can be structured as long term offtake agreements. Longer term, fixed price agreements (10-20 years) provide a predictable base of revenue that will aid in the ability of renewable gas projects to be financed. Therefore, electricity generation should not be seen as competitive with transportation end use, but rather a long-term market that allows renewable gas developers to diversify their portfolio with multiple end uses from the same renewable gas project to enable project development.

Bloom strongly disagrees with the suggestion that long-term contracts are not available in the electricity sector. To the contrary, Bloom's customers regularly sign long-term contracts for fuel to supply their fuel cells. It is important to understand that an offtake agreement for renewable gas to be used in electricity generation does not strictly mean an onsite generation resource is contracted with the utility (e.g. BioMAT), and equally important to not think of "pipeline renewable gas" as interchangeable with "transportation market".

To the first point, facilities such as food processing plants have a substantial electric and gas load that can be self-sustained using their own waste. Biogas generated from plant waste can address three uses without the need for a utility contract. (a) pre-upgraded biogas can feed fuel cells to generate electricity for facility electric loads, (b) pre-upgraded biogas can directly feed facility gas loads (typically furnaces,

[4] Draft IEPR, Chapter 9, page 279.

boilers and heaters), and (c) any unused biogas can be further upgraded and injected into the pipeline directed to the pipeline renewable gas market.

With respect to pipeline renewable gas meaning more than the transportation market, Bloom has over 20 MW installed in California generating electricity at customer sites using pipeline renewable gas. Despite continued customer demand, our ability to grow this portfolio of ultra-clean projects has been stunted by limited availability of in-state renewable gas. These customers are typically commercial and industrial companies who are interested in reliable, renewable power at their locations. These types of third party electricity generation customers are ideal for a renewable gas project developer who has incurred the cost of gas cleanup and pipeline interconnection. A long-term contract for pipeline renewable gas to be used in electricity generation provides a predictable base of revenue in order to hedge against transportation market uncertainty, but does not require the developer to incur additional cost for onsite electricity generation technology, permitting, or maintenance.

Given this evidence, Bloom requests that serious consideration be given to the paradigm of hedging long-term electricity contracts against the more volatile transportation market in the Commission's policy recommendations. For successful and sustainable renewable gas projects to be realized, policies need to allow and encourage multiple end uses for the gas supply.

Recommendations

- ***Focus on near-term opportunities that maximize GHG emissions reduction benefits***

"State funding agencies… should focus on cost-effective strategies to develop markets for renewable gas. This 2017 IEPR has revealed that renewable gas produced from anaerobic digestion used as a transportation fuel in near-zero emission, heavy-duty vehicles is the most likely near-term solution."[5]

Bloom continues to recommend that the Commission develop a roadmap that will help guide policy development for robust and efficient renewable gas use across multiple sectors.[6] Different sectors may have more than one opportunity for renewable gas end use. For example manufacturing might use renewable gas for CNG/LNG vehicle fuel, heat/steam production, and onsite electricity generation. This holistic sector-based view will allow for a multi-faceted solution to achieve short-lived climate pollutant reductions by sector and considering end use options as complementary solutions to the overall challenge rather than viewing each potential end use as competing with the others.

For example, clean onsite distributed generation resources that provide reliable primary power such as all-electric fuel cells can replace banks of diesel generators that building occupants currently use for back-up power thereby realizing both GHG and air pollutant benefits. Bloom has several data center customers that use our high reliability all-electric fuel cell systems as primary power resulting in significant local benefits of reducing the environmental and health impacts of criteria pollutant and

[5] Draft IEPR, Chapter 9, page 292.

[6] See also, Bloom Energy comments on IEPR Renewable Natural Gas workshop, July14, 2017

black carbon emissions associated with these back-up resources. This is an emissions source that is difficult to address in any other way. If the IEPR were to primarily encourage transportation as an end use for renewable gas, it would limit innovative, and in some cases environmentally superior, technology applications and miss out on significant environmental benefits in other areas.

At the very least, we reiterate our request above that near-term strategies consider the positive impact that a long term offtake contract for renewable gas for electricity generation provides. With this flexibility, sectors of the economy beyond the transportation sector will be able to solve some of their most pressing emissions challenges while supporting a robust supply for the transportation market at the same time.

- ***Continue the Low Carbon Fuel Standard (LCFS)***

Bloom supports continuing the LCFS as an important policy driver for developing a robust renewable gas market. We strongly support staff's recommendation for CARB to consider a pathway for renewable gas to electric vehicle charging under the LCFS. As an efficient non-combustion technology, fuel cells are the ideal solution to provide renewable and air pollution-free electricity from renewable gas for electric vehicle charging.

- ***Use a common feedstock collection, procurement, and supply framework***

The proposed interagency team for monitoring a state-wide feedstock inventory should also be tasked with developing a consistent methodology to estimate the energy yield from a given input of waste and an understanding of what scale of project is needed to develop a project and inject into the pipeline (e.g. approximate number of cows, annual tons of waste, or MMBtu/day). Understanding that there will be some variability, a consistent framework to consider these concepts developed by subject matter experts will facilitate communication between project developers, financiers, and offtake customers.

- ***Prioritize disadvantaged communities***

Bloom strongly supports prioritizing engagement with local governments and environmental justice groups in disadvantaged communities to consider local air quality impacts and to develop aggressive air quality standards so that renewable gas projects help to solve local air quality challenges.

- ***Implement policies to build commercial markets for renewable gas***

It is critical to the overall expansion of the market to identify and overcome barriers to pipeline interconnection and injection. Transport of renewable gas through the common carrier pipeline system will make this renewable resource accessible to a broad geography and wide array of consumers, therefore Bloom supports the recommendation that the CPUC continue efforts to implement dairy renewable gas pilot projects. Bloom also supports the recommendation that the CPUC should continue to evaluate ways to facilitate increased renewable gas use. One such way is to assess lessons learned from the interconnection pilot program that may be

transferred to address similar barriers to interconnection of renewable gas projects in other sectors (e.g. waste water treatment plants, landfills) to help spur a broader market. Additionally, we reiterate our point above that both onsite and pipeline renewable gas policies should be inclusive of diverse end uses to promote a robust supply and to capture maximal environmental benefits.

- ***Continue developing mechanisms for long-term market certainty for renewable gas***

As mentioned above, and cited by staff[7], longer term, fixed price agreements (10-20 years) represent a predictable base of revenue that will aid in the ability of renewable gas projects to be financed. Therefore, electricity generation, which can provide such contracts, should not be seen as competitive with transportation end use, but rather as a long-term market that allows renewable gas developers to diversify their portfolio with multiple end uses from the same renewable gas project to enable project development. This approach does not preclude policies that will help to reduce the uncertainty associated with California's LCFS (Low Carbon Fuel Standard) or the federal RFS (Renewable Fuel Standard) market credit prices; rather it provides an immediate remedy while these complementary policies are developed to further increase the attractiveness of projects to investors. Electricity generation fuel offtake agreements that can occur now and provide stability now make sense as part of the solution to encourage renewable gas project development.

- ***Minimize flaring of landfill gas***

Minimization of landfill gas flaring is a common sense measure to both reduce GHG emissions as well as air pollutants, including NOx and particulate matter. Bloom supports this recommendation, but urges the State to develop policies that provide landfill operators flexibility and diversity in end uses of landfill gas rather than strictly supporting transportation uses. As mentioned in our comments above, long term electricity contracts for either onsite generation or directed renewable gas use through the common carrier pipeline system can be used to provide a predictable base of revenue for a renewable gas project that can enable financing and spur development.

Along with stricter GHG emission standards, CARB should consider emissions of criteria air pollutants and the availability of technologies that emit near-zero levels of criteria pollutants, such as fuel cells and others in the CARB Distributed Generation Certification Program. Requiring use of these technologies for electricity generation, which go beyond air district standards, would allow for the use of renewable gas for electricity generation while providing a solution to air quality challenges.

- ***Consider lessons learned from BioMAT***

Bloom supports the recommendation to evaluate the BioMAT program to garner lessons learned that may help in future program improvements and design and as a way to assess remaining barriers to utility contracted electricity generation using renewable gas. One potential improvement in this or any similar framework moving

[7] Draft IEPR, Chapter 9, page 279.

forward is to include electricity generated from landfill gas as an eligible category. Given that landfills are the second largest sector source of methane emissions in Calfornia[8], such a policy would complement current efforts to divert organic waste and to minimize flaring of landfill gas.

- ***Re-examine the status of renewable gas in IEPR in 4 years***

Bloom supports ongoing examination of the renewable gas market and associated policies. We recommend that evaluation should occur at least every two years because, as evidenced by the various agency proceedings currently underway, the market is rapidly developing. This higher frequency of evaluation will ensure that any needed course corrections can be made and innovative technologies and business models can be incorporated into future strategies.

Bloom thanks the Commission for focusing on these important topics in the 2017 IEPR and looks forward to continued engagement as the State moves forward on strategies to accelerate distributed energy resource deployment and to develop the renewable gas market to meet its clean energy goals.

Respectfully,

Erin Grizard
Senior Director, Regulatory and Government Affairs

[8] Draft IEPR, Chapter 9, page 256.