Bloomenergy

January 17, 2017

Chair Mary Nichols
Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Short-Lived Climate Pollutant Reduction Strategy

Dear Chair Nichols,

Bloom Energy appreciates the opportunity to provide comments on the Revised Proposed Short-Lived Climate Pollutant (SLCP) Reduction Strategy released in November 2016. We support the Air Resource Board's (ARB) focus on SLCP emissions reductions, and appreciate the variety of approaches being considered including incentives, public and private investment and partnerships, systematic planning, and regulatory efforts.[1] We provide specific comments illustrating the ways in which all-electric fuel cells contribute to strategies to reduce methane and black carbon emissions in support of the ARB's goals. We recommend the following for consideration in the SLCP Reduction Strategy:

1. Consideration of broader policies that provide market signals to drive more biomethane supply at competitive rates rather than utility procurement mandates. Such policies could include competitive solicitations by the utilities; intervention to ensure interconnection (#2 below); aligning biogas rules across programs to create more market fluidity
2. Specific plans to enable biomethane source interconnection with the gas distribution system
3. Provide recognition that fuel cells occupy a unique position to replace firm generation, that today contributes to black carbon emissions, with a black carbon reducing technology
4. Consideration of specific pilot projects or programs that promote the use of biomethane in fuel cells to achieve the development of a sustainable renewable methane supply AND address criteria air pollution, including black carbon

All-electric fuel cells are a unique clean distributed electricity resource

Bloom Energy 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. Bloom's fuel cells are fuel flexible and can operate on either natural gas or biogas. 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 on-site distributed generation.

[1] "Revised Proposed Short-Lived Climate Pollutant Reduction Strategy," November 2016, page 61.

Bloom Energy Servers efficiently convert fuel into electricity through an electrochemical process without combustion. By virtue of the non-combustion process, Bloom Energy Servers virtually eliminate emissions of criteria air pollutants including NOx, SOx, CO, VOCs, and particulate matter (including black carbon) 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.

The high power density of Bloom Energy Servers leads to a small footprint required for the local generation of clean electricity, in turn resulting in reduced system-wide transmission losses. In addition, the fuel cells require only a small amount of water on start-up and consume no water during normal operation. They can help mitigate environmental impacts by displacing high water usage options with a clean and water-free alternative resulting in direct environmental benefits within local watersheds and reduced need within the energy sector to draw on California's increasingly limited supplies of water.

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 biogas.

Bloom supports developing a robust renewable methane supply

Bloom stands ready to further contribute to strategies aimed at achieving the State's ambitious climate and energy goals through the use of renewable fuels. Bloom's fuel cell technology is the most efficient at converting methane to electricity and is able to run on biogas produced from sources such as dairies, landfills, and wastewater treatment plants. As a reliable source of firm 24x7 power, Bloom can significantly contribute to overall reductions in methane emissions from these sources while providing a reliable power source to our customers.

Bloom has over 20 MW installed in California running on biogas, however increasing the number of these ultra-clean projects and expanding our positive environmental benefits has been stunted by limited availability of biogas. Therefore, we fully support the ARB's goal to explore options that will accelerate biogas projects and access to pipeline injection in order to make this an economical option available for our customers. All-electric fuel cells can currently run on biogas, so this represents an immediate benefit that may be realized if cost-effective and accessible renewable biogas supplies are made widely available. Bloom recommends consideration of policies other than utility procurement mandates to provide market signals to drive more biomethane supply at competitive rates. Such policies could include competitive solicitations by the utilities; intervention to ensure interconnection; aligning biogas rules across programs to create more market fluidity.

As a complement to other approaches in the SLCP Reduction Strategy to reduce methane through dairy manure management, support for integrating dairy manure as a renewable resource for methane-fueled technologies can be a significant source of

methane reductions.[2] Water treatment plants can be another source for renewable methane generation and capture that can be used to fuel ultra-clean electricity generation by fuel cells.[3] While the current thinking in the waste management sector is primarily focused on diversion of organics from landfills, a complementary strategy for reducing methane emissions is to capture and use landfill methane for electricity generation. Policies enabling all of these sources to contribute to a cost-effective and readily available state-wide renewable methane supply can allow technologies available today to provide immediate environmental benefits. Further, these policies should require the most efficient uses of biogas that maximize the co-benefits of GHG and criteria pollutant reductions.

Bloom strongly supports the ARB's efforts to capture methane from these waste stream sources and make it available as a fuel for electricity generation. As mentioned in the Strategy, in addition to encouraging onsite electricity generation at dairies, wastewater treatment plants, and landfills, it will be critical to the overall expansion of the market to overcome barriers to pipeline interconnection and injection.[4] Transport of biogas through the common carrier pipeline system will make this renewable resource accessible to a broader geography and wider array of consumers who are interested in generating reliable, renewable onsite power, but specific and targeted policies are needed to address this significant market barrier.

All-electric fuel cells provide reductions of black carbon from the power sector

We strongly agree with the ARB's encouraging the use of clean technologies in tandem with a robust renewable methane supply to generate electricity while simultaneously avoiding air quality impacts:

"Utilizing newer and clean technologies can help to overcome air quality permitting issues that have previously hindered project development. In particular, technologies or strategies that reduce or eliminate criteria pollutant and toxic emissions should be encouraged in both incentive and regulatory programs, particularly in areas with severe or extreme air pollution. For example, using ARB-certified distributed generation technologies, such as microturbines or fuel cells, can significantly cut NOx emissions compared to internal combustion engines."[5]

Bloom's all-electric fuel cells are a non-combustion technology which means that the air pollutant profile normally associated with the use of methane to generate electricity (i.e. combustion) is avoided while still providing a firm source of power generation. Increasing the air quality benefits beyond reductions in NOx mentioned above, all-electric fuel cells can also contribute to significant cuts in SOx, VOC, CO, and particulate matter (e.g. black carbon) emissions. Because of this, all-electric fuel cells should be recognized as a unique black carbon reducing technology and considered as part of the State's planning efforts to reduce the black carbon

[2] "Revised Proposed Short-Lived Climate Pollutant Reduction Strategy," November 2016, page 66.
[3] "Revised Proposed Short-Lived Climate Pollutant Reduction Strategy," November 2016, page 77.
[4] "Revised Proposed Short-Lived Climate Pollutant Reduction Strategy," November 2016, page 29.
[5] "Revised Proposed Short-Lived Climate Pollutant Reduction Strategy," November 2016, page 66.

emissions from stationary fuel combustion[6] in addition to being viewed as an innovative technology to use methane captured from renewable sources.

In addition, clean on-site 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. For example, Bloom has several data center customers that use our high reliability all-electric fuel cell systems as primary power resulting in avoided real estate and monetary investments that a fleet of diesel powered back-up generators would have required with the significant co-benefit of reducing the environmental and health impacts of criteria pollutant and black carbon emissions associated with these back-up resources.

All-electric fuel cells represent an innovative technology that provides both GHG and air pollutant benefits to address the ARB's goals for both methane and black carbon reduction. Bloom Energy thanks the ARB for its work on the Short-Lived Climate Pollutant Reduction Strategy and looks forward to further engagement as this strategy continues to be developed.

Respectfully,

Erin Grizard
Senior Director, Regulatory and Government Affairs

[6] "Revised Proposed Short-Lived Climate Pollutant Reduction Strategy," November 2016, page 51.