Bloomenergy

February 2nd, 2016

Robert Stein, Chairman
Connecticut Siting Council
10 Franklin Square
New Britian, CT 06051

RE: Response to Interrogatories (Petition NO. 1208)

Dear Chairman Stein,

Please find the attached response to interrogatories relating to Petition No. 1208, Manchester Sam's Club Bloom Energy Fuel Cell Project. Included is an original and fifteen copies.

Should you have any questions or concerns regarding the proposed Facility, please contact Rory Eblen at (516) 974-6824 or rory.eblen@bloomenergy.com

Respectfully,

Bloom Energy

Rory Eblen
Planning and Permitting Specialist

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
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VIA ELECTRONIC MAIL

January 15, 2016

Rory Eblen
Bloom Energy
Rory.eblen@bloomenergy.com

RE: **PETITION NO. 1208** – Bloom Energy Corporation, as an agent for Walmart Stores, Inc., petition for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, operation and maintenance of a Customer-Side 200-Kilowatt Fuel Cell Facility to be located at the Sam's Club store, 69 Pavillions Drive, Manchester, Connecticut.

Dear Mr. Eblen:

The Connecticut Siting Council (Council) requests your responses to the enclosed questions no later than January 25, 2015. To help expedite the Council's review, please file individual responses as soon as they are available.

Please forward an original and 15 copies to this office, as well as send a copy via electronic mail. In accordance with the State Solid Waste Management Plan and in accordance with Section 16-50j-12 of the Regulations of Connecticut State Agencies the Council is requesting that all filings be submitted on recyclable paper, primarily regular weight white office paper. Please avoid using heavy stock paper, colored paper, and metal or plastic binders and separators. Fewer copies of bulk material may be provided as appropriate.

Yours very truly,

Melanie Bachman
Acting Executive Director

MB/MP

c: Council Members
Amy Shanahan, Bloom Energy
Edwin Pho, Bloom Energy

Petition No. 1208
Bloom Energy
69 Pavilions Drive
Manchester, CT
Interrogatories

1. Would the proposed fuel cell shut down in the event of a power outage, and if so, does it have "black start" capability and the ability to automatically restart?

2. Would the fuel cell have an uninterruptible power module?

3. Would the fuel cell project comply with the Connecticut Department of Energy and Environmental Protection (DEEP) Noise regulations at the property boundaries?

4. Would the proposed fuel cell provide baseload or backup power (or both) for Sam's Club? Would any surplus power be sold to the grid?

5. Would any waste heat from the fuel cell be used for the building's internal use such as to provide or supplement domestic heating and/or hot water?

6. Would bollards be used to protect the fuel cell facility from being accidentally struck by vehicles?

7. What statutes and/or regulations govern fuel cell emissions for the proposed facility?

8. Provide a table showing state criteria thresholds and projected emissions from the proposed facility for all greenhouse gasses listed in the Regulations of Connecticut State Agencies Section 22a-174-1(49).

9. Provide information regarding available technologies to reduce greenhouse gas emissions from the proposed facility.

10. Could offsets be used to mitigate air emissions impacts from the facility?

11. Discuss other mitigation techniques that could be used to offset air emissions from the proposed facility e.g. planting trees. If planting trees is listed as an option, estimate the number and size of trees required.

12. Natural gas has sulfur dioxide injected as an odorant. Please submit a desulfurization plan narrative for the proposed fuel cell facility containing the following information:

    a) Chemical reaction overview concerning what substances are produced from the desulfurization process, as well as plans for their containment and transport;

    b) How much solid sulfur oxide would result from the desulfurization process, and methods and locations for containment, transport, and disposal;

    c) Whether any of these desulfurization substances are considered hazardous, and if so, plans for the containment, transport, and disposal of hazardous substances;

    d) Anticipated method of disposal for any other desulfurization substances; and

    e) Whether any gaseous substances resulting from desulfurization can be expected to vent from the fuel cells, as well as the applicable DEEP limits regarding discharge of these gasses.

Petition No. 1208
Walmart Stores, Inc.
69 Pavilions Drive
Manchester, CT
Interrogatories

Responses

1. The fuel cell, and more specifically the inverters within, are UL1741/IEEE1547 compliant and thus will not operate without a stable utility voltage available. In the event of an outage the fuel cells will not automatically shut down, they will enter a state of stand-by awaiting the return of a stable utility voltage. When in a state of complete shut down the Bloom fuel cells require a combination of remote and on-site coordination to start up the systems. This work is performed by Bloom employed, trained, and certified personnel only, the customer (Walmart) does not control the operation of the system directly.

2. This site will not have an uninterruptible power module (UPM) and thus will not have any means to output power in a grid independent capacity at any time.

3. Proposed site is considered in the category Class B Land Use: Retail Trade. The proposed equipment does not have any impulse, prominent discrete tones, or infrasonic and ultrasonic noise components, and therefore the property line threshold noise levels are set at 62 dBA. The distance to the site boundary from our system would be approximately 65ft. At that distance the expected noise level would be approximately 56dBA, well below the threshold for this category, so the installation would be in compliance.

4. Our system would provide base load and would not typically produce any surplus power for sale back to the grid.

5. Our system produces very little waste heat. Excess heat is reused internally to the system to improve overall system electrical efficiency. Any left over, low grade heat is exhausted out the top of the unit.

6. Yes. Bollards, both fixed and removable are used to protect the system from accidental vehicle impacts.

7. The emissions standards for this site are governed by LREC Sec. 16-244t.

8. Section 22a 174-1(49) references “greenhouse gases” or “CHGs” which is the aggregate of the following six component gases: carbon dioxide (CO2), methane (CH4), nitrous oxides (NOx), sulfur hexafluoride (SF6), any hydrofluorocarbon (HFC) or any perfluorocarbon (PFC) By the virtue of the non-combustion process the Bloom fuel cells virtually eliminate NOx, SOx, CO, VOCs and particulate matter emission from the energy production process. Similarly there are NO CH4, SF6, HFC or PFC emissions.

   Bloom emissions table is as follows:

Emission Type	Bloom Output	LREC allowance
Nitrous Oxides (NOx)	<0.01 lbs/MWh	0.07 lbs/MWh
Carbon Monoxide (CO)	<0.10 lbs/MWh	0.10 lbs/MWh
Sulfur Oxides (SOx)	Negligible	Not Listed
Volatile Organic Compounds (VOCs)	<0.02 lbs/MWh	0.02 lbs/MWh
Carbon Dioxide (CO2) See note 1	735-832 lbs/MWh	Not Listed

Note 1: Carbon Dioxide is measured at Bloom's stated lifetime efficiency level of 53-60%

9. Given the Bloom fuel cell emissions do not exceed the allowable amount for this project, research has not been done to reduce the gas emissions.

10. At this time research into offsets has not been completed by Bloom as the fuel cells meet the state criteria for emissions.

11. At this time research into mitigation techniques has not been completed by Bloom as the fuel cells meet the state criteria for emissions.

12. a. **Substances produced.** The first step in the production of electricity in the Bloom Energy server is desulfurization – the removal of the sulfur compounds, which have been added to the natural gas as an odorant by the natural gas suppliers. This step occurs in the desulfurization unit – a canister which contains a filter made for this purpose. Sulfur is not "produced" in this process, but is separated from the natural gas in which it was contained. In that process, trace levels of other compounds which are naturally present in the natural gas may also absorb to the filter. Again, these are not "produced" from the process, but are separated from the natural gas in which they were contained. The filter is made up inert materials.

Containment. The desulfurization process takes place entirely within desulfurization units. These are made of extruded aluminum or zinc-plated steel that are built to last for the life of the Server and beyond. Because they are built to hold natural gas, their structural integrity is essential. That integrity is assured by around the clock monitoring of the servers to detect any leak. Were there a leak, the Server (including the desulfurization operation) would shut down automatically. There has never been a leak from one of the desulfurization canisters.

The structural integrity and leak prevention continues after the desulfurization units are removed from service. At that point, the entry and exit points for the natural gas automatically seal shut. The desulfurization unit remains sealed and is not opened at the site, or anywhere in the State of Connecticut. In this respect, the Bloom system differs from other systems which may have been reviewed by the Sitting Council. Unlike the Bloom desulfurization units, other desulfurization containers are emptied at the site of the fuel cell. At that point, the integrity of the container is necessarily reduced and the applicable regulations change accordingly

Transportation. Within days that a desulfurization unit is taken out of service, it is picked up by a Bloom contractor and taken to a licensed facility outside the State, where the desulfurization unit is opened and the contents are removed. As described above, the desulfurization unit has complete structural integrity. Its safety as a container for transporting far more hazardous materials has been certified by the Department of Transportation. Specifically, the desulfurization units are certified to the standards set by DOT, the United Nations, IATA, ICAO

and IMO as meeting Hazardous Materials Distribution and Packaging requirements. This certification assures that the canisters are secure and have the structural integrity to transport the desulfurization materials safely and without risk of a release.

b. To the best of our knowledge, solid sulfur oxide is not produced in this process. At the time of canister replacement, the filter materials have essentially the same make up as when they were new. They also have adsorbed a small amount of sulfur odorants, which are filtered from the natural gas stream and accumulated in the sorbent, representing an estimated 0.3 wt.% of the filter materials. Even if there were an unknown or unanticipated generation of solid sulfur oxide as a breakdown product or otherwise, it would be a minute amount and, for the reasons described in the answer to question 1 above, would be fully contained during operation, removal and transportation.

c. The filter materials in the desulfurization units are all inert substances. None of them are hazardous materials. Adsorbed sulfur compounds do not pose a hazard either in the natural gas, or when the desulfurization units are removed. In addition to sulfur compounds, the filters adsorb trace amounts of benzene, other hydrocarbons and other naturally occurring components of natural gas. When the filter materials no longer provide fully efficient sulfur removal, Bloom removes the desulfurization unit and replaces it with another unit containing a fresh filter. As described in the response to question 12a above, the units seal automatically upon removal and are shipped within 1 week to a licensed facility in Texas. In removal and transportation of these desulfurization units, Bloom takes a number of additional safety measures. First, as described above, the units themselves are completely sealed, they are certified by the DOT as having sufficient structural integrity to be used for shipment of hazardous materials and hazardous wastes, and they are not opened until they reach Texas. Second, from the time they are removed from service until they are opened in Texas by trained personnel, an electronic record is maintained which documents, among other things, the date of removal from the Server, the anticipated and actual date of pick-up, the identity of the entity of the transporter, the date that shipment is expected and in fact arrives at the transfer facility in Texas, the date the unit is opened, the date the contents are removed and transported for reclamation and for disposition, the identity of the reclaimer or transporter and the date the unit arrived at its destination, and the ultimate disposition. These records are available for inspection by government inspectors. After the contents are removed from the desulfurization units, they are cleaned and re-used. The Texas facility is fully licensed, registered with the Texas Commission on Environmental Quality and serves as the waste generator. Once the units are opened, about 20% of the filter material, which contains copper, is sent for reclamation. The remainder is typically managed as a hazardous waste and shipped to a licensed hazardous waste disposal facility, in compliance with requirements applicable to such shipments.

d. All contents of the desulfurization units remain in the units until they arrive at the licensed facility in Texas and are managed as described above.

e. As described in the answer to 12b and 12c above, nothing in the desulfurization units – or from desulfurization – is expected to vent from the fuel cells. The desulfurization

materials are entirely contained in containers which are built not to leak or vent, are monitored to assure they do not, and have not leaked or vented.