20 Walnut Street, Suite 308, Wellesley, MA 02481
www.vanguardrenewables.com

December 28, 2016

VIA ELECTRONIC MAIL

The Massachusetts Department of Energy Resources
The Massachusetts Office of the Attorney General
Fitchburg Gas & Electric Light Company d/b/a Unitil ("Unitil")
Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid
NSTAR Electric Company and Western Massachusetts Electric Company d/b/a Eversource

RE: Comments on the development of an RFP for the competitive solicitation of bids to enter into cost-effective long-term contracts for clean energy generation pursuant to Section 83D

Dear Interested Parties:

Vanguard Renewables LLC ("VR") is an established privately-funded developer of farm-based anaerobic digesters ("AD") in the state of Massachusetts. There are two operational facilities in WMECO territory (Hadley & Deerfield) plus another in National Grid territory (Rutland) with an additional three sites in permitting – Greenfield (WMECO), Haverhill and Spencer (National Grid).

As a qualified Class I renewable portfolio standard eligible resource, AD is eligible to participate under the 83D RFP, however the pricing mechanisms and environmental benefits significantly differ both in nature and in quantitative impact to the state's GWSA and RPS goals from alternative forms of clean energy prioritized here. In addition, the scale at which AD would be implemented within the Commonwealth by this RFP is not near comparable to large scale systems like hydro and off-shore wind therefore cannot be evaluated in the same pool of projects. As such, Vanguard is proposing that in the Utility's efforts to form a clean energy RFP under 83D that it consider separating projects into pools (i.e. an 83D pool for large scale hydro/wind projects and 83A pool for AD and other smaller scale renewables) so all eligible Class I could be emphasized and evaluated on equal footing. It is understood by VR that the 83A RFP undertaken in 2015 did not result in any contracts for Eversource therefore an opportunity remains unfulfilled and re-opening the RFP to this class of renewables could be beneficial for many stakeholders.

On that note, VR is additionally most supportive of the initiatives to add environmental attributes to the valuation for all renewables (denoted under #3 & #4 within the Comment Request letter) which has encouraged us to further comment in favor of this effort. Being a small-scale industry, one of the greatest benefits of AD systems of any size is their impact on carbon reduction. An AD system producing 1MW of power is almost 40x more effective in displaced tons of CO_2 than

solar and at least 2x more effective than hydro, considering that AD is baseload power and uses greenhouse gas emitting waste as fuel for its generation. While hydro power could also be considered baseload, depending on the circumstances, it is not a waste-to-energy technology and potentially could have other harmful environmental impacts (not seen in AD facilities) that may offset environmental benefits from carbon reduction. However, the focus of our commentary below is solely to promote inclusion of the environmental attributes to the valuation of distributed generation so as to support a diversified portfolio of electric generating technology.

In summary, VR would like the opportunity to participate in a clean energy RFP program as an equal participant amongst its peers in order to provide the major carbon reduction and additional benefits from its unique closed-loop supply chain as discussed in detail below. We realize this is somewhat unorthodox in approach, but want to commend all in this effort and seek to enlarge the participant pool for the good of all in the Commonwealth.

Respectfully submitted,

/s/ William Jorgenson

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Enc: Comments & Attachment 1

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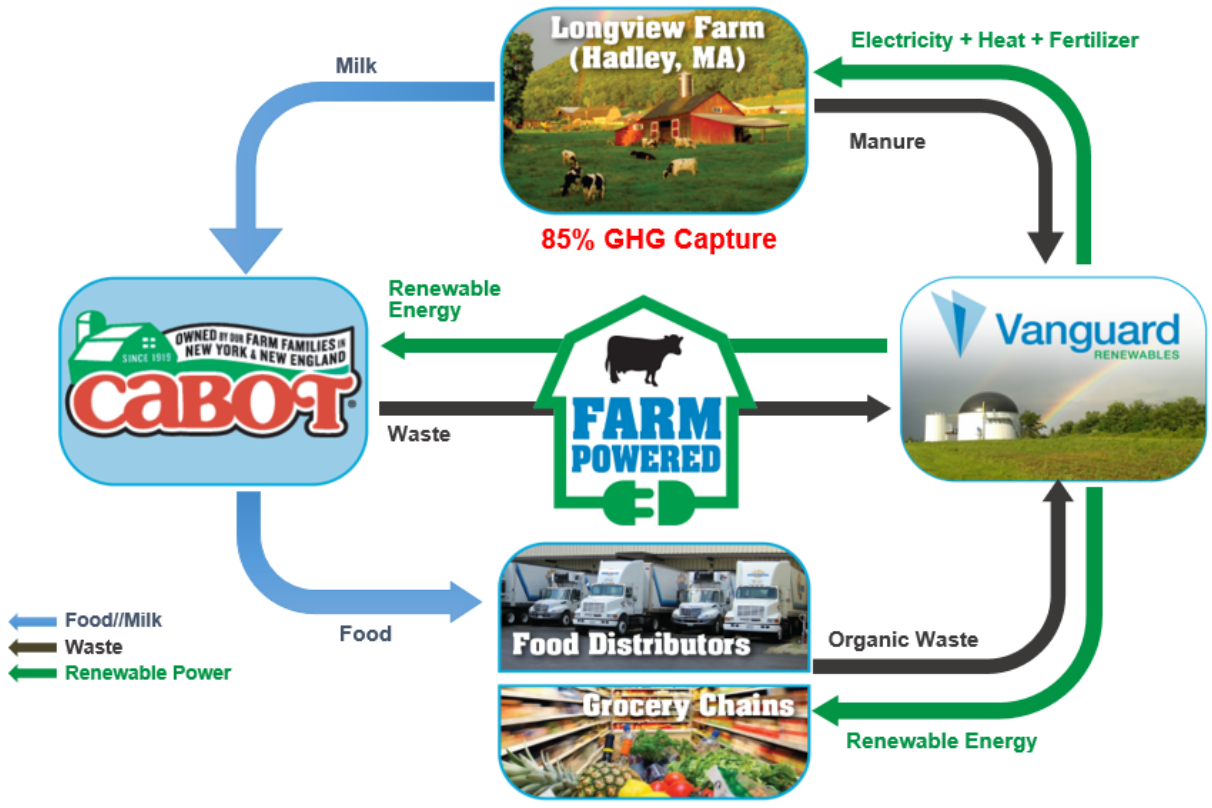
Background

In order to set the stage for commentary, it is critical to understand the background of farm-based AD which impacts local farms, the food industry and the community at large. AD uses both livestock manure and food waste from food processors and grocery stores (or other industry retailers) as the fuel to convert waste to energy. Farm-based digesters differ from other forms of AD in that the food inputs (e.g. raw milk/dairy) that come from the farm to the processor come back to the farm in the form of waste to generate renewable power, heat and fertilizer for the farm's crops (which are then used as silage for the milking herd). The following diagram presents the "closed-loop supply chain" and zero-waste benefits of this structure that enables a cycle of inputs and outputs to continually "feed" each stakeholder.



Integrating the farm and food community affects a multitude of stakeholders aside from the farm and includes food manufacturers (sustainable disposal outlets for organic waste), waste haulers (new business opportunities), state agencies (mandated Food Ban from landfills & GWSA goals) and communities (clean energy, more jobs). These societal contributions from a simple farm-based system vastly outweigh benefits produced by alternative forms of energy. With scale, the benefits can exponentially benefit society and become a more competitive form of energy.

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Energy/Environmental Related Goals – As put forth in Comment Request Letter

Carbon Reduction & 2020 GWSA Goals of the Commonwealth (25% reduction by 2020)

There are two categories of carbon reduction to be evaluated with respect to clean energy: 1) offset of use of fossil fuels 2) other societal environmental benefits associated with the generation technology. Farm-based AD offers solutions in both of these categories given the operational characteristics of incorporation with current agricultural practices. The agricultural industry is considered a major contributor to greenhouse gas ("GHG") emissions across the nation, therefore attention should be paid to energy projects in this sector for their environmental contributions.

Seeking to add accepted metrics to measure performance, VR has utilized both of the EPA's Greenhouse Gas Equivalencies Calculator[1] and also the WARM Tool[2] to begin to quantify the GHG reduction that occurs from farm-based AD projects which accepts both manure and food waste as fuel. These tools calculate the GHG impact based on feedstock inputs, system size (electricity/heat produced) and other attributes for all types of renewable technologies. A 1MW farm-based AD system vastly outnumbers its alternative energy counterparts with its ability to reduce harmful greenhouse gases. Greenhouse gas reduction in AD systems occurs in the following forms:

- Replacing conventional sources of electricity (fossil fuels) similar to other forms of clean energy
- Replacing conventional sources of heat on the farm (propane/oil) by using waste water off the engine to provide forced hot water heat to barns and homes on-site
- Capturing methane from livestock waste (methane is 25x more harmful than carbon)
- Capturing GHG emissions from food waste currently sent to landfills or compost
- Reducing need for chemical fertilizer which reduces carbon emissions from manufacturing and transportation of product

In addition to these, more or less, obvious carbon reduction attributes, other factors such as land use (less than solar and hydro systems), no harmful impacts to ecological systems or naturally occurring landscapes, baseload energy and higher capacity factors (typically 85%-96%). At this time, data is not available to value all of the carbon reducing benefits that these AD facilities provide however, with information available today and using the EPA calculators defined above, Vanguard has determined that a 1MW can reduce carbon emissions by 21,222 tons/MW versus 560 tons/MW for a solar and 2,600 tons/MW for an on-shore wind project.[3]

[1] https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
[2] https://www.epa.gov/warm/versions-waste-reduction-model-warm#WARM%20Tool%20V14
[3] Refer to Exhibit A for a summary of this information.

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1. *Carbon Monetized – fossil fuel offset*

   The Social Cost of Carbon is an estimate of the monetized damages to global society associated with an incremental increase in carbon emissions in a given year. It is intended to include changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change however it is believed to be an underestimation of the true value. Therefore, states like NY have proposed to use the higher of the SCC or the current REC value to assign a carbon monetization specifically for the fossil fuel offset of clean energy generation. This methodology may be refined over time as the market will eventually drive the valuation of carbon offsets, but given available information today, this has been viewed as the most economical beginning. This approach is in conjunction with a stack value approach (versus net metering) in order to value clean energy based on location and performance rather than load zone and net metering. Therefore, other pieces of the stack value attributes like capacity whereas net metering does not. This will have to be taken into account by the utility when analyzing RFP submittals.

2. *Carbon Monetized – other societal/environmental benefits using an example developed by Cornell University for farm-based AD*

   Cornell University performed a study of farm-based AD projects and the additional carbon reduction benefits that they produce. Using engineering calculations and typical values for ADs designed to reduce GHG emissions, the reduced carbon dioxide equivalent emissions (MT CO_2 eq.) can be determined both for the fossil fuels avoided and the GHG mitigated emissions by the application of ADs. Applying the undisputed EPA values for the social cost of carbon (SCC) to the total amount of GHG reduced can define the economic value (monetized carbon) of this aspect of AD technology. The typical scenario, as shown in the accompanying Cornell PRO-DAIRY document "Value of ADG Technology on New York State Dairy Farms" (Attachment 1), creates a combined value for E of $0.082/kWh. This value represents both CO_2 offsets and CO_2 equivalents destroyed and we submit should be included in the carbon valuation. Just as fossil fuels have been the supply for conventional electricity, manure and food waste is the supply for renewable electricity and should be valued in a similar fashion. Therefore, this additional value should be considered as part of the proposed tariff until this RFP as it benefits society as a whole from waste produced from society as a whole.

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Exhibit A:

PER 1MW	Farm-Based Anaerobic Digestion	Solar (PV)	Wind (On-Shore)	Small Hydro
Base Load Energy	Yes	No	No	Generally
Capacity Factor	88-92%	25%	40-45%	60%
Inputs	Manure & Food Waste	Intermittent sun	Intermittent wind	Water
Outputs	Electricity (or Natural Gas), Heat, Fertilizer, Increased Crop Yields	Electricity	Electricity	Electricity
Tons CO_2 Displaced	21,222	560	2,600	10,265
CO_2 Equivalent by # of Homes	2,000	53	245	967
Acreage Required	2	5	<1	<1
Pros	Converts waste to fuel, sustains farms, first responder capability.	Best for brownfields & areas with minimal seasonality.	Little acreage required.	Controlled output, storable energy.