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Subject: 2020 APS Minimum Standard Review Comment from Tufts University

Per 225 CMR 16.07(3) the Massachusetts Department of Energy Resources ("DOER") is required to complete a review of 225 CMR 16.00 Alternative Energy Portfolio Standard ("APS"), including a public comment period, no later than December 31, 2020.

The review must include, but is not limited to, an examination of the costs and benefits of the program to ratepayers, an examination of the effectiveness of the program in meeting the energy and environmental goals of the Commonwealth, and an evaluation of whether the Minimum Standard or its rate of increase, as established in 225 CMR 16.07(2), should be adjusted.

DOER has taken initial steps to conduct this review by commissioning an independent analysis and report of the APS program completed by **Daymark Energy, LLC ("Daymark Report")**. In order to **supplement the information from the Daymark Report, DOER is opening a public comment period as part of its 2020 APS Minimum Standard Review to seek feedback from stakeholders on the following questions. Tufts University response to those questions are included in blue text below:**

1. What are the benefits of the APS program to ratepayers, including but not limited to economic, environmental, and societal benefits?

For higher education the APS program supports business continuity, reliability, and resiliency initiatives that are often competing with other capital needs. It enables the introduction of renewable technologies that help these types of institutions begin to address their carbon neutrality and green house gas emissions reduction targets. This also enables a thoughtful dialogue with our business leaders and curriculum developers to understand the need for blending viable incentivized technologies together in order to meet out economic, environmental and societal commitments.

Tufts University pays a 3rd party organization to monetize the AEC's that are generated by their CHP. This service was procured through a competitive bidding process. It would be helpful to understand what the DOER and/or Daymark believe a fair market value for these monetization services should be. It would also be helpful to understand whether the DOER believes smaller organizations cannot bear the volatility created by oversupply and whether risk averse organizations like Tufts should be pursuing larger organization like suppliers to secure longer term fixed products.

The CHP supports a trigeneration process that creates steam, chilled water, and hot water from the waste heat produced by the plant equipment. The AEC payments are being used to study centralized and decentralized heat pump technologies that would be added to the AEC incentivized CHP network to further increase efficiency and reduce gas consumption.

Tufts has installed various types of heat pumps in their buildings that are fed by the electricity generated by their CHP. The CHP is used to generate the electricity that is needed to offset the power that is not being produced by on campus solar PV. The AEC's produced by the CHP

provided our finance team with an incentive to focus capital funds towards investing in and maintaining CHP efficiency. There are many strategic initiatives in the organization that compete for funds and the reduction in AEC value has skewed finances view on how the market now views maintaining or increasing CHP efficiency.

The Sustainability Office at Tufts also views that maximum CHP efficiency helps ensure we maintain and reduce our emissions centrally at the plant and through the power consumed by the heat pumps installed on the CHP network.

The academic departments that committed to using their funds to support the construction of a CHP expected operational savings. Similar to finance, they have also been exposed to the efficiency incentive which has helped Operations communicate the value the market is placing on CHP efficiency. This opened new doors for requesting funds to further invest in CHP efficiency. The market move away from incentivizing CHP efficiency has also skewed their focus and interest from efficiency to other capital spending needs.

2.What are the costs of the APS program to ratepayers, including but not limited to economic, environmental, and societal costs?

Rule changes create uncertainty and credibility issues for long-term financial investments.

There are many discussions around the country about the regulatory changes needed to create a 21st century electricity system. New business models are needed to integrate higher levels of distributed energy resources, take advantage of new technologies, meet environmental goals, and address changing customer needs and expectations. The reduction of AEC availability for the CHP industry is hitting an industry that has been slow to change historically, there is a lot at stake for CHP owners and the consumers of their energy. Consumer include organizations like ISO New England, Eversource, National Grid, etc... There are many transformations needed and AEC's can support CHP development to bridge these changes.

As a non-profit CHP owner, Tufts University invest time, money, and skill, in an enterprise which accommodate private and public necessities with its passive and active commitments to ISO New England and National Grid. We view AEC's as privileges that help justify the expenditure of our own funds and the employment of our time and skill. Expenses are passed through to each branch of the University connected to the CHP. The AEC's are considered a motivator to provide efficient operations and utilities services to our internal and external clients. The rate of return is a combination of the cost of paying back debt holders with interest and the reduced operating costs to each of the branches of the University served by the CHP.

Tufts CHP provides power for the university to meet it's own needs, reducing the power required to be generated by the utility. While the trend is for the grid to become cleaner, there is still significant generation from sources that are much "dirtier" than CHP. The CHP also produces chilled water using the waste hot water from the CHP process, any chilled water the absorber cannot create is supplemented by an efficient centrifugal chiller. AEC's offered for heat pumps are creating more interest in studying replacing or augmenting the Tufts utility scale centrifugal chillers with utility scale heat pumps. This may not only reduce natural gas consumption but also reduce cooling tower investments and enable rejecting heat into a hot

water loop. This hot water is estimated to not always have enough energy to cover year round heating needs and therefore the waste steam heat or jacket water from the CHP is proposed to be used to supplement and meet the 8,760 hour heating load profile of the campus. Reducing cooling tower needs will also reduce the excessive amount of make up water used to support the heat rejection process use to support the condenser water system in a conventional electric centrifugal chiller.

Despite generally being a lower risk investment, utilities services do face risks that can negatively affect the Universities ability to do business. As Utilities are seeking to protect their revenue stream they are beginning to enter the distributed generation market. Their need to invest into an aging and outdated grid requires CHP owners like Tufts to help stabilize grid reliability. AEC revenue helps drive and maintain investment in CHP efficiency. For some of our peers AEC's may also help drive decision making on whether a distributed generation project passes hurdle rates. While the Utilities debate what their roles are with AEC's, grid reliability, and where they believe their revenues should actually be... the grid is not going away and Tufts can help bridge the time needed for these business models to evolve by ensuring the DOER maintains AEC's incentives to ensure efficiency and reliability of CHP assets. At a minimum, CHP assets that are currently subscribed.

3. Do you believe the APS program should prioritize technologies which provide the most benefits, such as greatest greenhouse gas emissions reductions?

The APS program should prioritize creative integrated technology solutions that deliver the greatest economic, environmental and societal benefits. Consider formulas that are technology agnostic, uniform, and focus on marginal carbon emissions.

4. From 2015 through the present, what have been the average quarterly Alternative Energy Certificates (AEC) sale prices?

Tufts University has been received \$17-\$20 per AEC up to the second quarter of 2020, where 4% of that price was paid to our registration, verification, optimization, monetization aggregator. A significant drop in prices has been presented to Tufts University finance for the third quarter.

5. Is the current APS minimum standard and the annual rate of increase adequate? Please include details and any data supporting why or why not, where possible.

The word adequate suggests that it shouldn't be less. Ultimately, this needs to be gradual and predictable so it can be considered in long-term capital planning. Anything currently published should not be changed regardless if a stakeholder believes it is too fast or slow of an annual increase.

6. Do you anticipate a growth or decline in the supply of AECs in the APS program over the next 5 years? 10 years? If so, how would you quantify this increase in growth rate? Please include details and any data supporting your conclusions.

Theoretically an increase is only logical unless existing AEC generators stop operating their systems. Heat pumps for example require less investment and some may argue less incentive as

compared to what it takes to maintain a bridging asset at the highest level of efficiency with more people, skill and time.

7.Are there modifications to the APS program that could be made to reduce the volatility of the APS market?

Forcing a higher compliance level due to an oversupply is a difficult precedent to adjust long term capital planning efforts to. The simplest perspective on reducing volatility is to not modify the APS program. Creating a floor price for AECs, may provide some longer-term certainty for project investment decisions. However, with the intent of the Daymark report and its intentions to help DOER with the APS program, a quota/queue to regulate the amount of new AEC qualifications may be more practical. The initial reason there was volatility was the rules of the program changed. Less rule changes mean less volatility. Instead of a floor price, there could be an annual queue/quota for new assets to the program that is sized by supply/demand curves. If Tufts leadership is convinced a program is here to stay, planners and finance can better encourage moving a project forward.

As a result of the volatility and anxiety the Daymark report has created, Tufts University requests that the DOER consider grandfathering all CHP facilities currently participating in the APS or planning a CHP installation. Tufts University also urges the DOER to consider delaying the release of the updated APS until the Daymark study is peer reviewed by other qualified stakeholders.

8.Has the APS incentive had an impact on the decision of system owners to invest in APS eligible technologies? Why or why not.

APS incentives in CHP have changed the way finance, stakeholders and decision makers view investing in CHP efficiency. Expanding the CHP to integrate other APS eligible technologies like heat pumps to take advantage of additional thermal heating incentives is now being pursued. The study of integrating a central utility scale heat pump within the CHP to generate both heating and cooling for the campus. This strategy also removes the need for larger cooling towers by reducing the amount of heat rejected into the towers and rejecting the heat into a hot water loop instead. This also reduces the amount of make up water needed to achieve the heat rejection needed for a conventional centrifugal chiller. This further reduces the amount of natural gas that may be needed to supplement the CHP waste heat being created by the flue gas and jacket water to make steam and hot water for the campus heating, dining, and process needed.

For smaller CHP, heat pump, and other qualified technologies the cost of monitoring, reconciling, and complying with the metering requirements compared to projected APS generation could prevent program participation. Projects considering investing in these new technologies may view the overhead requirements to participate as less of an incentive to pursue a project.

9.How could the APS program be improved to better influence residential or commercial purchasing behaviors?

Building upon some of the comments in the answer to question No. 8 we offer two opinions.

A simpler version for those that may not have the resources to administer and reconcile the APS program requirements is to consider a similar model to how the Utility rate case for the energy efficiency fund is structured. Utilities offer technology/product distributors to take the incentive and pass that reduced price of a product or service down to their customer. This approach attempts to build on the Daymark recommendation of having the Utility companies take AEC obligations on and use the efficiency fund model to pass through at least the first year of AEC's to the customer in addition to any other applicable energy efficiency fund incentive.

Often more complicated portfolios and are taking advantage of the opportunity's deregulation have created have also allocated resources to support accounting, administration, and reconciliation of their supply contracts for gas and electricity. However, many residential and smaller commercial consumers have been burned by suppliers and contract terms that escalate like high interest rate credit cards. The cost or fees associated with monetizing AEC's could be published and normalized to create a fair market for this smaller technology pool. If the DOER receives feedback that this may be viewed as more of an unreasonable tax, perhaps a different approach would be to have quotas based on customer size. In states like CT the small REC program has much more value than the large REC program which helps prevent small projects from competing with large projects. Having two or more AECs classifications based on size would help support smaller projects.

10. Are there currently eligibility criteria in the APS program that you believe are a barrier to participation in the program? How would you address these barriers?

The APS currently only allows for renewable heating, and not cooling, to be counted toward APS certificates. Additionally, intermediate and large renewable thermal systems require some form of direct or indirect metering to calculate useful thermal. Often these projects have equipment that simultaneously heat and cool. Having to meter and calculate these potential scenarios can be complicated. Allowing for cooling as eligible would eliminate this issue. At a minimum, allowing for instances of simultaneous heating and cooling without having to create complicated methodologies would be a benefit. Alternatively, if DOER created standard assumptions (rather than metering) to account for simultaneous heating and cooling for heat pump projects, it could reduce complexity and streamline program applications. Unless Tufts University is designing for the program specifically in mind at the onset of a project, then we have found it can be difficult and often expensive to meet program requirements. Additionally, there can be a disincentive for sites that are more efficient (but not Passive, NetZero, or HERS rated which get the multiplier), as they potentially generate less credits because they efficiently heat a space and have a low designed EUI. These sites' projects are still expensive, but do not necessarily benefit from significant APS potential revenue.

Some further specific issues and suggestions for addressing barriers are:

- Relaxing ANSI C 12.20 standards for kW meters for renewable thermal projects, or to allow for metering points within the equipment itself. Revenue-grade kW metering is

required on grid electric for intermediate/large projects. Revenue grade metering for often numerous heat pumps can be cost prohibitive.

- If DOER can provide a public list of btu compliant and affordable meters it would aid in program entrance. BTU meters are often more expensive than electric meters.
- Increase the intermediate threshold to capture a larger portion of commercial buildings.
- Add multipliers for efficient projects (ex. EUIs under a baseline) that do not have HERS certificates.
- Similar to other states, the program could be segmented by size and make 2 or more separate markets. The queue/quota for the size groups could be resized to give a greater proportion of capacity to smaller projects than the current market distribution.
- Volatility in the program appears to come from rule changes and market changes. We understand rule changes can be proposed, evaluated, and rolled out over time. However, creating an alternative to the APS market as Daymark outlines may also need to be considered. If the goal is to reduce greenhouse gas emissions only based on efficiency, Tufts CHP system generates power, steam, HHW and Chilled Water from the same BTU input. Fixed or at least predictable benefits will provide incentive for alternative technologies and encourage investment. Measurement, verification, and audit would remain driven by performance. Further, understanding the flexibility of AEC qualified equipment combinations coupled with today's latest in machine learning algorithms reinforce the strategic position CHP plants have in further enabling a smart grid that achieves reliability and emissions reduction. This comes from the availability of ISO NE fuel mix data and marginal emissions data to prioritize minute by minute power and emissions peak shaving strategies that schedule not only engine operation and load but the operation and load of chillers, cooling towers, boilers, and absorbers for example. These combinations create unique opportunity to further incentivize creative integration of all AEC incentivized technologies that use software and artificial intelligence to optimize these assets and further improve both emissions and performance.
- It would be prudent to further study the role large and small CHP's that are part of the current AEC program cover the gaps created by the growing inventory of renewable solar and wind technologies that do not provide the consistency and reliability to the grid operations.
- Without proper understanding of investment in building envelope design and aged facilities infiltration and insulation values, heat pump technologies deployed in buildings that replace perimeter radiation and/or forced hot water systems may often be found to require CHP generated heat to supplement deficiencies during peak/design day periods. This can also apply to select geothermal heat pump installations. While architectural design, U value and R value may not play a role in why a heat pump should receive AEC's, comparing the efficiency and gas consumption of a high efficiency gas fired boiler to a gas fired CHP that provides peak heating support to augment air source and geothermal loop temperatures should also be considered.

11. What revisions to the existing APS eligibility criteria would you propose to improve and simplify the APS program, if any?

Please see the above response to Question 10, namely allowing for cooling and relaxing metering requirements.

12. Is there any additional information you believe DOER should consider in its 2020 APS Minimum Standard Review?

Responses to the above questions will be accepted until 5pm on December 4, 2020. Please send all responses to Samantha Meserve at <mailto:DOER.APS@mass.gov> with the subject "2020 APS Minimum Standard Review Comment".