



December 4, 2020

VIA ELECTRONIC FILING

Samantha Meserve
Massachusetts Department of Energy Resources
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Re: 2020 APS Minimum Standard Review Comment

Dear Samantha Meserve:

Please accept these comments on behalf of the National Fuel Cell Research Center, in response to the 2020 APS Minimum Standard Review Stakeholder Questions, released on November 5, 2020 per the requirement in 225 CMR Section 16.07(3).

Respectfully Submitted,

___/s/___ Jack Brouwer___

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2020 MASSACHUSETTS ALTERNATIVE ENERGY PORTFOLIO STANDARD
MINIMUM STANDARD REVIEW STAKEHOLDER QUESTIONS

Comments of the National Fuel Cell Research Center

I. Introduction and Background

The National Fuel Cell Research Center (“NFCRC”) appreciates the opportunity to respond to questions from the Massachusetts Department of Energy Resources (“DOER”), as part of the 2020 Massachusetts Alternative Portfolio Standard (“APS”) Minimum Standard Review, per 225 CMR 16.07(3).

The NFCRC facilitates and accelerates the development and deployment of fuel cell technology and systems; promotes strategic alliances to address the market challenges associated with the installation and integration of fuel cell systems; and educates and develops resources for the power and energy storage sectors. The NFCRC was established in 1998 at the University of California, Irvine by the U.S. Department of Energy and the California Energy Commission in order to develop advanced sources of power generation, transportation and fuels and has overseen and reviewed thousands of commercial fuel cell applications.

II. Comments

The NFCRC responds to questions related to the benefits of APS eligible technologies, specifically fuel cell systems, and current issues with the demand and supply of Alternative Energy Credits (“AECs”) in the APS programs.

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

The APS program has the potential to deliver significant benefits to ratepayers. The APS has been instrumental in supporting the use of clean, efficient energy technologies, until the supply and demand imbalance interrupted the market uptake of APS technologies.

Renewable wind and solar power generation, fuel cells operating on natural gas, biogas, and renewable hydrogen, and energy storage technologies can all reduce CO₂ and other greenhouse gas (GHG) emissions. Fuel cell systems are sized to the base electrical load for maximum efficiency and cost-effectiveness. Through the fuel flexibility of fuel cells and the ability to operate continuously and follow fluctuating electrical (and thermal) loads, fuel cell systems can also provide a critical role in enabling increased penetration of renewable solar and wind resources on the grid. These features of fuel cell systems allow them to reduce pollutant emissions and improve air quality over and above the improvements that can be made with solar, wind, and energy storage systems alone, and support policies to convert organic waste streams to beneficial use.

Fuel cell systems also displace traditional emergency backup generators (almost exclusively diesel combustion generators) that emit criteria air pollutants and GHG. This feature is especially critical given that much of the Northeast currently suffers from poor air quality and faces major challenges in achieving clean air for the many citizens that live and work within these areas, especially including economically disadvantaged communities that are often disproportionately burdened by air pollution and risks of COVID-19. By providing always-on zero criteria pollutant emission power, fuel cells can increase adoption of intermittent renewable wind and solar resources throughout the state while significantly increasing the generation of decarbonized and pollutant-free electricity.

The benefits provided by resilient power are two-fold – continued power to ratepayers during extended outages creates direct financial benefit of avoided power outages and increases public safety. Additionally, using fuel cells for grid islanding, microgrids and resilient power displaces the use of diesel generators, having a direct and immediate air quality impact in local communities. Air quality should be as valued as carbon reduction with respect to ratepayer impact, and the avoided negative health effects create significant societal benefit.

Such microgrids are already in operation, replacing diesel generators and reducing air toxics, criteria air pollutants and greenhouse gases. As examples, the University of California, San Diego runs a microgrid with photovoltaic systems, battery energy storage, a fuel cell system and a gas turbine to create exceptional redundancy. The Marcus Garvey Village microgrid in Brooklyn, New York is also an example of such a multi-technology installation. This project was installed under the Brooklyn Queens Demand Management Demand Response program and uses

solar, storage, and fuel cell technologies in one microgrid, to optimize the efficiency, reliability, and affordability of the project and improve neighborhood air quality. Such systems could easily be replicated across Massachusetts and in areas under continued threat of superstorms and extended power outages.

States, utilities, and customers across the Northeast have opted to use resilient, long-duration microgrids with fuel cells and other technologies in response to increasingly frequent natural disasters and grid interruption events. The need for long-duration power generation from DER was apparent as some of these natural disasters, such as Winter Storm Alfred in 2011 and Superstorm Sandy in 2012, caused grid outages that lasted for weeks at a time. In response to these and other extended outages, the towns of Woodbridge and Hartford, Connecticut have installed microgrids to maintain essential community services during extended outages – and serve as examples of what benefits could accrue to Massachusetts with expanded availability of AECs in the APS program.

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 continue to include a broad portfolio of technologies that allow ratepayers to use the most efficient and environmentally friendly systems for their specific site requirements.

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

The AEC market is an open and extremely volatile market. The recent influx of AECs from CHP has inundated the market and the price has collapsed. Without certainty on the AEC price from year to year, it is difficult to show savings or finance a new APS project.

The Daymark Study provides guidance to answering this question:

- Scenario analysis of future Alternative Energy Certificate (AEC) supply and the contributions of various APS-qualified technologies¹ was focused on combined heat and

¹ Daymark Energy Advisors study available at: <https://www.mass.gov/doc/alternative-energy-portfolio-standard-review/download>

power (CHP) and renewable thermal, which together produce the vast majority of AEC supply.

- The supply of AECs is clearly outpacing demand. The baseline scenario shows that this supply and demand imbalance will continue to grow. CHP is the largest contributor to AEC supply, and Daymark's baseline scenario shows CHP's share near or above 50% through 2030. The increasing renewable thermal supply represents that next largest category of oversupply.
- Given other incentives available to CHP, Daymark demonstrates that CHP procures net financial benefits over a 5-year period, considering other incentives that are also available to CHP. Daymark thus infers that CHP is now economic without APS support. Additionally, the study found that CHP systems do not provide emissions benefits in the modeled scenarios.
- In conclusion, the Daymark report finds two possibilities to address the current AEC oversupply. The first is to raise the APS requirement to stimulate demand. The second possibility is to either phase out new CHP eligibility or to decrease the renewable thermal multiplier.

Market certainty can be created by focusing the investments of the APS on projects that require the AECs for financial viability. Biofuel projects require very little upfront capital investment and projects that qualify as renewable thermal are simply a matter of fuel-switching. As suggested in the Daymark report, the DOER should evaluate the necessity of directing incentives to cost-effective CHP that has flooded the market and driven the reduction of available AECs for other technologies, like fuel cell systems, that will not create an oversupply situation.

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

Project development has been stalled due the significant decrease in value of AECs. Again, certainty is needed to develop projects that create local and global economic, environmental, and societal benefits.

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 program presents a disconnect between electric-only fuel cell and combined heat and power (“CHP”) fuel cell efficiency requirements. The current Fuel Cell Statement of Qualification Application states that all fuel cells must:

Be at least as efficient as the current average for emitting locational marginal units, as based on the heat rates for these units shown in the most recent ISO-NE Electric Generator Air Emissions report available at the time the fuel cell submits its application. If the Fuel Cell generates both electricity and useful thermal energy, then the fuel cell must have an overall efficiency of 55% on an annual basis.²

The moment one ounce of heat is used by a fuel cell system, the requirement jumps from the marginal emission rate to 55% overall efficiency. The DOER should rectify this misalignment with efficiency objectives and require that all fuel cell systems meet the former requirement of the current average for emitting locational marginal units.

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

Further to the Question 10 response, qualification to the APS program is yearly; if a system does not meet the efficiency threshold it loses the ability to earn AECs for an entire year. With this qualification process the AECs cannot be included in finance models and relies on external factors including how the customer operates or maintains their internal facilities that use the heat. The NFCRC would suggest that perhaps instead of a binary qualification there could be a stepped or gradual reduction of credits if the system does not meet the requirement year to year. For example, a system would qualify for 50% of the performance-based incentive if the system were below the requirement but above some alternate minimum level.

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

The NFCRC supports the proposed recommendations of Daymark to address the AEC market imbalance in the near-term.

² Massachusetts Department of Energy Resources, Alternative Portfolio Standard Fuel Cell Statement of Qualification Application available at: [Apply to the APS: CHP, Flywheel Storage, and Fuel Cells | Mass.gov](https://www.mass.gov/info-details/apply-to-the-aps-chp-flywheel-storage-and-fuel-cells)

III. Conclusion

The NFCRC values the Commonwealth's commitment to grid modernization and the expansion of clean distributed energy resources to meet energy and environmental goals with the APS. The NFCRC fully supports the review of the APS and AEC demand and supply issues and requests further consideration of the above recommended program improvements.