

**By Electronic Delivery**

December 4, 2020

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

Dear Ms. Meserve:

Conservation Law Foundation (“CLF”) offers these comments regarding the review of the Alternative Energy Portfolio Standard (APS), 225 CMR 16.07(3). CLF is a non-profit, member-supported organization dedicated to protecting New England’s environment. CLF protects New England’s environment for the benefit of all people and uses the law, science, and the market to create solutions that preserve our natural resources, build healthy communities, and sustain a vibrant economy. Past CLF advocacy has included litigation and policy advocacy to enforce the Massachusetts Global Warming Solutions Act, expand energy efficiency services, and support greater reliance on clean energy. CLF sits on the Massachusetts Global Warming Solutions Act Implementation Advisory Committee (“IAC”), leads the Electricity Sector Working Group of the IAC, and has been deeply involved in the IAC’s oversight and guidance of the development of the Commonwealth’s Clean Energy and Climate Plan for 2030 (“CECP”).

These comments focus on maximizing the environmental benefits of the APS program by targeting the reduction of greenhouse gases and assuring that low and moderate income families have the opportunity to benefit from the APS program (Question 1, 3, 5, 10 and 11 of the Stakeholder Questions). Specifically, we address how the APS program can optimize greenhouse gas reductions by focusing on replacing small oil, propane furnaces and boilers as well electric resistance heat with both geothermal and air source heat pumps (the Daymark report labels these “small renewable thermal”). We would also support extending to natural gas utilities (LDCs) the APS requirements to purchase Alternative Energy Certificates. At the end of the document,

we provide recommendations for additional data and considerations that should be folded into an update to the Daymark analysis.

The Daymark report contains excellent analysis about where the APS can be most effective, where it is un-needed and the balance of supply and demand for Alternative Energy Certificates (AEC) generated under APS. It points to the replacement of oil, propane and electric resistance heat with heat pumps as the most effective generators of Alternative Energy Certificates, both in terms of cost and in terms of greenhouse gas reductions. Based on the Daymark analysis and other considerations, CLF makes the following policy recommendations:

1. **APS incentives should focus on replacing residential oil, propane and electric resistance heat with heat pumps.** Daymark states that “small renewable thermal systems achieve emissions reductions at the lowest cost compared to other renewable thermal and CHP systems.” Daymark at 8. The analysis shows that the lowest required incentives are for small renewable oil and propane systems, as well as electrical resistance heat. Daymark at 45. The cost per ton of carbon reduced for small renewable oil and propane systems range from \$13-\$92 vs. costs of \$115-\$192 to replace small natural gas systems and as high as \$348/ton for intermediate thermal systems replacing natural gas. Daymark at 19. Daymark estimated that required total financial incentives (stated as multipliers) to replace oil and propane range from 6-16 (before taking into account any other available incentives). Larger systems and biomass require multipliers of 13-45.
2. **The multipliers should be modified to encourage deployment of heat pumps.** Modifying the multipliers is the optimal tool for adjusting APS incentives. The multipliers can be more easily modified as the relative prices of electricity, heating oil and propane change over time and the replacement technology economics change over time. Multipliers can be more easily modified to reflect the relative prices of different fossil fuels, volatility of energy prices, the replacement technology employed (air source or ground source) and provide the appropriate incentives to balance supply and demand. For example, in the average year, retail fuel oil prices in Massachusetts change by 19% and it is not unusual for fuel oil prices to double or halve over a two-year period. If fuel oil prices increased to the level in the winter of 2014, approximately double the current price, and stayed at that level, then the multiplier for oil furnace replacements could be cut to 0 from 7 for an air source replacement pump excluding Mass Save incentives (assuming the data on Table 3 page 12 Daymark

and a 70% efficient oil furnace being replaced). If fuel oil prices increase by 19%, the typical annual fluctuation, the multiplier could be cut from 7 to 3 before accounting for any Mass Save incentives for an air source retrofit. With Mass Save incentives, the multiplier could be cut to 0. Another example compares the incentives needed to retrofit oil v. propane furnaces, with oil requiring a multiplier of 7 v. propane which requires a multiplier of 13 before applying any other incentives (Daymark page 45, table 18). By making the multiplier fuel specific and by adjusting the multiplier downward when fuel prices rise and upward when fuel prices fall, DOER can potentially balance supply and demand.

3. **Moderate-income households should receive additional multipliers to increase just and equitable access to renewable energy.** Moderate-income households have often been unable to take advantage of incentives that lower their costs of heating and cooling, reduce greenhouse gas emissions and improve their health. These households often have limited access to capital and therefore don't take advantage of incentives for conversion to renewable energy. An additional multiplier of 2-3x, pre-minted, for moderate-income households to convert to air and ground source heat pumps would likely enable significantly higher participation by oil and propane burning moderate-income households (60-120% AMI). All of the AECs for moderate-income households should be pre-minted to provide the capital needed for conversions, regardless of supply conditions. This would involve waving the requirement that the market be 25% undersupplied to pre-mint for low- and moderate-income households.<sup>1</sup>
4. **To replace electric resistance heat, incentives will likely need to cover nearly the full capital cost of installing renewable thermal.** Because the vast majority of the 15% of households with electric resistance heat are in rental housing, larger incentives are needed to replace it with renewable thermal.<sup>2</sup> While the Daymark analysis shows that there is a positive NPV to replace electric resistance heat with heat pumps, the split incentives between owner and renter make it difficult to replace the heating source. Since the owner typically invests in capital improvements but the renter typically pays for heating, it is difficult to deploy more efficient and healthy renewable heat. Better cost alternatives to resistance heat have been available long enough that any remaining building stock reliant

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<sup>1</sup> Note that low income households have access to larger incentives and different services through the Mass Save program and thus are less likely to utilize the APS.

<sup>2</sup> Joint Center for Housing Studies of Harvard University, America's Rental Housing, December 2013, <https://www.jchs.harvard.edu/research-areas/reports/americas-rental-housing-evolving-markets-and-needs> and US Census Quickfacts, <https://www.census.gov/programs-surveys/sis/resources/data-tools/quickfacts.html>.

on resistance heat is likely owned by moderate income customers with capital constraints or by landlords who are not incentivized to access that NPV benefit. For moderate income households, the incentives provided by Mass Save and the APS program may be insufficient to cover the \$12,600 capital cost estimated by Daymark (page 42). The multiplier needed to replace electric resistance heat would likely need to be about 10-12, reflecting the Mass Save incentives and the savings from 0% loans totalling \$5100 for a 3 ton system (see below), plus another \$5000 to \$6000 from the APS program.

5. **The requirement that heat pumps installations must supply 90% of the heat for small renewable thermal installations should be relaxed.** Between 2020 and 2050 most homes are likely to replace their heating systems twice (once every 15-20 years). Heat pumps with integrated controls operate most efficiently at warmer temperatures but need to be sized up substantially to deal with the lowest temperatures each winter as a standalone technology. Alternatively, air source heat pumps with a backup technology for the coldest few hours of the year (whether existing furnace or boiler or a small electric resistance panel) can achieve substantial cost and greenhouse gas savings at lower cost. In the Mass Clean Energy Center program from 2014-2019, approximately 77% of the installations were partial, with oil, propane, gas or resistance electric form of backup heat. A partial conversion today can reduce carbon emissions at lower cost with subsequent upgrades bringing full conversions.
6. **Natural gas fired combined heat and power (CHP) projects should be removed from the APS program as rapidly as possible because they do not need the APS incentives and produce no greenhouse gas benefits.** Daymark at 7, Figure 28; at 65. The Daymark report indicates that natural gas fueled CHP projects, which generate the bulk of Alternative Energy Certificates, neither require subsidies nor provide greenhouse gas benefits. Because the APS program is currently oversupplied with AECs, there is no reason to leave them in the program. Their participation depresses AEC prices and displaces more effective technologies. Continuing these subsidies is a waste of ratepayer funds.
7. **The requirement of the APS program that electric utilities purchase Alternative Energy Certificates should be extended to cover the Commonwealth's natural gas local distribution utilities (LDCs).** So long as LDCs are only allowed to comply by purchasing certificates or making an alternative compliance payment, extending the program to gas utilities would increase the demand for AECs by 175-191% during the period from 2020-2030. Daymark at 51. This increase in supply would enable all or most of the approximately 30% of Massachusetts homes that heat with oil or propane and need to replace their furnaces or boilers to do so without oversupplying the market for AECs

(using the Daymark estimate of the rate of adoption, pages 51-52 and 59). Extending the program to LDCs would increase residential natural gas prices by approximately 2.3% (using the revenue reports from the 2019 annual reports of Massachusetts LDCs to the DPU). We recognize that this recommendation is beyond the authority of DOER and would require a legislative change to M.G.L. Chapter 25A Section 11F ½.

Finally, we will note that any revision to one of DOER's clean energy incentive programs should be executed with an eye toward compliance with the forthcoming Clean Energy and Climate Plan for 2030. The IAC has recommended that all such incentive programs should be revised (via any necessary legislative as well as regulatory action) to remove eligibility for biomass and waste combustion technologies.<sup>3</sup>

In addition to the policy recommendations listed above, CLF recommends the following additional analysis building upon Daymark's work to ensure that the most relevant data informs program design and multipliers:

- **Daymark's analysis should be extended to incorporate the Mass Save incentives (including the 0%, 7-year HEAT loans) available in its financial analysis, including its NPV and breakeven multiplier analysis.** The Mass Save program offers incentives of \$1250 per ton for heat pumps to replace oil, propane and electric resistance heat. For a 3-ton heat pump this incentive totals \$3750. In addition, 0% 7-year loans are available for installing heat pumps. For a 3-ton heat pump, the 0% loan represents a subsidy of approximately \$1450 (v. a 5% loan). These incentives represent about 38% of the incentive that Daymark concluded is required for either a ground source heat pump or air source heat pump (partial) replacement for an oil burning furnace. This should reduce the required multiplier to 4 for an air source heat pump retrofit and 10 for a ground source heat pump v. 7 and 16 respectively without these incentives.
- **Daymark's analysis of renewable thermal should be extended to recognize that the cost of installing heat pumps varies significantly from home to home.** Costs are highly variable even for a single technology, and the APS program can adjust multipliers to focus its incentives on the most cost-effective installations. Even for a single technology (air source or ground source replacing a particular type of

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<sup>3</sup> "Global Warming Solutions Act Implementation Advisory Committee Guiding Principles, Cross-Cutting Policy Priorities, and Sector-Specific Policy Priorities for the Clean Energy and Climate Plan for 2030", at 6 (Oct. 2020), <https://www.mass.gov/doc/iac-work-group-proposed-guiding-principles-and-policy-priorities-updated-10262020/download>.

fuel), the cost of installing small renewable thermal can vary by as much as 10-fold between the lowest cost installations and the highest cost installations. The Massachusetts Clean Energy Center (“MassCEC”) data base of over 20,000 air source heat pump installations from 2015 to 2019 shows the wide range of costs for installing heat pumps. For the 7,460 oil conversions in the data base the cost per ton ranged from \$419 to \$4500. Between the 20th percentile of oil conversion cost to the 80th percentile costs rise from \$2813 to \$4570 per ton. For the 948 propane conversions the range was from \$1670-\$15,500 per ton. Between the 20th percentile of propane cost and the 80th percentile costs rise from \$2794 per ton to \$4530 per ton. Using the data from MassCEC, the APS program can adjust the multipliers to achieve the desired level of AEC supply at the lowest possible cost.

- **Daymark’s analysis of the costs of small renewable thermal systems (page 42 of the Daymark report) should be updated to reflect local costs.** Mass Clean Energy Center’s databases provide project cost information more specific to Massachusetts. This data set of over 20,000 air source and over 500 ground source heat pump installations from 2015 to 2019 (2020 for ground source heat pumps) shows lower costs for air source heat pumps and higher costs for ground source heat pumps than are reflected in the Daymark analysis.

Thank you for the opportunity to comment, and CLF looks forward to working with DOER to ensure that the Commonwealth’s clean energy policies are optimized to meet our energy justice and climate mitigation needs.

Sincerely,



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