

Appendix N

Heat Pump Water Heater Analysis and Considerations

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By Ian G. Burnes and Laura Martel
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Introduction

1. What is the purpose of this testimony?

This testimony describes the heat pump water heater measure and provides evidence about the quantity of heat pump water heater installations that are achievable for incorporation into the Trust's Sixth Triennial Plan.

2. Who is introducing this testimony?

The testimony is provided by Ian Burnes and Laura Martel. At the Trust, Mr. Burnes is the director of strategic initiatives and Ms. Martel is the evaluations manager.

3. Mr. Burnes, please state your name, title and business address.

My name is Ian Burnes, and I am employed by EMT as the Director of Strategic Initiatives. My business address is 168 Capitol Street, Suite 1, Augusta, ME 04330.

4. Please summarize your educational and professional experience.

I have a Bachelor of Arts Degree in Economics from Wesleyan University. I have been working at the Trust since 2009. My responsibilities include the oversight of the strategic initiatives team that implements the Trust's customer tracking database, maintains the Technical Reference Manuals, oversees the program evaluations, manages the Trust's resource in ISO-NE's Forward Capacity Market, and coordinates the Trust's work at the Public Utilities Commission. Before coming to the Trust, I worked at the Governor's Office of Energy Independence and Security.

5. Ms. Martel, please state your name, title and business address.

My name is Laura Martel, and I am employed by EMT as the Senior Research and Evaluation Manager. My business address is 168 Capitol Street, Suite 1, Augusta, ME 04330.

6. Please summarize your educational and professional experience.

I have a Bachelor of Science Degree in Ocean Engineering from Florida Atlantic University and a Master of Engineering in Acoustics from Pennsylvania State University. I have over 20 years of technical leadership, project management, and research and evaluation experience. I was hired by EMT in 2014 to design and implement impact and process evaluations for energy efficiency programs. I am responsible for the Efficiency Maine Technical Reference Manuals. Prior to joining EMT, I was with Lockheed Martin in Manassas, Virginia, where I served in various engineering, management, and technical leadership roles of increasing responsibility.

7. Which programs and/or budgets will include heat pump water heaters during the Triennial Plan VI period?

The Trust will use the retail and distributor channels to reach the different markets for heat pump water heaters. This appendix describes the portion of the water heating market the Trust believes it can acquire through the Triennial Plan VI (TPVI) period.

EMT will incentivize heat pump water heaters through Retail and Distributor Initiatives. These heat pump water heaters will be funded through the Electric Efficiency Procurement. The Trust also plans to fund some heat pump water heaters through a recently awarded federal grant through the EPA called the “New England Heat Pump Accelerator.”

8. Please provide a high-level overview of EMT’s approach for calculating the cost-effectiveness of heat pump water heaters in Triennial Plan VI.

Through the retail and distributor channels, this measure involves the purchase and installation of a new heat pump water heater in place of a new code-compliant or standard efficiency water heater or as an early replacement of an operational water heater. Savings and measure cost calculations are dependent on the baseline (counterfactual scenario) assumed. Because some water heater purchases are made as emergency replacements of failed systems (replace-on-burnout), some are purchases for new homes or businesses (new construction), and some are pre-emptive replacement of operational water heaters (retrofit), a blend of baselines must be accommodated. Additionally, for replace-on-burnout and new construction, where the baseline is the purchase of a new water heater, various system options must be addressed in the calculations.

Given the multiple decision types implicated in a potential water heater purchase, in 2020 the Trust commissioned Michaels Energy to conduct a survey study of recent program participants from the heat pump water heater measures promoted through retail and distributor channels. The results of the survey were used to determine the appropriate baseline to use for savings and measure cost calculations.¹

Based on the study results, the Trust calculates energy or fuel savings assuming a blended fuel mix, because many of the program participants installed a heat pump water heater instead of an electric water heater, while others offset water heating from another fuel. The study calculated a blended energy savings as follows:

- Electric – 56.4%
- Oil – 34.1%
- Kerosene – 1.0%
- Propane – 6.6%

¹ Brian Uchtman, [Heat Pump Water Heater Free-ridership and Baseline Assessment Results Memo](#), Michaels Energy, June 26, 2020.

- Natural Gas – 1.9%

Similarly, the measure cost used in heat pump water heater calculations reflects a blend of the costs associated with the different decision types. The study’s authors determined the average measure cost reflected a blend of 19% retrofit projects and 81% new construction/replace-on-burnout projects. Costs for retrofit projects include the full cost of installation, including labor. Costs for new construction/replace-on-burnout include the incremental cost of the equipment between the standard practice and a heat pump water heater. Please see Appendix B for the budget amounts and heat pump water heater targets per program.

9. How was the opportunity for heat pump water heaters determined for the Triennial VI period for Retail and Distributor Initiatives?

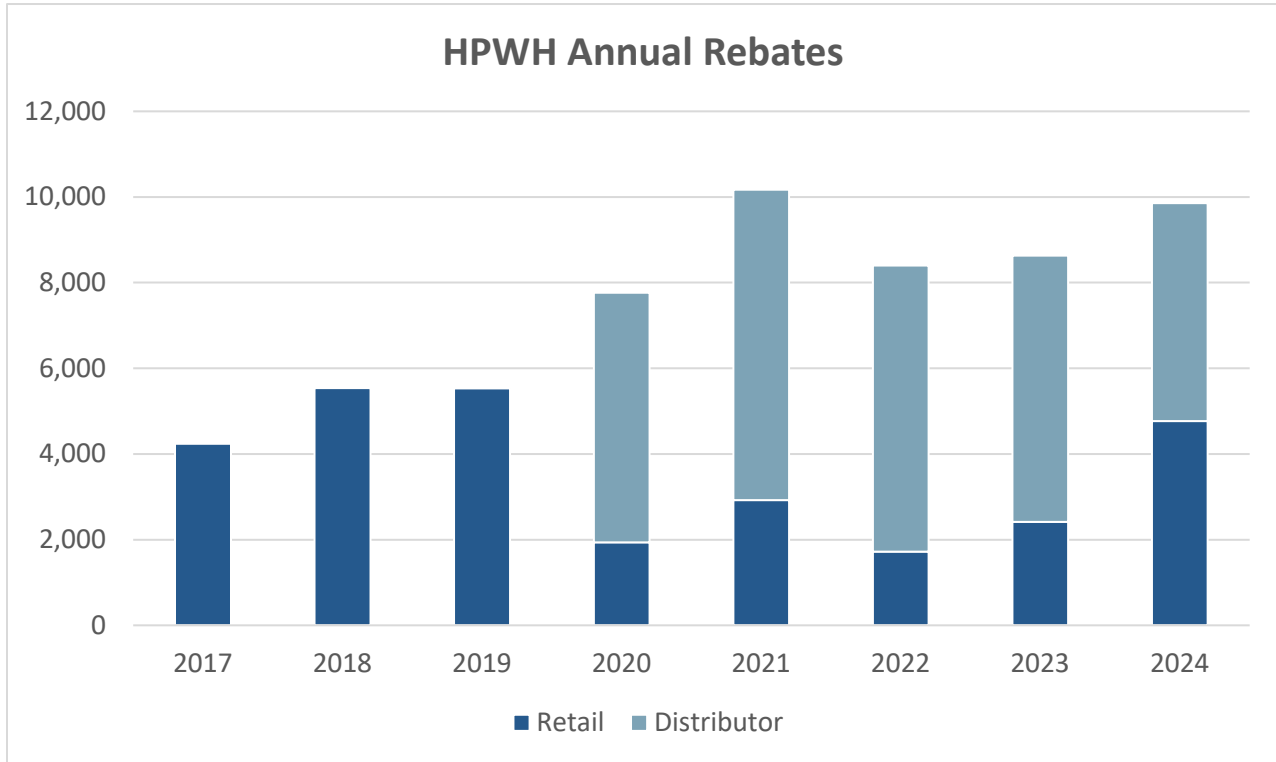
For Retail and Distributor Initiatives, the Trust reviewed past program activity, focusing particularly on the achievable program pace demonstrated when rebate levels and program implementation motivated the most activity. In the past the distributor and retail channels have each achieved a pace equivalent to 7,000 heat pump water heaters per year (14,000/year total). However, the program has struggled to maintain that pace for an entire year given external impacts such as supply chain disruptions and delays. As seen in Figure 1, program activity increased between FY2019 and FY2021, declined in FY2022, and then increased again between FY2022 and FY2024. The Trust estimates that 30,000-45,000 standalone water heaters are purchased for residential applications each year in Maine. While not every home is well suited for a heat pump water heater, the 2024 residential baseline study found that 73% of homes in Maine meet all three key criteria² for installing a heat pump water heater.³ The Trust expects the program activity to continue to increase over time.

Therefore, the Triennial Plan VI budget modeling assumes 11,000 heat pump water heaters in FY2026 growing to 13,000 heat pump water heaters in FY2028.

² The key criteria for installing a heat pump water heater are 1. sufficient ceiling height, 2. sufficient space in utility room, 3. utility room remains above 40 degrees Fahrenheit year-round.

³ NMR, Maine Residential Baseline 2024, August 16, 2024.

Figure 1: Historical Heat Pump Water Heater Rebates



10. Describe the customers and sales process for Retail and Distributor Initiatives, and how does that impact the program budget?

Retail stores sell water heaters to homeowners, building managers, plumbers, and contractors. Sales are often unassisted, with price being a primary deciding factor. Retail sales are often prompted by emergency replacement situations, making in-store availability a requirement for purchase. The Trust has worked closely with retail partners to make supply chain improvements and ensure in-store inventory of the heat pump water heaters. Setting rebates at levels that drive more heat pump water heater sales than the traditionally popular and lower-priced emergency replacement water heater motivates retail stores to maintain store inventories, provide prominent product placement, and negotiate manufacturer discounts. For Triennial Plan VI, rebates for heat pump water heaters are modeled to fully cover the incremental cost difference between a heat pump water heater and an emergency replacement water heater in the retail channel where the warranty term, tank size, energy savings and dehumidification give heat pump water heaters an advantage for do-it-yourself home and business owners.

Distributors sell mainly to plumbers and other contractors, providing equipment primarily for emergency replacements and new construction. Plumbers pass the price of the equipment on to their customers. They also compete against other plumbers so it is important that they can select a heat pump water heater without being underbid by plumbers that specify standard water heaters in their bids. Instant discounts avoid requiring the plumber to pay any of the price difference up-front or deal with an application process. The Trust has been successful in converting emergency replacement water heater

sales to heat pump water heater sales by lowering the cost of the heat pump water heater below that of the emergency replacement water heater and reimbursing the distributor for the processing required to submit instant discount requests. The difference in cost to the contractor helps overcome plumbers' reluctance to adopt new technology and offsets additional installation complexity.

11. Does the Trust anticipate reaching some low-income customers installing heat pump water heaters through the Retail and Distributor Initiatives?

Yes. A program survey conducted in late 2019 found that 14.2% of heat pump water heater purchases through retail channels, and 14% of the heat pump water heater sales through distributors, were made by or on behalf of low-income households.⁴ The Trust will update these shares upon completion of the next heat pump water heater impact evaluation scheduled for 2025. See Appendix G for discussion on how the Trust's programs are meeting the statutory allocation requirements for low-income households.

13. Does this conclude your testimony?

Yes.

⁴ Uchtmann, Heat Pump Water Heater Memo, p. 2.