October 10, 2025

Submitted electronically via Docket Number 25-1203-PET e-File

Holly R. Anderson
Clerk of the Commission
Vermont Public Utility Commission
112 State Street
Montpelier, VT 05620-2701

Re: Vermont Department of Public Service Draft 2025 Energy Efficiency Market Potential Study

Dear Ms. Anderson,

On behalf of Northeast Energy Efficiency Partnerships (NEEP)[1], we are pleased to submit comments on the draft 2025 Market Potential Study (MPS or "the study"). NEEP is a non-profit whose mission is to accelerate regional collaboration and best practices to advance energy efficiency and related solutions in homes, buildings, industry, and communities. NEEP thanks the Vermont Public Utility Commission (PUC) for the opportunity to provide comments on the draft MPS, which the Vermont Department of Public Service (DPS) commissioned GDS and the Brightline Group (the consultants) to produce.

The program achievable resource acquisition budget proposed in the draft potential study is 20% below the planning budgets approved by the PUC in the last demand resource plan due to the removal of the cold climate air source heat pump (ccASHP) program and the use of alternative avoided costs. This budget reduction would result in millions of dollars lost in energy efficiency benefits for Vermont electric customers. As discussed below, this results in lower savings and fewer benefits flowing to Vermont residents.

In these comments, NEEP recommends Vermont: 1) preserve cold climate heat pumps as a measure to improve energy affordability for residents while the state updates and finalizes its heat pump analyses and program designs; 2) refine the Heat Pump AMI Analysis to inform program and policy design; and 3) update avoided costs for the Vermont Energy Efficiency Utilities' (EEU) energy efficiency programs. By implementing these recommendations, the PUC will support programs that lower energy costs for Vermonters and improve affordability.

Continued investment in cold climate heat pumps will help lower Vermonters' utility bills.

Many households face high or severe energy burden leading to economic energy insecurity – the inability to adequately meet basic household energy costs – and must make difficult choices like trading off costs for heating or eating. This inequity is especially pronounced in New England, where households face the largest gap between low-income and median energy burdens. The region also has some of the highest energy costs in the country, driven in part by the high costs for heating.

[1] NEEP staff offer these comments, but they do not necessarily represent the view of the NEEP Board of Directors, sponsors or partners. NEEP is a 501 (c)(3) non-profit organization driven by its mission to advance the benefits of energy efficiency in the public interest.

In addition to existing high energy burdens, electricity prices have risen in recent years. Average prices in New England are up 19 percent since 2022 and could increase more than the national average through 2026. Gas prices are also forecasted to climb into 2026. Drivers for higher electricity prices include the cost of gas delivered to power generators in New England, growing demand that requires more transmission and distribution upgrades, and deferred grid maintenance.

These trends highlight the need for continued investment in energy efficiency. Efficiency programs are critical to improving energy affordability because they lower overall energy consumption. Programs promote advanced technologies like heat pumps, provide targeted incentives and assistance to customer segments such as low-to-moderate-income customers and renters, improve grid efficiency to constrain costs, and promote prudent long-term utility strategies and investments.

CcASHPs are an efficient, cost-effective heating and cooling technology that maintain comfortable indoor temperatures year-round while saving energy, providing important benefits to Vermonters. In the summer, they save electricity by using less energy to cool a building. In the winter, they more efficiently heat homes and save electricity when replacing or displacing electric resistance heating. Incentive programs like the EEUs' and innovative, streamlined delivery strategies lower the up-front heat pump costs and help customers access these benefits.

Vermont is a leading state in heat pump deployment. As of 2024, Vermont had installed more heat pumps per capita than any New England state, with 97 heat pumps per 1,000 residents or ten percent of Vermont housing units. Efficiency Vermont's midstream heat pump program and workforce training efforts are nationally recognized as innovative and effective in addressing market barriers and delivering benefits to consumers.

But much more work remains. Almost 60% of Vermont households use propane, kerosene, or fuel oil to heat their homes, which is a larger share than homes in every other state except New Hampshire and Maine. About 9% of New England homes use electric resistance heating, which is more than most other U.S. regions. Removing ccASHPs from the MPS overlooks the cost-effective, remaining potential for this technology to lower energy bills for Vermonters and provide efficient heating and cooling.

Tens of thousands of cold climate air source heat pumps on NEEP's ccASHP Product List operate efficiently (i.e., they have a Coefficient of Performance [CoP] over 1.75) down to 5 degrees Fahrenheit. Many ccASHPs maintain capacity and efficiency at and well below 0 degrees Fahrenheit. This is evidenced by NEEP's ccASHP Product List containing over 55,000 heat pump products with performance data at or below 0 degrees Fahrenheit and is further supported by field validation studies like *Performance Results from DOE Cold Climate Heat Pump Challenge Field Validation*. The NEEP Product List includes sizing tools to assist contractors in properly sizing ccASHPs to heating loads in cold climates, including Vermont. Efficiency Vermont uses NEEP's sizing tool in their trainings for trade partners.

Recommendation: The MPS should include energy savings from ccASHPs in the Program Achievable potential.

The draft VT Heat Pump AMI Analysis found lower effective full load hours (EFLH) associated with ccASHPs than anticipated, largely because Vermonters are using their ccASHPs to supplement fossil fuel heat rather than replace it. As a result of this finding from a single study, the DPS requested that the consultants remove ccASHPs from the Program Achievable estimate in the draft MPS.

Removing ccASHPs from the EEUs' portfolios is premature. Prior to taking this step, NEEP recommends that the DPS take additional time to address stakeholder comments and finalize its Heat Pump AMI Analysis. NEEP also recommends updating program design. These steps are prudent prior to taking such a significant action of removing all savings from heat pump measure in the MPS. Our recommendations below provide more detailed suggestions for pursuing these changes and illustrative examples from other states.

Removal of this measure would also fall short of the EEUs' statutory requirement to achieve all cost-effective energy efficiency (30 V.S.A. § 218c(a)(2)). Including ccASHPs in the MPS would ensure an energy savings potential that better aligns with the recent EEU savings levels. Further, as outlined above, keeping ccASHPs in the EEUs' portfolios will help Vermonters secure affordable and efficient heating and cooling for years to come.

Recommendation: Explore policy and program options to reduce participant reliance on backup heat.

CcASHPs are cost-effective, reliable technologies, and removing them completely from the portfolio could undo market progress and be detrimental to residents of Vermont who need reliable, cost-effective ways to stay warm in the winter. NEEP encourages Vermont to reconsider this approach, as there are potential flaws in the study, as outlined below. Instead, we recommend deploying effective program design to ensure that customers are using their ccASHPs to supplement other heating sources. If Vermont wants to encourage EEU customers to use their heat pumps as their primary heating source and reduce reliance on backup heat, it can look to neighboring states for ways to adjust implementation strategies. We outline some key examples below:

Maine ASHP Incentives: Like Vermont, several Maine studies published in 2019 and 2024 identified low ccASHP run times among homeowners. These studies found that Maine residents underutilized heat pumps installed as supplemental heat because they kept and continued to use their existing heating systems. In 2021, Efficiency Maine commissioned a detailed study of homes that use heat pumps as their primary, year-round heating source. The study found that heat pumps met all participating homeowners' needs year-round and all homeowners were satisfied with their home comfort. The CoP for the heat pumps ranged from 1.7 to 3.9 for the performance period, and seven out of ten homes did not use supplemental heating.

As a result of these findings, Efficiency Maine updated its residential and commercial heat pump programs to promote whole-building heat pump systems and move away from incentivizing partial or supplemental heat pumps. The new program design requires qualifying heat pumps to serve as the primary heating system for the zone or building in which they are installed. The program includes a sizing requirement for heat pumps to cover 80% or more of the heating design load. To ensure heat pumps can cover the whole heating load, contractors

must indicate on rebate forms which method they used to calculate the heating load. Decommissioning is not required, but on the rebate form, homeowners must attest that they will use the heat pump(s) as the primary heating system throughout the heating season. Similarly, contractors must also attest that they informed customers of this requirement and that they installed and configured the heat pump(s) to be the primary heating system throughout the heating season. Finally, Efficiency Maine pairs these program changes with a robust public-facing campaign for both contractors and residents focusing on installation and operational best practices.

Massachusetts ASHP Incentives: Mass Save encourages customers to reduce reliance on backup heat through a series of program design components. First, the incentive level for whole-home heating is more than double that of partial-home incentives ($3,000/ton vs. $1,250/ton). To be eligible for the whole-home incentive, the program requires the heat pump to be sized to cover 90-120% of the total heating load at the outdoor design temperature, per ACCA Manual J Design Conditions. For customers to receive the whole-home rebate, Mass Save also requires that they remove or disconnect their pre-existing heating system, except for domestic hot water heating. On the whole-home heat pump verification form, customers must acknowledge that Mass Save requires them to use heat pumps as the sole source of heating in the home. Additionally, Mass Save may require system sizing (Manual J and/or Manual D) documentation upon request. The program rebate for partial-heating requires integrated controls set below a program-defined switchover temperature. Mass Save utilities also offer online contractor courses on rightsizing, maintain frequent contractor communication, and attend manufacturer events and contractor presentations.

New York Clean Heat Program: New York's statewide New York Clean Heat Program shifted entirely to whole-home rebates, removing all partial-load incentives. New York Clean Heat requires heat pumps alone to meet the home's full heating load, in this case 100-120%, similar to Mass Save. The program requires contractors to provide documentation with all applications to show equipment sizing in accordance with program rules. While New York Clean Heat utilities do not require decommissioning for all whole-home incentives, they offer higher incentives if customers install the heat pump with integrated controls and decommission their pre-existing heating system. The utilities also require sizing and design training for contractors, offer online educational materials, and conduct a robust QA process that reviews sizing practices and identifies needs in their contractor base. The New York Clean Heat utilities have a field assessment process consisting of routine and systematic assessment activities to support quality installations and ensure that participating contractors comply with program rules, like sizing requirements.

The examples below illustrate four key strategies Vermont could adopt to enable heat pump programs that increase effective full load hours (EFLH) associated with ccASHPs.

- Heat pump sizing: The EEUs could encourage contractors to size heat pumps for the entire home. Programs to encourage whole home sizing and offset usage can refine EEU programs to achieve higher EFLH rather than remove the technology entirely from their energy efficiency portfolios. In the examples above, Maine, Massachusetts, and New York demonstrate several best practices for heat pump sizing to increase EFLH.

- Incentive Design: The EEUs currently offer a midstream incentive that is a flat rate regardless of project size. The EEUs could adjust this offering to increase based on the size of the unit or number of units for a specific project as a higher number of units indicates sizing and potential to displace. The EEUs could require additional materials or attestations from customers or contractors to ensure they sized units to heat or that contractors have helped customers understand when and how to switch between heat pumps and their back up system like Maine's program. Further, EEUs could increase contractor training on sizing and decommissioning best practices to ensure contractors' instinct is to cover the whole home and help grow trust in the ability of ccASHPs to meet heating needs in Vermont.

- Switchover temperature: The EEUs could require switchover temperatures for program participants. This is the outdoor temperature at which heating switches from heat pump to the supplemental/backup boiler or furnace. This would minimize Vermonters' use of supplemental or backup heat and ensure systems are set up to favor heat pumps as the primary heating source. Programs can set maximum allowable switchover temperatures and verify them to ensure heat pump customers are making full use of the technology. Programs can verify the switchover temperature during post-installation inspections and by analyzing average fuel costs. Additionally, programs can require integrated controls designed to prevent simultaneous heat and stage supplemental heat to only activate when needed and provide contractor training geared towards integrated controls. Mass Save uses both strategies. Additionally, programs can add checklists to rebate forms and/or require a photo or screenshot of settings. To proactively identify challenges among heat pump customers in their first winter, programs can conduct follow-up visits or review data from a sampling of recent installs.

- Rate design: The PUC could require the distribution utilities to offer electricity rates that make heat pumps cheaper to run and ensure the costs of heat pump operation reflect their costs to the grid. Current ratepayers with heat pumps are paying more into the grid, as Massachusetts recently found, and which led to rate reform for seasonal heat pump rates. CcASHPs can help all customers reduce increasingly expensive bills, including but not limited to fuel oil and propane customers.

A robust, representative AMI study will calibrate heat pump savings and program opportunities across a range of customers.

The draft MPS omits ccASHPs based on the results of a draft VT Heat Pump AMI Analysis (AMI Analysis). NEEP is concerned that this is an insufficient basis for their exclusion because the AMI Analysis has not yet been finalized and includes limited data. We see several opportunities to improve the methodology of the Vermont Heat Pump AMI Analysis and its application to the MPS.

Comparable analyses in neighboring states (e.g., Maine, Massachusetts, and New York) have combined AMI data with field metering to more accurately characterize real-world savings. Neighboring states have also established heat pump sizing requirements for programs to ensure they are designed to meet the full heating load. Other programs have gone further to require fossil fuel system decommissioning to earn heat pump incentives. Incorporating lessons from these studies could help Vermont calibrate its AMI Analysis.

Recommendation: Expand and update the AMI Analysis to include customers that have had their heat pumps longer.

The AMI Analysis only includes customers that purchased a ccASHP within the last two years, according to the presentation of AMI analysis results by DPS and its consultant, Ridgeline Energy Analytics. They note the increase in usage between the first and second years of heat pump ownership and that "long-term utilization may be higher than first-year utilization."[2] The study analyzes 7,058 meters of customers who have heat pumps, which may be a representative sample of total heat pump customers across the state (70,960, according to Efficiency Vermont's March 2025 Heat Pump Market Assessment). However, all these users in the AMI study installed the heat pumps within the prior two years, which may skew the results. At the Tier III TAG meeting, DPS provided an update that the evaluation contractor will perform studies on heat pump performance for years three and four of ownership to verify the increase in usage. This additional data would help the DPS and EEUs understand how heat pump users grow more confident with heat pump usage over time and would allow DPS to establish more accurate EFLH and energy savings assumptions in the MPS.

NEEP recommends that the PUC require the DPS and its consultants to update the AMI Analysis, so it includes heat pump customers that have had their heat pumps for more than two years. This will provide a more robust analysis of heat pump usage. It is worth investigating how this trend evolves over time and how customer comfort with new heating technologies improves. Additionally, experts find that households often increase heat pump use in the second year as they finish using existing stock of delivered fuels or grow more familiar with the heat pump system's capabilities. Evaluating EFLH by year of ownership would help distinguish between transitional behavior and true underperformance, ensuring that short-term data does not understate long-term savings potential.

Recommendation: Use AMI study results to identify opportunities for education and targeted intervention.

Other states that have had comparable results from heat pump usage studies have used engagement and targeted intervention to improve results. The DPS/Ridgeline presentation from July 2025 discusses how many customers 1) purchased heat pumps as a supplement to an existing heating system, 2) never received any directions/training on heat pump usage, and/or 3) are on gas heating systems (which displayed significantly lower usage of heat pumps than users on other backup system fuel types). It also mentions that there are a significant number of customers (18% of survey respondents) who reported no winter heat pump use at all. These findings indicate that there are opportunities for EEUs to change their program offerings for customers and contractors to emphasize the importance of education around heat pump operation, for example, by pursuing the program design changes that NEEP offers earlier in these comments. It could also be helpful to

[2] Figure 9 in the AMI Analysis shows a statistically significant increase in heat pump usage from the first year a customer owns a heat pump to the second year.

conduct a study on customer and contractor understanding to inform program changes and what educational materials would help customers increase their use of heat pumps.

In addition to customer education, several reviewers noted that program design also plays a key role. Open-ended incentives that allow fossil fuel backup systems to remain in place could limit energy savings. Neighboring programs in Massachusetts and New York have begun incorporating programmatic elements to limit this, as NEEP describes in the program examples above. Incorporating these lessons would help Vermont's AMI Analysis findings translate into actionable program improvements.

Recommendation: Clarify analytical methods and conservation assumptions.

NEEP found it difficult to follow how DPS and its consultants converted the AMI data from kWh usage to delivered Btus and drew conclusions about fossil fuel backup use. The analysis relies on HSPF2 values developed for IECC climate zone 4, whereas Vermont is primarily in climate zone 6. Using zone 4 assumptions likely underestimates delivered heat and exaggerates the appearance of limited system use. DPS and its consultants could refine the AMI Analysis by applying temperature-dependent COP curves (see Maine study) to more accurately estimate heating output.

NEEP also recommends that DPS and its consultants provide greater transparency in how they applied the equations and assumptions, including example calculations and uncertainty ranges. This added clarification would improve replicability and allow stakeholders to more confidently interpret results. These steps align with best practices seen in other regional evaluations, such as Maine's 2024 metered study.

We recommend that the AMI Analysis also clarify the proportion of ducted, ductless, and multi-head systems included in the dataset, as these configurations exhibit different performance characteristics and backup-heat behavior. Ducted systems may include built-in electric resistance elements that activate during colder periods, which could artificially inflate the measured electricity consumption in AMI data. Without distinguishing between compressor operation and resistance backup, the study may misattribute this usage to heat pump performance.

Recommendation: Add validation methods to strengthen conclusions.

While AMI data offers valuable insights into customer usage patterns, this data alone cannot confirm the degree of fossil fuel displacement or system efficiency. Pairing AMI analysis with limited field metering, thermostat runtime data, or targeted customer surveys would help verify whether low EFLH reflects partial system use or simply efficient modulation of variable-speed equipment. By design, variable speed heat pumps do not run at full capacity in moderate temperatures. It is also common for heat pumps to be oversized for heating such that they will never run at their full capacity. This does not mean something else is providing heat, but that the heat pump is in its modulation zone.

The Maine 2024 Heat Pump Impact Evaluation provides a model for this hybrid approach, combining AMI data with measured COP and runtime information to calibrate statewide assumptions. Implementing a small validation study of this type would enhance the credibility and interpretability of Vermont's findings. Validation

metering or thermostat runtime data would also help identify when backup resistance heat is engaged in ducted systems, ensuring that observed load shapes accurately reflect heat pump operation.

Recommendation: Update AMI study results and MPS to reflect public feedback.

The PUC convened a public workshop as part of the AMI Analysis proceeding to discuss the results of the draft study in July. Multiple entities, including multiple distribution utilities and EEUs, submitted comments on the draft analysis to raise important considerations, such as the exclusion of medium- and long-term heat pump usage analyses in calculating statewide EFLH. As noted earlier in these comments, this is an important consideration in understanding actual heat pump usage across Vermont and providing a representative sample of expected heat pump energy savings. The draft AMI analysis and the MPS should address these comments and qualify the takeaways from the draft analysis by acknowledging that it excludes this valuable information.

Updating avoided costs will ensure regulatory consistency and align with past practices.

Recommendation: The PUC should approve updated avoided costs and require DPS to use the latest EEU cost data in the MPS.

The EEU Process and Administration Document calls for DPS to biennially propose updated values for use in EEU cost-effectiveness screening including avoided costs of energy and other screening components. The PUC has not updated avoided costs for EEUs since Case No. 21-2436-PET in 2022 and is overdue to do so. Instead, the draft MPS uses a set of avoided costs that the PUC has not reviewed or approved. This is a departure from past practice which requires PUC approval of avoided costs.

NEEP recommends that the PUC update and approve new avoided costs for EEUs, which the PUC has opened a proceeding to do. NEEP suggests that the PUC use avoided cost data in the 2024 Avoided Energy Supply Components in New England Report (AESC), as these estimates are a more accurate representation of avoided costs. Updating these avoided costs through a proper proceeding can ensure there is alignment between the parties and provide an opportunity to identify and discuss any discrepancies prior to using them in the MPS. Without this opportunity for alignment, there is a risk that the MPS could eliminate measures without the proper assumptions and data. This would result in program inefficiencies and regulatory inconsistency. The DPS asked the PUC to approve updated avoided costs during the MPS workshop on September 19, 2025. This echoes the importance of these data for estimating the EEUs' energy efficiency potential.

NEEP suggests that the PUC approve updated avoided costs and require the DPS and its consultants to revise the MPS to use newly approved avoided cost data and to use the same avoided costs across measures. The final study should clearly explain the calculations for benefit cost ratios it contains. Following these recommendations would ensure that the MPS supports regulatory consistency and data transparency.

Conclusion

NEEP appreciates the opportunity to comment on the draft MPS. A robust MPS will help identify all cost-effective energy efficiency and guide the EEUs towards robust efficiency program implementation. It is now more important than ever for the EEUs to help Vermonters access ccASHPs and energy efficiency upgrades that make their electricity more affordable, especially in the absence of federal incentives for energy efficiency measures and ccASHPs.

NEEP is available to provide technical assistance to DPS, the consultants, or the EEUs on the MPS and other energy efficiency programs. Please contact us with any questions.

Sincerely,

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