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Case No. 22-2954-PET
Exhibit No. EVT-JP-2 (clean)

Amended Resource Acquisition Model Results for Efficiency Vermont's 2024-2043 Electric Demand Resources Plan and 2024-2033 TEPF Demand Resources Plan

Submitted to

The Vermont Public Utility Commission

Pursuant to Case No. 22-2954-PET Scheduling Order issued October 13, 2022

Amended November 17, 2023

Categories:

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Appendix A: Proposed Resource Acquisition Modeling Results

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Efficiency Vermont

Executive Summary

On September 26, 2023, the Vermont Public Utility Commission (PUC or Commission) issued an order[1] approving Efficiency Vermont's Demand Resources Plan (DRP) for the 2024-2026 period based on the resource acquisition (RA) modeling results filed on December 9, 2022. This filing by Efficiency Vermont contains amended resource acquisition modeling results for electric energy efficiency investment in Vermont for the 20-year period 2024-2043, and for thermal energy and process fuels (TEPF) efficiency investments for the 10-year period 2024-2033. These amended modeling results reflect the changes to electric portfolio model based on the Commission September 26, 2023 Order[2] and Efficiency Vermont's October 26, 2023 Compliance Filing[3] which reduced the 2024-2026 Flexible Load Management Program budget by $1.2M.[4] These amended modeling results also reflect the proposed DRP Amendment which shifts budgets within the electric portfolio to fund the continuation of the Energy Efficiency Modernization Act (EEMA) transportation and thermal program services and activities for the years 2024-2026. The continuation of EEMA programs, originally authorized by the legislature through the passage of Act No. 151[5] in 2021, was reauthorized when Act No. 44[6] was signed into law by Governor Scott on June 1, 2023. EEMA allows Efficiency Vermont to use part of its electric efficiency budget on programs and services that reduce greenhouse gas emissions (GHG) in the transportation and thermal energy sectors. The EEMA extension, as authorized by Act No. 44, only applies to the 2024-2026 period and is limited to up to $2M per year for a total maximum of $6M over the course of the three-year performance period. The amended modeling results reflect budget shifts among some major markets to accommodate the transportation and thermal related program activities in the 2024-2026 period. These budgets shifts were achieved by lowering the quantities of certain traditional efficiency measures within the residential and commercial/industrial (CI) portfolios and shifting these incentive budgets to fund EEMA programs. Non-incentive budgets were also shifted accordingly. These budget shifts are reflected in slightly reduced modeled savings results. No changes were made to the electric resource acquisition budget or model for years 2027-2043.

[1] *See* Case No. 22-2954-PET Order of 9/26/2023.

[2] *See* Case No. 22-2954-PET, Orders of 9/26/2023 and 11/13/2023 which establish the baseline DRP and provide clarifications and revisions that restored the $350,000 to the Refrigerant Management budget.

[3] *See* Case No. 22-2954-PET, Efficiency Vermont Compliance Filing of 10/16/2023.

[4] Note: These two changes, the reduction of the overall budget by $350,000 over the 3 years and shift of $1.2M Flexible Load Management budget to fund other efficiency measures in the portfolio with an increase of savings was previously captured in Efficiency Vermont's Compliance Filing of 10/26/2023.

[5] "Act No. 151" refers to *An Act Relating to Energy Efficiency Entities and Programs to Reduce Greenhouse Gas Emissions in the Thermal Energy and Transportation Sectors* as enacted by the Vermont General Assembly and signed into law on September 23, 2020.

[6] "Act No. 44" refers to *An act relating to energy efficiency modernization* which became effective June 1, 2023. This act extends for an additional three years the pilot program established in Act No. 151 that allows thermal energy and process fuel efficiency funding to be spent on measures allowed under the pilot program.

This model and results were also amended to reflect the impact of the TEPF budget correction for years 2027-2033 as ordered by the PUC on September 26, 2023 and included in Efficiency Vermont's Compliance Filing of October 26, 2023. The TEPF budget and modeling results were adjusted down by approximately 5.8% to account for a correction in how inflation was applied to the TEPF budget in years 2027-2033. No changes were made to the TEPF model for years 2024-2026 and these budgets and modeling results remain consistent with those filed on December 9, 2022. The TEPF budgets reflect the expected Forward Capacity Market (FCM) and Regional Greenhouse Gas Initiative (RGGI) revenue forecasts over the ten-year period. They do not include any additional funding sources such as those resulting from the American Rescue Plan Act (ARPA) or the Inflation Reduction Act of 2022 due to the uncertainty of the magnitude and timing of these potential additional funding sources. It is anticipated that any changes or impacts resulting from these additional funding sources will be addressed in a future filing in this Demand Resource Plan Proceeding (DRPP).. The description of resource acquisition services and activities described herein reflect a significant majority of proposed activities and costs in the Efficiency Vermont comprehensive Demand Resources Plan Update Proposal being submitted to the Vermont Public Utility Commission pursuant to the Commission's Scheduling Order in Case No. 22-2954-PET issued on October 13, 2022.

In this proposal, Efficiency Vermont presents the amended modeling results and impacts of proposed Efficiency Vermont programs and services. At the conclusion of this proceeding, Efficiency Vermont will be responsible for implementing electric programs and services with ratepayer funds. It is also responsible for implementing TEPF programs and services with revenue from Efficiency Vermont's participation (on behalf of electric utility ratepayers located in the Efficiency Vermont service area) in the Independent System Operator New England (ISO-NE) Forward Capacity Market (FCM) and with state revenue from Vermont's participation in the Regional Greenhouse Gas Initiative (RGGI). Creating lasting, high-value benefits for Vermont's ratepayers is a core principle of operating Efficiency Vermont. Thus, in this exhibit, Efficiency Vermont offers proposed electric and TEPF resource acquisition models that generate cost-effective and lasting energy savings, cost savings, and other benefits for Vermonters today and into the future. This filing presents the proposed electric and TEPF resource acquisition models methodologies and results. Collectively, the electric portfolio modeling and TEPF portfolio modeling are referred to as the DRP Model. The results demonstrate performance targets within the boundary conditions established by the modeling assumptions developed in collaboration with stakeholders and with the Vermont Department of Public Service (DPS or Department) and are grounded in regulatory and statutory requirements and objectives.

Description of the Proposed Resource Acquisition Models

Efficiency Vermont submits herein the proposed electric and TEPF resource acquisition models**.** The amended electric model reflect both a continuation of current program offerings in addition to new measures and services, in alignment with approved[7] budgets and continuation of EEMA programs in the 2024-2026 period. These models balance performance within the framework of the Quantitative

[7] *See* Case No. 22-2954-PET, Order of 9/26/2023.

Performance Indicators (QPIs), including both Performance Indicators and Minimum Performance Requirements (MPRs) for the 2024-2026 performance period. Furthermore, the models balance priorities across least-cost programs, services, and technologies designed to maximize performance and transform markets with other performance objectives, such as residential and low-income spending, geographic equity, etc. The electric model is based on approved budgets that are adjusted at a rate of 2% inflation starting from the current 2023 budget and continuing through the 20 year 2024-2043 DRP forecast.

The amended electric model reflects the following budget shifts to fund the Efficiency Vermont's EEMA transportation and thermal program activities. These programs are expected to utilize the full $6M funding authorized over the three years of the 2024-2026 DRP performance period. To fund these EEMA programs, certain residential and CI measure quantities were reduced which enabled these incentives to fund EEMA measures. The impact on energy savings of shifting incentives from these traditional efficiency measures to EEMA transportation and thermal measures is reflected in the modeling results. A portion of the non-incentive budgets of these residential and commercial programs were also shifted to support the EEMA programs. Combined the incentive and non-incentive budgets shifted from the residential and CI portfolios equal $2M per year.

Efficiency Vermont identified several areas within the residential and CI sectors of the electric resource acquisition model that could accommodate reduced spending in order to accommodate the EEMA programs while still able to meet customer and partner needs. The $2M per year budget shift includes the following activities:

> A reduction of quantities of certain measures and program costs within the Residential Existing Homes Portfolio enables $400k/yr in incentives and $200k/yr in non-incentives budget to shift to EEMA program activities.
>
> A reduction of quantities of certain measures within the Commercial and Industrial Business Existing Facilities portfolio enables $950k/yr in incentives and $450k in non-incentives to shift to EMMA program activities.
>
> To fund EEMA transportation program activities the Efficient Products incentive budget increased by $510,000 per year to support dealership sales and infrastructure incentives and non-incentive budget increased by $520,000 per year to support the program.
>
> To fund EEMA thermal program activities the Low Income Single Family Retrofit incentive budget increased by $840,000 to support heat pump fuel switch projects for low income households. The low income non-incentive budget was also increased by $130,000 per year to support the program.

Efficiency Vermont also submits for the Commission's consideration the amended TEPF resource acquisition model**.** The TEPF model covers a ten-year period for residential and commercial services that reduce the use of unregulated fuels, while meeting minimum spending targets in residential and low-

income market sectors. Consistent with the modeling approach for the current 2021-2023 period, this model reflects the approved budgets for inflation throughout the entire ten-year modeling analysis.

The amended TEPF model reflects the approved adjustment to the budget for years 2027-2033 to accurately account for the effect of inflation from 2024-2026 on the 2027-2033 budgets which had been incorrectly applied to the TEPF model in the initial December 9, 2022 filing. This change reduces the TEPF budget by approximately 5.8% each year in 2027-2033 which results in lower modeling results of approximately 5.8% across each of the metrics for these seven years. This change does not impact the model in years 2024-2026 and no changes are reflected in this amendment for those first three years. Efficiency Vermont built these proposed models using Efficiency Vermont's modeling tool for the DRP, which is based on measure-level details of costs, savings, and customer adoption. The tool allows for planning and projecting the impact of future efficiency programs and measures across the Efficiency Vermont portfolio for up to 20 years. In particular, the modeling tool gives Efficiency Vermont a platform for designing future programs, creating estimates for adoption rates of efficiency measures, assigning costs, and ascertaining performance impacts across all levels of implementation. Through the tool's portal, Efficiency Vermont can share these results with the Department and other stakeholders.

Modeling Results

Electric Resource Acquisition Results

The results from the amended electric resource acquisition model for the upcoming DRP update performance period are summarized in Table 1.

Table 1: Electric resource acquisition modeling results for the 2024-2026 performance period.
(Amended 11-17-2023)

Electric	Performance Period
Performance Output	**2024-2026**
Total Resource Benefits	$172,230,500
Annual MWh	184,000
Summer Peak kW	19,700
Winter Peak kW	27,100
Lifetime MWh	2,400,300
Greenhouse Gas (GHG) Reductions (Electric-funded energy + non-energy) - Metric Tons CO_2e	124,300
Flexible Load kW	2,160

TEPF Resource Acquisition Results

TEPF budgets for the 2024-2033 period are higher than in the currently approved DRP because of updated, increased RGGI revenue forecasts. Although there are higher overall budgets, there is a projected 17% or $1.6M decrease in FCM revenues for the 2027-2029 period versus 2024-2026. However,

the change is primarily attributable to the spend down of the projected $5.1M TEPF fund balance during the 2024-2026 period. Therefore, the TEPF model reflects a decrease in budget and quantity of TEPF savings (measured in millions of British thermal units or MMBtu) in years 2027-2033, compared to the 2024-2026 performance period. As budgets significantly drop in 2027, savings are also expected to decline. Efficiency Vermont projects a long-term trend of flat FCM revenue from 2027 continuing through 2033, due to anticipated stable prices for demand resource capacity in the FCM auctions. TEPF revenue and expense forecasts will likely be reviewed and updated periodically as contemplated in the PUC's Order in Case No. 21-1616-PET issued on August 31, 2021.

The TEPF metric of number of housing units weatherized represents the total number of housing units, both single family and multifamily, and funded by both TEPF and electric funds. Although no changes were made to the TEPF model for years 2024-2026 as part of this EEMA amendment, because the number of electrically heated homes weatherized is proposed to be reduced to fund EEMA, the TEPF modeling results and QPI for number of housing units weatherized is reduced from 4,100 to 3,700 housing units.

The results from the TEPF resource acquisition model for the upcoming performance period are summarized in Table 2.

Table 2: Proposed TEPF resource acquisition modeling results for 2024-2026 performance period. (Amended 11/17/23)

TEPF	**Performance Period**
Performance Output	**2024-2026**
Annual MMBTU	363,100
Residential Single-Family Comprehensiveness	100%
a. Air Leakage Reduction	34%
b. Insulation	44%
c. Weatherization & Heating Systems	16%
Number of Residential Housing Units Weatherized	3,700
GHG Reductions (TEPF-funded energy + non-energy) - Metric Tons CO_2e	21,000

Electric Resource Acquisition Model

Electric Model Budget

The resource acquisition budget proposed by Efficiency Vermont starts at $41,311,162 per year in 2024 and is then adjusted for inflation at 2 percent (2%) for years 2025 – 2043 (that is, the 2024-2043 planning budget is set in *nominal* dollars). However, the proposed electric resource acquisition model uses 2024 real dollars and does not adjust for inflation. To ensure accuracy with the results, Efficiency Vermont

modeled each year's budget in 2024 dollars. In practice, this will mean that inflation must be backed out from the proposed nominal budgets for 2024-2043. The result is a modeled budget of $41.3 million, flat in 2024 dollars, over the course of the remaining 20-year planning period (Figure 1).

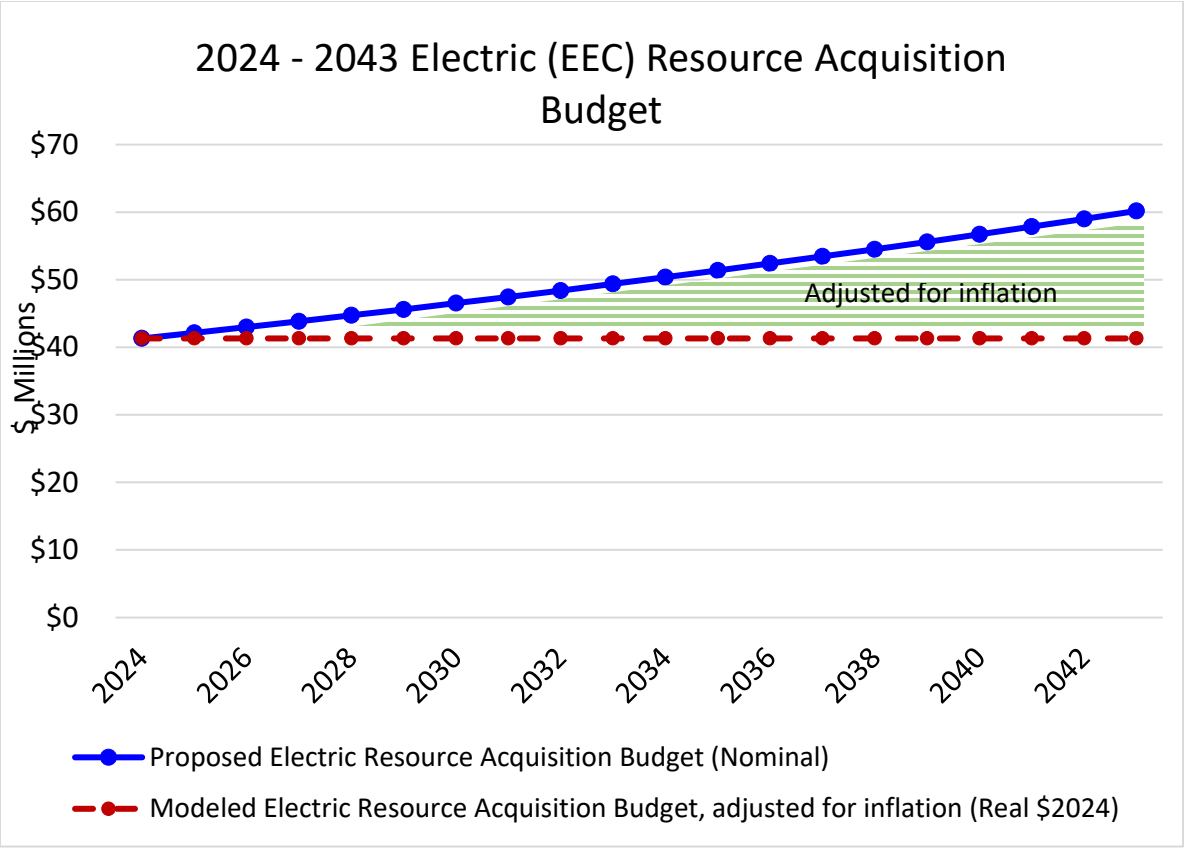

Figure 1: Efficiency Vermont proposed electric resource acquisition budget in nominal and real 2024 dollars.

The proposed electric resource acquisition model represents a portfolio that balances continuation of Efficiency Vermont's core programs at approximately 89percent of the proposed electric budget, with allocation of approximately 11 percent of the proposed budget for continuation of evolving services including transportation, energy savings accounts, flexible load management, and refrigerant management. As described in the sections that follow, the proposed model and budgets for these core and evolving services are realistic, cost effective, and result in robust performance targets for Efficiency Vermont.

Electric Model Description

The electric resource acquisition model is a twenty-year electric energy efficiency forecast of achievable results based on a portfolio of efficient technologies offering cost-effective energy savings for residential, commercial, and industrial customers across Efficiency Vermont's service territory. The model determines the budget required to achieve these results based on anticipated incentive levels required for the

successful market adoption for each technology and necessary non-incentive program costs to support program development, implementation, and customer participation. The model uses a comprehensive *bottom-up* approach (that is, building the model using individual measures), enabling modelers to adjust the quantities of over 700 unique measures or technologies per year (such as "cold climate heat pumps"), spanning 13 "end-use" categories (such as "space heat efficiency") and 12 different "reporting categories" (such as "Existing Homes"). The measure quantities are forecasted based on a combination of historical program performance balanced with market intelligence gathered from customers, vendors, contractors, designers and other key stakeholders. Technology penetration and stocking studies such as the Department's residential and commercial new and existing building market characterization and assessment studies and recent potential studies inform the model forecasts. Studies developed by American Counsel for an Energy-Efficient Economy, Consortium for Energy Efficiency, New Buildings Institute, United States Department of Energy (DOE), and the Design Lights Consortium also inform the model forecasts. In addition, the direct experience of Efficiency Vermont's program managers, subject matter experts, subcontractors, and customer facing staff is critical to ensuring these model forecasts are as accurate as possible. All these sources help inform the model inputs and development. The amended model results reflect the budget shifts amended to fund the EEMA transportation and thermal program activities.

Approach

The proposed electric resource acquisition model is designed to ensure the program portfolio can continue to achieve performance results, while delivering high customer value to ratepayers. Certain QPIs and MPRs are in tension with each other since each are designed to achieve different policy and statutory objectives. Efficiency Vermont has a 20-year track record of successfully achieving these performance targets, because of the wide variety of programs, services, markets, technologies, and activities that Efficiency Vermont implements. This strategy ensures that the collective portfolio meets the many and varied performance metrics. The proposed electric resource acquisition model is designed on this successful historical experience, modified across the next 20 years to account for shifting trends in technology, product market saturation, rising baselines, new federal and state efficiency standards, and expected market conditions including continued challenges posed by rising inflation, supply chain disruptions, and workforce shortages. It also reflects the need to continue to invest in evolved services, such as addressing GHG emissions caused by refrigerant leakage and systems to enable shifting peak loads to times when the energy mix is cleaner, cheaper, and more abundant.

Efficiency Vermont assumes that its programs and services in the 2024-2026 performance period will have continuity with the programs and measures being implemented today. Efficiency Vermont used the existing program and measure penetrations as a foundation for model development by loading the modeling tool with known historical measure quantities, savings, costs, and incentives from 2021 (the most recent full year of verified program performance at the time of modeling). Beginning with this starting point, Efficiency Vermont then updated these efficiency measure characterizations and quantity levels to incorporate changes adopted since 2021. These changes included updates to the Technical Reference Manual (TRM); updates to state and federal efficiency standards; and recent or anticipated

program changes affecting measure quantities, savings, costs, or incentive structures. In particular, updates were made to measure characterizations to reflect the rising cost of equipment and labor due to high levels of inflation and the ongoing challenges caused by the global pandemic which disrupted supply chains and continues to impact workforce availability.

Efficiency Vermont also made sector-level modeling assumptions for the commercial and industrial (CI), residential (RES), and low-income (LI) markets, as developed collaboratively with the DPS and other Vermont energy efficiency utilities (EEUs) to provide consistent assumptions across the DPS Potential Studies and Efficiency Vermont DRP model. Within these sectors, Efficiency Vermont created budgets for each initiative, basing them on historical experience and the current mix of programs and services. Program Staff then updated spending allocations of spending to account for (1) expected future shifts in both markets and technologies that affect the potential for energy savings, and (2) the amount of investment needed to overcome customer barriers to participation. For example, after the first few years Efficiency Vermont anticipates a rapid decrease in savings from lighting while increasing savings from refrigeration, industrial process, and space heat efficiency measures. Each trend required shifting program costs and budgets over time.

The proposed electric model makes assumptions about quantities of measures across the 20-year model. These assumptions relied on Efficiency Vermont best estimates of market growth opportunities, technology saturation levels, anticipated technology advancements and future code changes, and planned customer engagement strategies. Efficiency Vermont staff identified measures with anticipated high savings and adoption potential, and adjusted costs to increase participation and market share. Costs for technical support, customer engagement, supply chain partnerships, and targeted marketing were identified and categorized as program expenses within non-incentive costs. Efficiency Vermont managed the modeling for savings and budgets to meet all policy and modeling assumptions agreed to with the DPS.. The EEMA amended model reflects an increase in residential spending to approximately 47% per year compared to the modeling results used for the original DRP model previously reviewed by the Commission in Case No. 22-2954-PET. This varies slightly from the Department's initial proposed modeling assumptions in its Potential Study[8] to have residential spending shift to 46% beginning in 2024 through 2032, and 48% from 2033 through 2043.

Trends

The electric resource acquisition model adapts to a continuing, rapid shift in the portfolio savings away from lighting to other technologies. As identified in the previous DRP, the model contains very little screw-based lighting quantities beginning in 2024, limited to a small quantity for low-income customers, some connected bulbs (or "smart" bulbs) planned for promotional activities, and some limited multifamily lighting. In 2022 the Department of Energy (DOE) enforced the backstop provision of the Energy Independence and Security Act (EISA) which prohibits the sale in the US of any general service lighting

[8] Exhibit DPS-1, *Public Service Department Initial Draft Potential Study Demand Resource Plan Proceeding,* dated July 27, 2022, at pages 28-29.

(GSL) products that have an efficacy of less than 45 lumens per watt. This federal standard change essentially mandates that all GSL lighting manufactured and sold in the US utilize Light Emitting Diode (LED) technology. As a result, other than the exceptions noted above, there is no residential lighting in the model. In addition to the federal rule changes, Vermont passed legislation (Act No. 120)[9] in 2022 to limit the sale of mercury-containing equipment, which bans the sale of all four-foot fluorescent lamps in the state beginning in January 2024. To support commercial and industrial customers who currently have fluorescent lighting meet the intent of this legislation and reduce energy use, Efficiency Vermont and Burlington Electric reached an agreement with the DPS to enable the CI lighting program to continue to support retrofitting fluorescent lighting to LEDs and claim savings through 2026. After that date, any lighting savings is limited to supporting the adoption of advanced lighting controls, lighting systems redesigns to reduce energy, and ongoing support of any lighting types not impacted by Act No. 120. Despite the removal of a significant portion of the general service and upstream lighting savings from the model, lighting still remains prominent, especially in the CI market as LED fixtures continue to offer significant energy efficiency opportunity as a retrofit of traditional linear fluorescent, at least through 2026. Figure 2 shows the expected trends over time in annual MWh savings for various major end-uses across the electric portfolio.

[9] "Act No. 120" refers to *An act relating to prohibiting the sale of mercury lamps in the State* as enacted by the Vermont General Assembly and signed into law on May 19, 2022.
https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Documents/ACT120AsEnacted2022.pdf

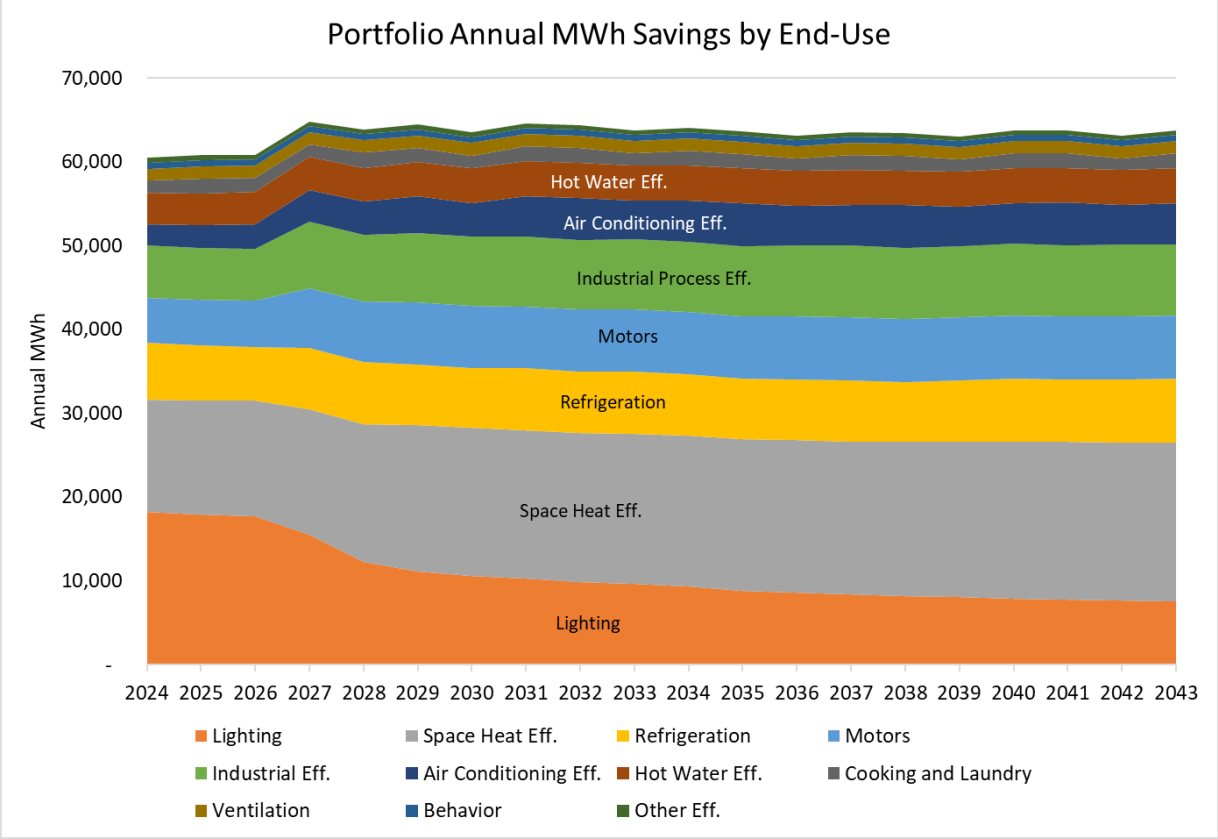

Figure 2: Electric portfolio annual MWh savings by end-use. (Amended 11-17-2023)

Over time Efficiency Vermont will continue to ramp down its focus on lighting, while phasing in new program measures and expanding existing ones. For example, in the RES market, Efficiency Vermont expects to capture additional savings from space heating, water heating, laundry, and refrigeration end-use technologies. In the CI market, Efficiency Vermont proposes an expansion of industrial process, refrigeration (including refrigerant management), motors, air conditioning, and space heating. Figure 3 provides an illustration of this effect, excluding the scale-skewing effect of lighting on the figure, showing that over the course of the next 20-years, Efficiency Vermont will expand its work in non-lighting markets to compensate for the reduced level of savings from lighting technologies.

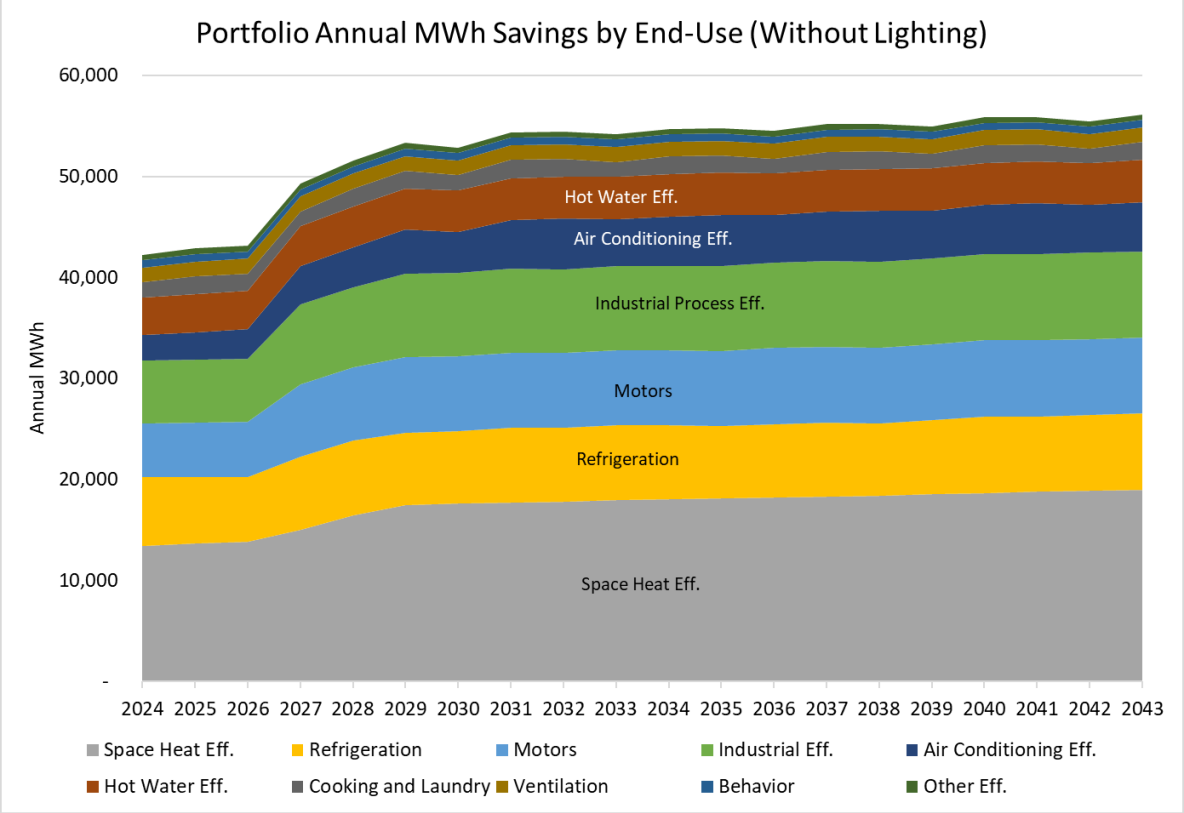

Figure 3. Electric portfolio annual MWh savings by end-use (with lighting removed). (Amended 11-17-2023

These potential savings forecasted for some end-uses, such as lighting, vary significantly from the previous DRP model (2021-2040). Other end-uses, such as industrial process, have forecasted savings that are consistent with the previous DRP. Figure 4 compares the total MWh savings forecasted for the three period 2024-2026 by end-use between the previous (2021) and current (2024) DRP Update models. Lighting is the most dramatic difference with forecasted savings in the current model at about 60% of that of the last DRP (See description of lighting assumptions in *Technology Trend* section). Most other end-use technologies are similar in estimated levels of savings, some slightly higher or slightly lower in this DRP Update compared to the last DRP.

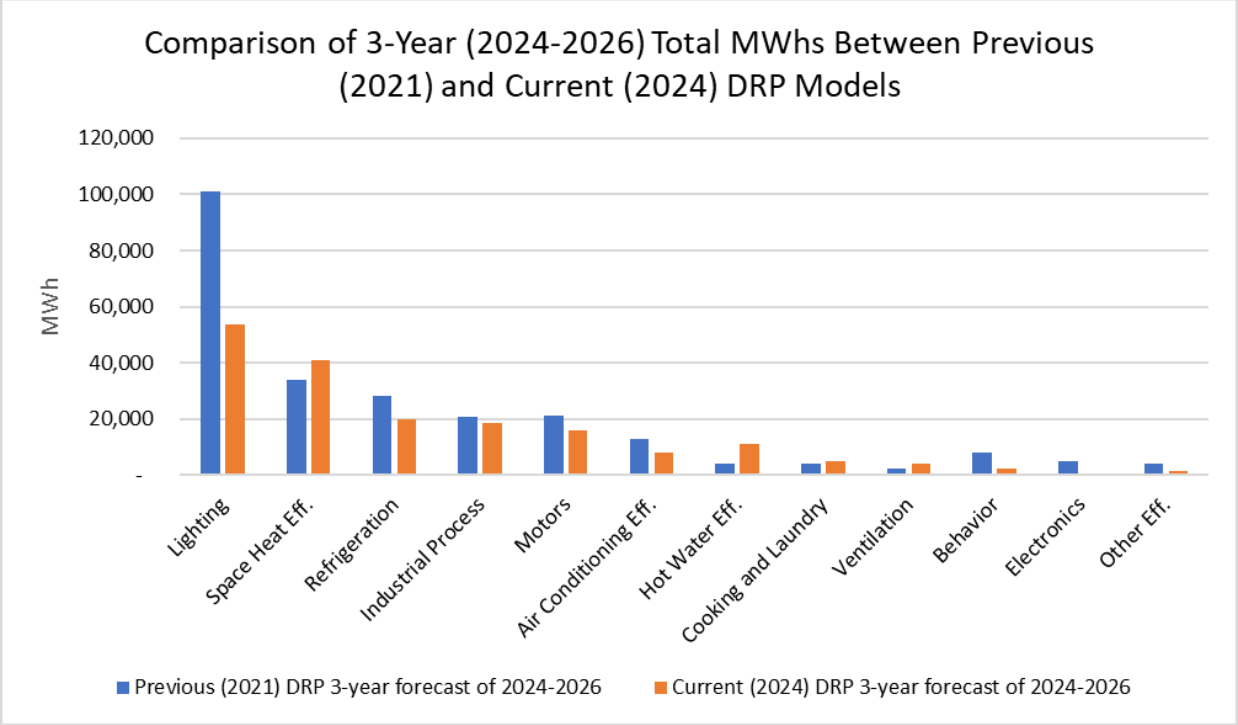

Figure 4. Comparison of forecasted 3-year (2024-2026) total MWh by end-use between previous (2021) DRP and Current (2024) DRP models. (Amended 11-17-2023)

In both the CI and RES markets, the increase in non-lighting measures (which historically have required larger customer incentives) causes the portfolio cost per MWh savings to be higher than in recent performance periods. The shift away from lighting measures, especially lighting products delivered through less costly upstream or "market opportunity" program delivery approaches, will require higher levels of customer engagement and information sharing to stimulate the market for the more complex efficiency measures. The necessary engagement and technical support for information sharing will increase non-incentive costs of implementing initiatives for the more complex and sophisticated efficiency measures and systems. The effect is demonstrated in Figure 5 which compares the acquisition costs (i.e., the dollars spent per first-year MWh saved) of the previous DRP model, which had a much greater amount of lower cost lighting measures in the early years, to the current DRP model.

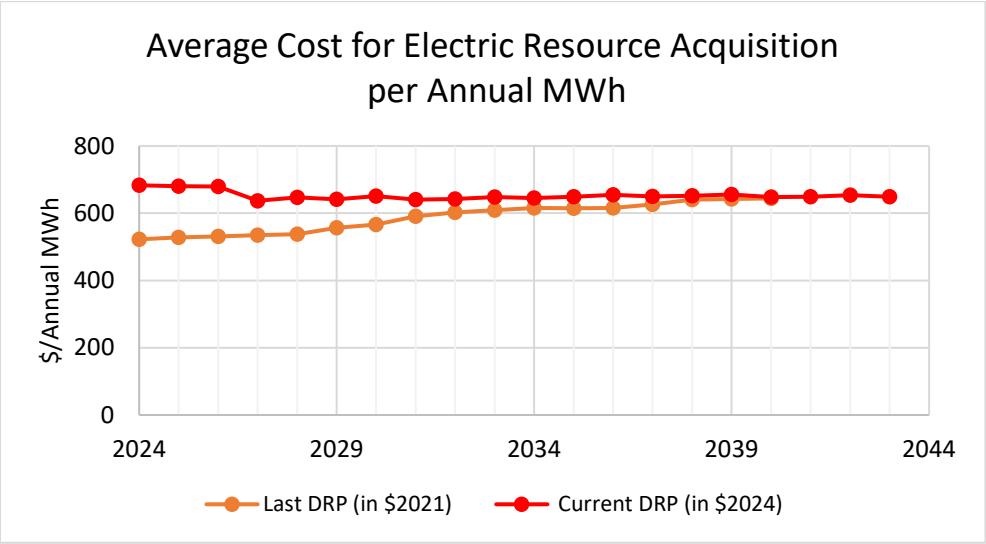

Figure 5. Electric portfolio total resource acquisition costs in dollars per annual MWh. (Amended 11-17-2023)

Electric Portfolio Modeling Results

Figures 6 through 11 show the electric modeling results over the 20-year period for total resource benefits, annual MWh savings, summer and winter peak kW reductions, lifetime MWh savings, greenhouse gas emission reductions, and the amount of flexible kW assets forecasted to be installed.

Figure 6 shows the expected performance for electric total resource benefits (TRB), across the portfolio and presented in 2024 dollars.

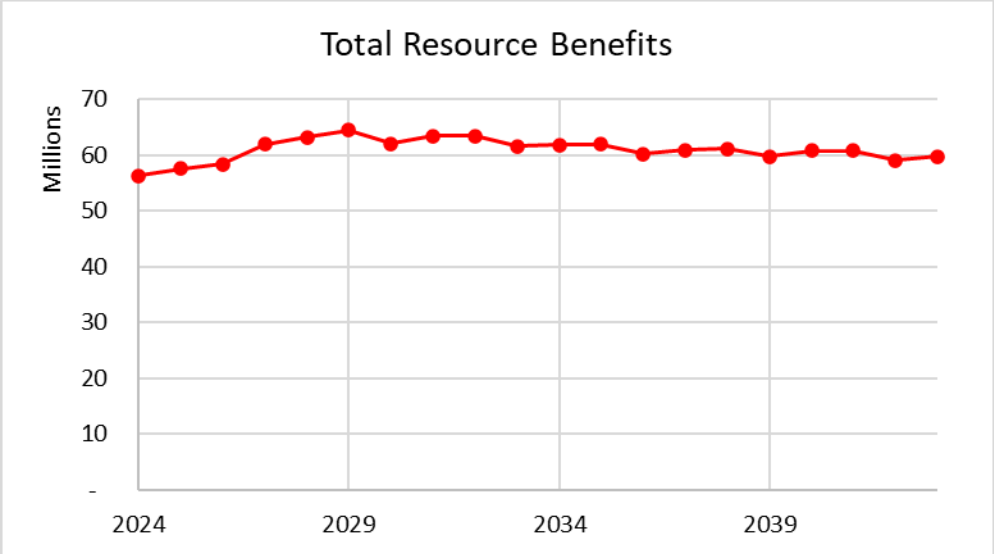

Figure 6. The total resource benefits of the proposed electric resource acquisition model, in 2024 dollars. (Amended 11-17-2023)

Figure 7 presents the modeling results for electric first year annual MWh savings across the period.

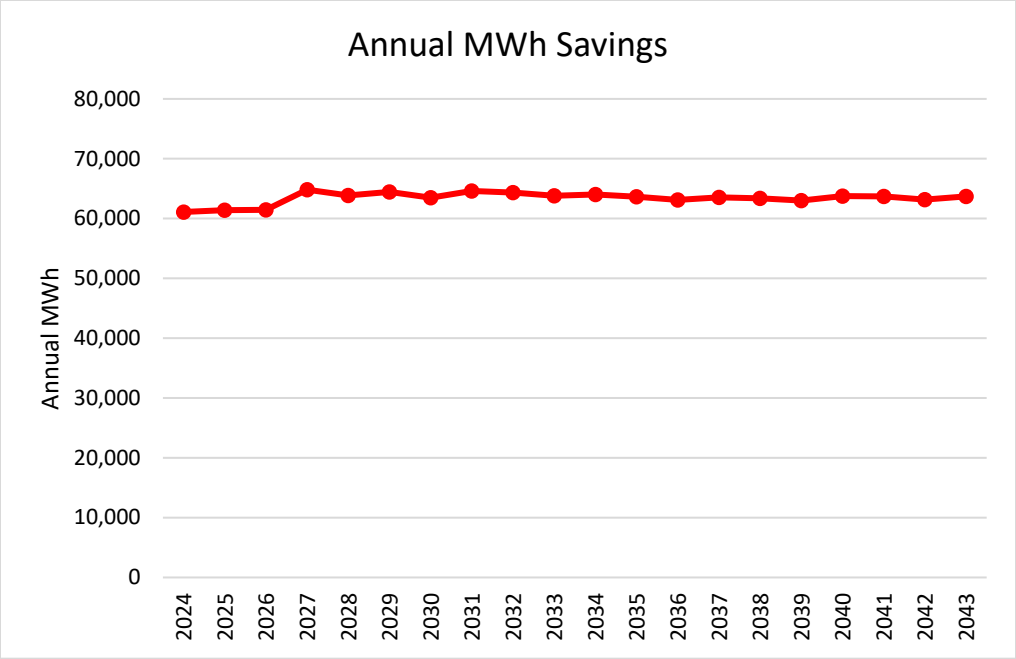

Figure 7. Electric portfolio annual MWh savings. (Amended 11-17-2023)

Figure 8 presents the modeling results for electric winter and summer peak reductions in kW across the period.

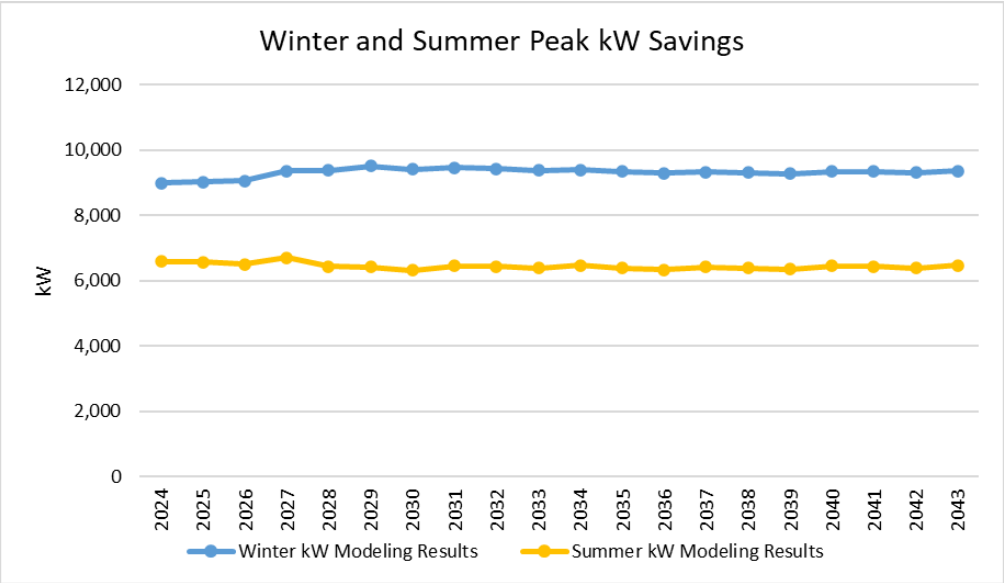

Figure 8. Electric portfolio annual summer and winter peak kW savings. (Amended 11-17-2023)

Figure 9 shows the modeling results for lifetime MWh savings across the period.

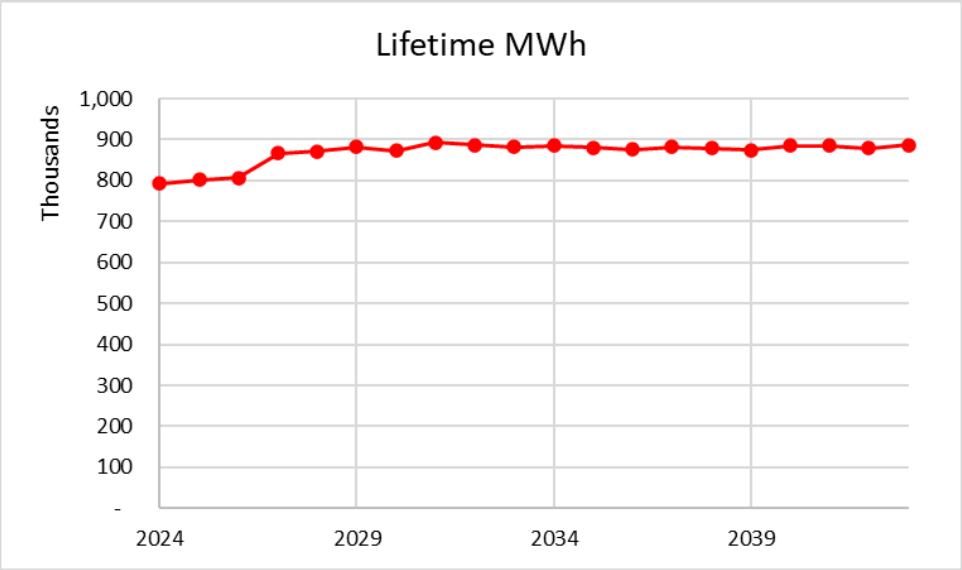

Figure 9. Electric portfolio lifetime MWh savings. (Amended 11-10-2023)

Figure 10 shows the modeling results for combined electric energy and non-energy GHG reductions in metric tons of CO_2e across the period.

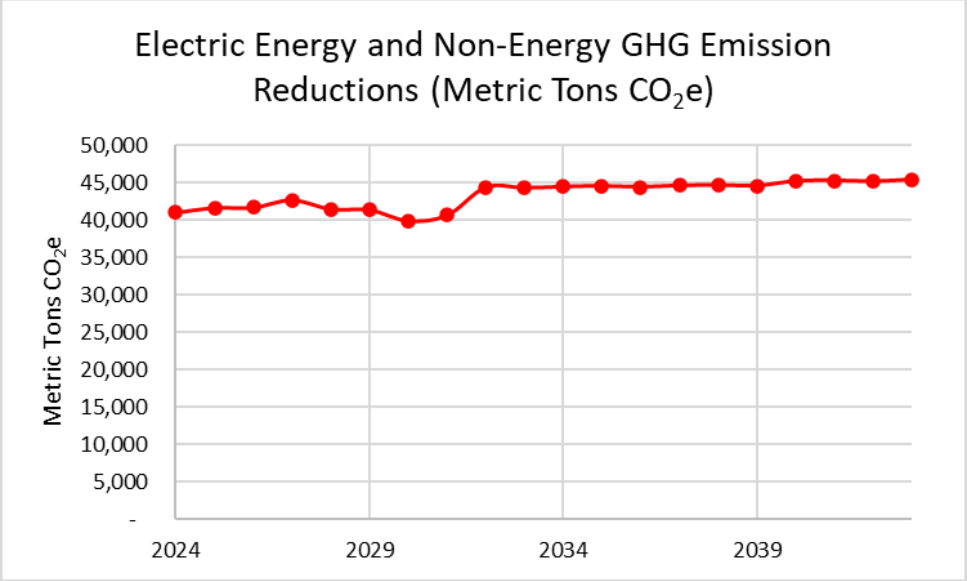

Figure 10. Electric GHG emission reductions (energy and non-energy). (Amended 11-17-2023)

Figure 11 shows the modeling results for the amount of flexible load kW assets forecasted to be installed across the period.

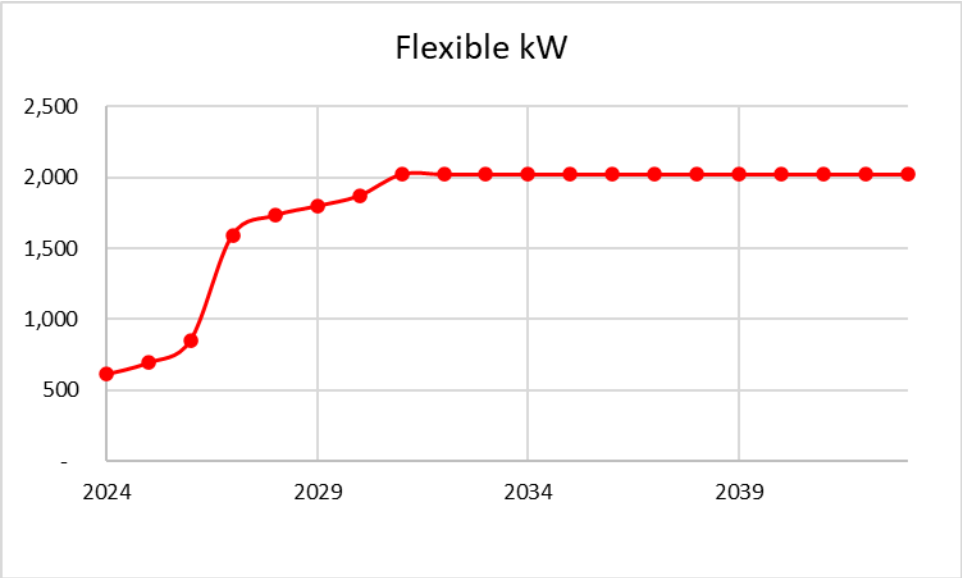

Figure 11. Electric portfolio flexible load kW forecast. (Amended 11-17-2023)

Modeling Methodology and Sector Results

Modeling Methods

Efficiency Vermont used its web-based modeling tool to create a bottom-up, measure-by-measure savings analysis to develop the proposed models for both the CI and RES portfolios. Efficiency Vermont began with the 2023 budget and increased it by 2% per year for inflation. These budgets beginning in 2024 are lower than what is in the currently approved DRP. These budgets were a starting point, from which target budget sector splits were applied for RES, LI, and CI, modeling assumptions developed in collaboration with the DPS and other EEUs during the development of the Department's statewide *Vermont Energy Efficiency Market Potential Study* (Potential Study).[10] The one exception to these sector split assumptions is that Efficiency Vermont is proposing to modify the residential and commercial budget sector splits assumed in the 2021-2040 DRP to 47% residential/53% C&I through 2026 as compared with the DPS proposal of 46% residential/54% C&I beginning in 2024. All other modeling assumptions remain consistent with the Department's Potential Study modeling assumptions. Efficiency Vermont built the bottom-up model to achieve these various targets starting from the current portfolio, then adjusted up or down depending on the particular technology forecast, market opportunity, measure saturation, and long-term objectives and priorities for the program and the state. Efficiency Vermont also updated the measures to reflect changes to the Technical Reference Manual (TRM), updated state and federal efficiency standards, updated net-to-gross ratios, changing baselines, updated avoided costs which impacted measure screening, and changes based on the most recent program and market shifts. Figure 12 shows the distribution of incentives, by end use, across the period showing the decreasing incentive spending on

[10] Exhibit DPS-1, *Public Service Department Initial Draft Potential Study Demand Resource Plan Proceeding*, dated July 27, 2022 at pages 28-29.

lighting and increase in other end-uses, especially space heating efficiency which includes heat pumps, weatherization of electrically heated homes, and space heating controls such as advanced thermostats.

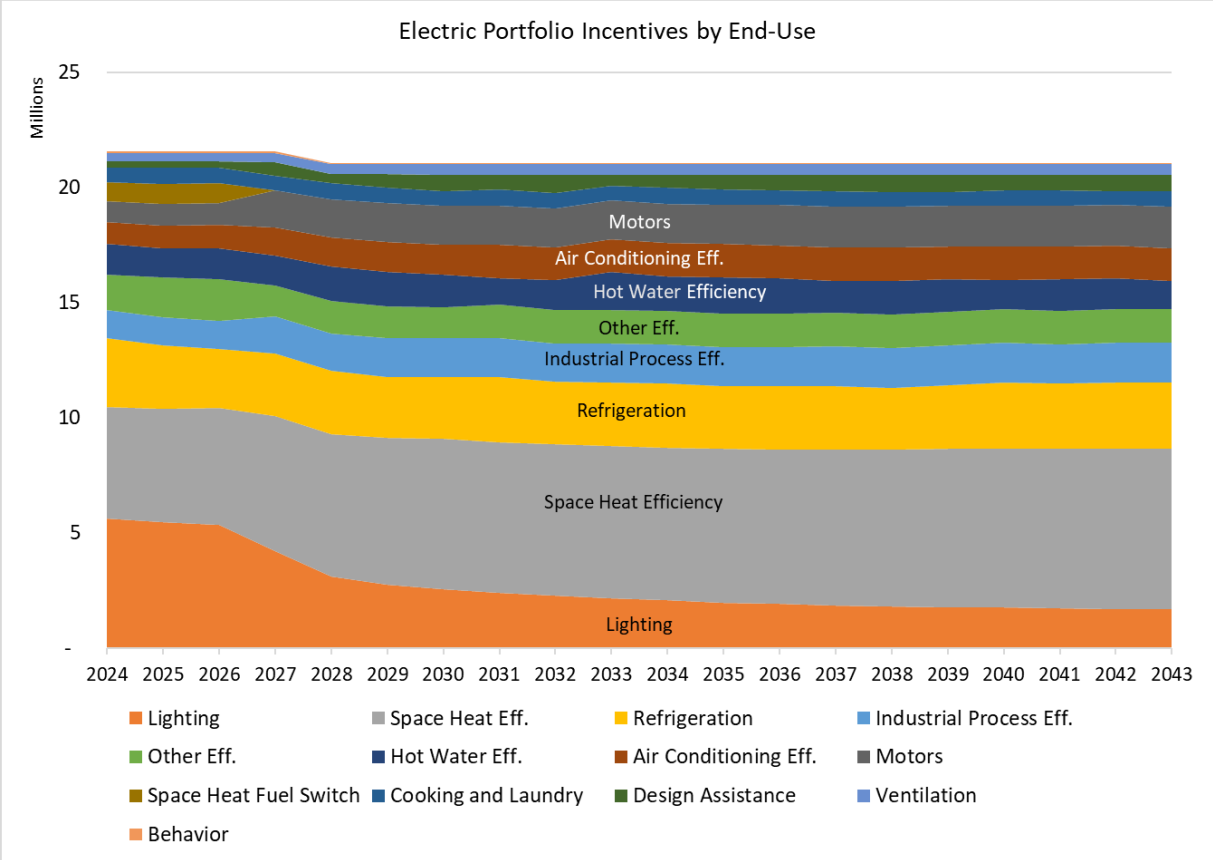

Figure 12. Electric portfolio incentives by end-use. (Amended 11-17-2023)

Efficiency Vermont populated the tool with actual measure quantities and characteristics from the most recent year of verified performance (2021). Efficiency Vermont updated each of these measure characteristics to reflect expected changes relative to the current TRM, to state and federal codes and standards, baseline changes, updated avoided costs, and program shifts in incentives or savings. Modelers adjusted measure penetration levels for each year to correspond with anticipated growth in markets. Efficiency Vermont program, planning, and field staff informed the adjustments. They are the single best source for market knowledge, technical expertise, and direct field contact with Vermont businesses and homeowners. Efficiency Vermont also works closely with organizations, manufacturers, suppliers, and state and federal agencies to better understand and estimate future market trends. Program staff reviewed the most recent PSD Market Characterization and Assessment Studies[11] which provide market adoption data for various technologies across the residential and commercial existing buildings and new construction markets. This intelligence informed the extent to which savings from markets, programs, and modeled technologies could remain flat, grow, or decline over the 20 years.

[11] https://publicservice.vermont.gov/energy_efficiency/eeu_evaluation

Residential Model

For the amended RES model, Efficiency Vermont separated the bottom-up, measure-by-measure modeling approach into the following residential programs:

- Efficient Products
- Low-Income Multifamily New Construction
- Low-Income Multifamily Retrofit
- Low-Income Single-family New Construction
- Low-Income Single-family Retrofit
- Market Rate Multifamily New Construction
- Market Rate Multifamily Retrofit
- Market Rate Single-family New Construction
- Market Rate Single-family Retrofit – Existing Homes

The RES portion of the total (residential and business) resource acquisition budget never goes below a minimum of 43 percent of the total resource acquisition budget and increases to 48 percent by 2033. Program staff set budget minimum requirement targets for LI programs and services at 12.1 percent which is an increase from the current spending target of 11 percent modeled for the 2021-2023 period, reflecting an agreement with the DPS in the Potential Study modeling assumptions.[12] Staff then built target incentive and non-incentive budgets for each of these reporting categories, basing the numbers on historical experience and expected areas of growth from technology and market perspectives. The addition of the EEMA Low Income Fuel Switch program increases the low income budget from 12.1% to 14.6% of the total RA budget.

As a starting point, Efficiency Vermont distributed measure level data from 2021 across these reporting categories, informed by experience and by guidance from program staff. Staff then made shifts, basing the direction of those shifts and their amounts on anticipated future program plans, baseline shifts, and remaining market potential. Efficiency Vermont then added characterizations to the model for new measures that were not contained in the 2021 data to the model. To address the significant loss of lighting savings in the residential market from EISA impacted baseline and market transformation shifts in screw-based lamps and energy star fixtures, Efficiency Vermont plans to continue accelerating the adoption of many other technologies where potential growth is feasible. The most significant end use categories and measures modeled for growth in the residential portfolio are:

- **Space heating.** Heat pumps, advanced thermostats, integrated controls, and thermal shell measures on electrically heated homes
- **Water Heating.** Heat pump water heaters
- **Laundry.** Clothes washers and heat pump clothes dryers

[12] Exhibit DPS-1, *Public Service Department Initial Draft Potential Study Demand Resource Plan Proceeding*, dated July 27, 2022 at pages 28-29.

- **Refrigeration.** Refrigerators and freezers, retail and early replacement including units utilizing natural refrigerants
- **Air Conditioning.** Dehumidifiers, air cleaners, room air conditioners
- **Motors.** Boiler circulator pumps

Residential Results

Figure 13 shows the total annual MWh savings combined by end-use for the residential markets listed above.

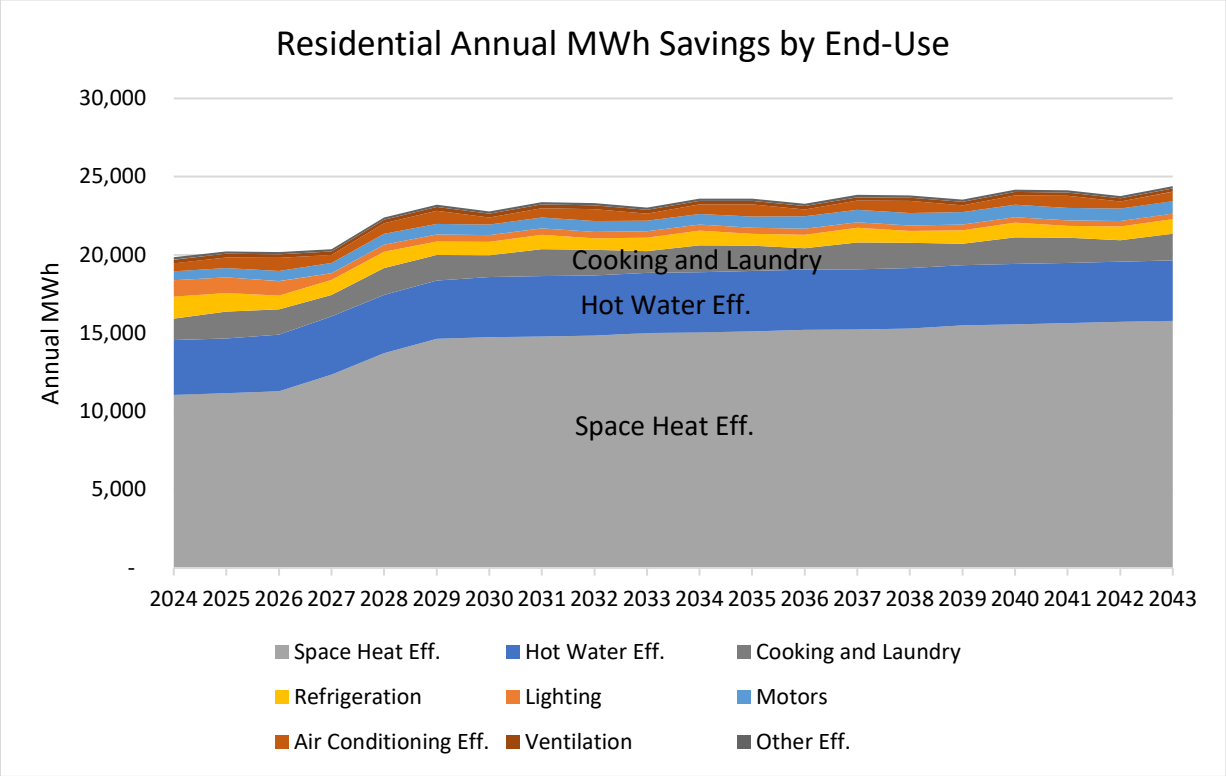

Figure 13. Residential annual MWh savings by end use. (Amended 11-17-2023)

The following graph, Figure 14, compares the residential technical, economic, maximum achievable, and program achievable results of the recent DPS market Potential Study (MPS) to the Efficiency Vermont residential model. The annual MWh estimates of the residential program achievable study are similar in several, but not all years, to Efficiency Vermont's residential model for estimated annual MWh savings over the twenty years. Figure 15 compares the total 3 year (2024-2026) residential annual MWh savings by major end-use between the DPS program achievable Potential Study and Efficiency Vermont's DRP model. This level of detail helps show which end-uses have similar forecasts and where differences in the modeling assumptions occur. As shown in the graph the annual MWh savings forecast for HVAC + shell and hot water efficiency end-uses are very similar (within 2%). The major difference in potential savings estimates between the two studies are in the appliance (which includes cooking, laundry, refrigerators,

and freezers), lighting, and miscellaneous load (which includes motors, electronics, and plug-loads) end uses. Another difference is that DPS achievable Potential Study includes between 900 and 1,500 MWh of residential behavioral savings, while Efficiency Vermont is not proposing any residential behavior programs in the portfolio at this time.

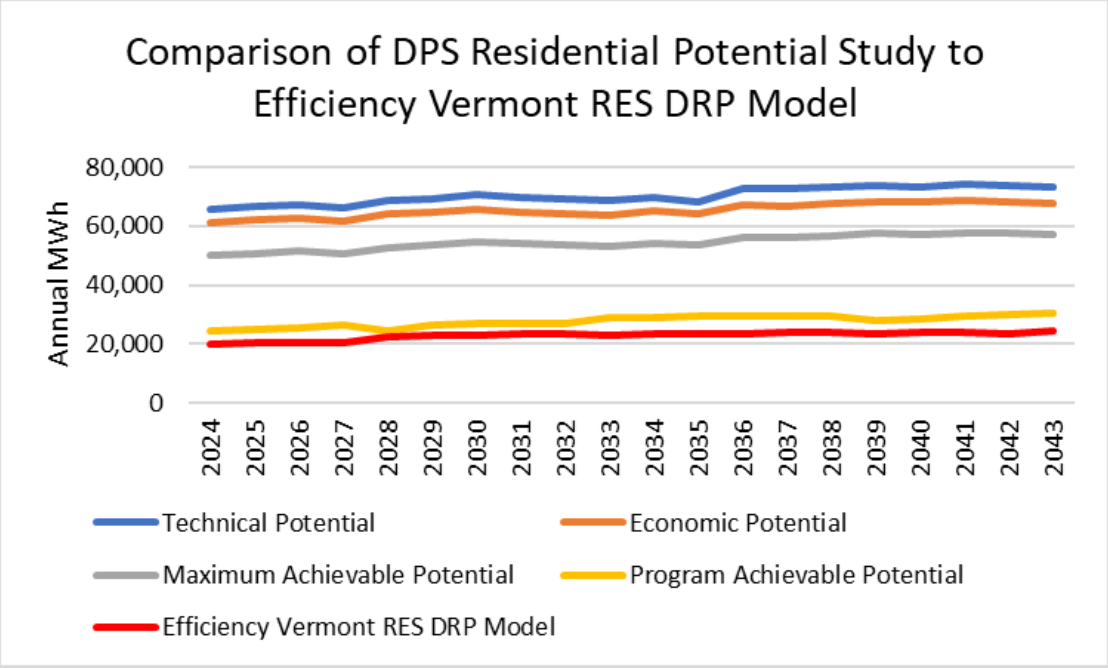

Figure 14. Comparison of the DPS residential technical, economic, maximum achievable, and program achievable potential studies to Efficiency Vermont's residential model results. (Source: Vermont Department of Public Service, *MPS Final Results Summary File (EVT), November 21, 2022*) (Amended 11-17-2023)

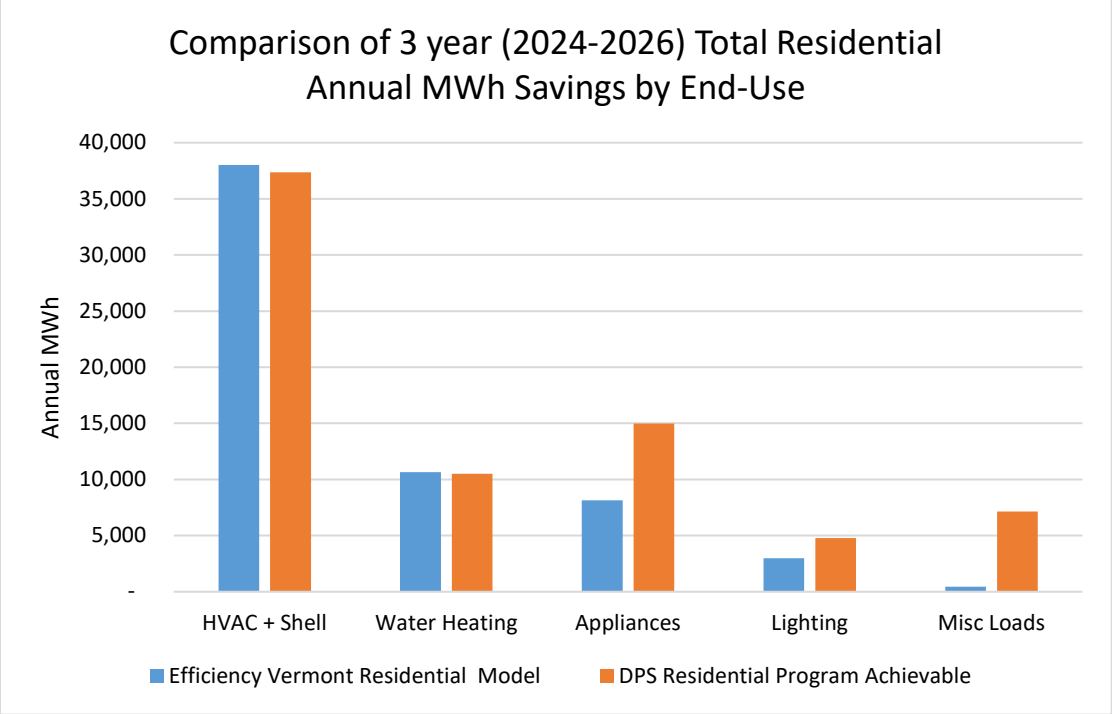

Figure 15. Comparison of 3 year (2024-2026) total annual MWh savings by major end-use for the residential portfolio between Efficiency Vermont DRP model and the DPS program achievable study. (Source: DPS *MPS Final Results Summary File (EVT), November 21, 2022*) (Amended 11-17-2023)

Efficient Products

The amended Efficient Products (EP) budget reflects an increase of $510,000 toward electric vehicle dealership sales/infrastructure incentives and an increase of $520,000 for non-incentives to fund the transportation portion of the EEMA program activities. The amended model includes a measure for EV sales incentives with quantities ranging from 900 to 1,300 vehicles per year at a per unit incentive level ranging from $300 to $400 per vehicle. The amended model also includes EV dealership infrastructure incentives estimated at 6 projects per year at an average incentive of $25,000 per project. These infrastructure projects range from EV charging equipment to specialized tools and training needed to service EVs. The non-incentive budget covers program costs such as labor and other direct and indirect program costs as well as the marketing budget.

The residential efficient products lighting program was significantly impacted by the federal Energy Independence and Security Act (EISA) backstop provision (effective July 2023) that requires all general service lighting to meet a minimum 45 lumens per watt efficacy. This essentially requires that most screw-based lamps, residential type fixtures, and downlights use LED technology. As a result, other than a limited number of LED bulbs for low-income customers, promotional activities, and some limited lighting savings in the multifamily sector, most residential lighting savings is removed from the model beginning in 2024. This is a change from the previous DRP modeling assumptions which had significant residential

lighting fixtures continuing in the residential portfolio beyond 2024 even though most screw-based lighting had been removed beginning in 2021.

As savings from lighting technologies is no longer a significant part of the residential portfolio beginning in 2024, Efficiency Vermont is planning to increase market penetrations of other technologies to make up for the loss of the lighting savings. Going forward space heating measures such as heat pumps, will be the largest source of savings in the residential portfolio. The technologies with the greatest likely savings for efficient products are:

- **Space Heating**. Heat pumps are the primary source of saving in the end-use category, growing from 47.5 percent (9,500 MWh) of residential savings in 2024 to 52 percent (12,100 MWh) by 2029.
- **Water Heating**. Heat pump water heaters offer significant savings consistently over the 20 years of between 3,000 to 3,500 MWh per year.
- **Laundry.** Efficiency Vermont expects clothes washers, heat pump clothes dryers, and other laundry measures to also offer significant savings ranging from 1,000 MWh to 1,500 MWh per year over the 20 years.
- **Motors**. Program staff assumed that savings from residential motors would increase from 560 MWh in 2024 to 800 MWh by 2043, primarily driven by increased boiler circulator pump replacements.
- **Air Conditioning**. Savings from residential air conditioning systems (not counting the cooling portion of the heat pumps mentioned above) is expected to fluctuate between 500 and 800 MWh per years as different levels of efficiency of dehumidifiers, air cleaners, and room air conditioners are introduced to the market.

Market Rate Single-family Retrofit – Existing Homes

There are approximately 337,000 housing units in Vermont, with at least 276,000 consisting of single-family homes or single family with multiple units.[13] Most of this housing stock is at least 30 years old with 75% built prior to 1990 and 25% built prior to 1939. The Existing Homes portfolio includes programs and services aimed at enabling customers who live in this older housing stock to reduce their annual heating costs, enjoy healthier living spaces, and reduce energy usage. Specific services within Existing Homes include Home Performance with ENERGY STAR®(HPwES), the Home Energy Loan Program, and Do-It-Yourself Weatherization. While most funding for these services is provided through the TEPF budget, an increasing portion is funded through the electric budget as more homes switch from 100% fossil fuel-based heating systems to either a combination of heat pumps with fossil fuel or wood back up, to 100% electric with whole house heat pumps.

Efficiency Vermont's primary weatherization program, HPwES, provides incentives for air sealing and insulating single family residential buildings (1-4 units). The program leverages trained contractors to

[13] Housing with up to 4 units are classified as single family residential. Housing with 5 or more units are classified as multifamily residential.

complete work in compliance with Building Performance Institute (BPI) standards. Efficiency Vermont embraces a market-based approach, whereby participating contractors can adopt business models and service provision that best suit their needs and the needs of the customer. As such, some contractors within the program are a one-stop-shop, completing the testing and the work in-house, while others opt to conduct testing only and subcontract the weatherization work out to others. In recent years, it's been acknowledged that Vermont suffers from a labor shortage, and in the skilled trades especially. This has directly impacted the number of projects that have been able to be completed to-date and will undoubtedly impact program reach into the future.

The Home Energy Loan empowers customers to finance energy efficiency projects at a discounted interest rate. Historically, access to upfront capital has been a significant barrier to customers, and interest-bearing loans can be challenging for customers, especially those who are low-to-moderate income, to balance with other household costs. Through the Home Energy Loan, Efficiency Vermont partners with local financial institutions who focus on equitable access so that customers may pursue projects with an energy and monetary benefit through low or no-interest loans.

Lastly, the Do-It-Yourself Weatherization Program was designed for customers to be able to take on small projects around their homes that have energy-saving benefits and helps increase awareness around weatherization. Efficiency Vermont, through marketing efforts, provides videos and other content to help owners take on the projects themselves.

In the 2024 - 2026 performance period, Efficiency Vermont will be focusing on tailoring program offerings to allow greater access to weatherization by Vermont residents. This will include adding weatherization programming that is more streamlined for customers and contractors to access, focusing on building heating electrification in tandem with weatherization, and adding more robust data collection and monitoring for pre-existing programs.

It is anticipated within the next three years Efficiency Vermont will launch a streamlined weatherization offer to increase participation. This will include thermal measures that are currently in the model as a placeholder as they are not yet fully characterized. Efficiency Vermont will also be moving towards bundling electric measures with thermal shell improvements by incentivizing thermal shell improvements and electric measures to be installed at the same time. This is also a newly identified electric measure. Adding these products to the mix will allow for more customers to access weatherization and for Efficiency Vermont to try and expand the market, with the appreciation of a limited workforce and competing customer financial needs.

While weatherization has existed for years, the understanding of the full benefits, beyond the traditionally understood energy and cost-savings, is still a new market concept. Efficiency Vermont is in the early stages of capturing the broad spectrum impacts to customers and envision how this market will be active for the foreseeable future. Integrating electrification and fine-tuning other pathways for weatherization will allow Efficiency Vermont to further expand upon its evaluation of weatherization benefits including the health and safety benefits.

To fund the EEMA program, $400,000 in incentives and $200,000 in non-incentives was shifted from the Existing Homes program budgets. These decreases were primarily focused on weatherization program activities for moderate income households which will now be eligible to receive similar financial support through the American Rescue Plan Act (ARPA) funding. Therefore, support for these moderate income households is expected to increase despite this shifting of electric funds to support EEMA program activities. However, the shift in funding will reduce the savings results achieved through the electric portfolio slightly as shown in the following sections and reflected in the amended modeling results in Appendix A.

Efficiency Vermont expects electric savings in the Existing Homes program to steadily increase over the 20-year period, increasing from 260 MWh in 2024 to 1,160 MWh savings per year by 2043. The following key measures provide savings for the Existing Homes market:

- **Thermal Shell:** While the majority of thermal savings is funded by the TEPF budget, Efficiency Vermont expects electricity savings from thermal shell improvements in electrically (primarily cold climate heat pump) heated homes to increase steadily from less than 1 percent (60 MWh) of residential savings in 2024 from weatherizing 47 homes to 2.4 percent (570 MWh) by 2043 from weatherizing about 386 homes. Of the 47 homes planned for electrically funded weatherization services in 2024, over 30% are targeted to reach moderate income households (defined as less than 120 percent area median income) with higher incentives.
- **Ground Source Heat Pumps (GSHPs):** As the number of heat pumps installed in Vermont continues to increase, the portion of those that are designed to meet 100% of the heat load (whole house heat pumps) are also expected to increase. GSHPs, also referred to a geothermal heat pumps, are a highly efficient whole house option that are able to tap the year around 50 degree water in the earth as a heat source. Efficiency Vermont expects the number of GHPSs to grow from 15 systems per year in 2024 to 50 per year by 2033.
- **Integrated Controls for Heat Pumps:** Integrated controls enable household heating systems to optimize to achieve least cost of operation, least greenhouse gas emissions, or other variables by switching between the heat pump system and any back-up fossil fuel or biomass-based systems depending on outside temperature, current price of electricity and fuel, or other variables.
- **Equity:** New in this 2024 – 2026 DRP, Efficiency Vermont has included dedicated "Equity Measures" to the Existing Homes electric and TEPF portfolios. These measures are currently included in the model as incentives only (no savings) as they are intended to support other traditional efficiency measures in better reaching and meeting the needs of underserved Vermont households and businesses.
- **Behavior:** Efficiency Vermont has decided to not include any residential behavioral programs in the DRP model for the 2024-2043 forecast which is a change from previous DRP.

Market Rate Single-family New Construction

The primary focus of the Residential New Construction program is to support builders in constructing homes that are highly energy efficient (above current VT Residential Building Energy Standard), resilient, durable and healthy. Specifically, the program encourages the use of best building practices based on current building science and incorporating the best and most cost-effective building materials and technologies for heating, cooling and ventilation. Core to this mission is providing exceptional technical assistance to builders, designers and trade professionals through Efficiency Vermont's Efficiency Excellence Network, Engineering Consultants' and Account Managers' services and support.

The market rate RNC Program has recently gone through significant changes in an effort to lower operational and acquisition costs while continuing to provide robust technical support and meaningful incentives. The program has shifted from an intensive whole home-based certification and incentive structure to a focus on overarching market support to design and construction professionals along with incentivizing specific technologies and measures that support the program's ongoing focus on energy efficiency, resilience and health. This has been accomplished by targeting services and incentives specifically to builders rather than homeowners (moving "upstream") and requiring participants in the program to be members of the recently created Efficiency Excellence Network's (EEN) Residential New Construction trade group. Membership in this group sets a base standard of experience and knowledge in building science and code compliance that helps establish confidence and credibility for customers building new homes or additions or undergoing extensive gut rehab renovations to existing homes where increasingly stringent code requirements apply.

Builders can join the EEN RNC Trade Group at two levels:

- Efficiency Vermont Residential Construction Professional (requires certificate of insurance and passing grade on building science and code quiz)
- Efficiency Vermont Certified Builder- this is for any builder who has completed an Efficiency Vermont certified home since 2018. (Any Residential Construction Professional can become a Certified Builder by successfully completing an EVT certified home.)

The DRP model includes the set of measures that are either currently available or are anticipated to be offered through the program by 2024. These include:

- Drain Water Heat Recovery
- Balanced Ventilation
- Airsealing
- Tri-pane windows
- Continuous insulation
- All-electric bonus for new all electric homes
- A rating incentive to help offset the cost of the HERS rating
- A Certified 3.0 incentive for meeting the latest home specification

Because the current market rate RNC program is structured completely differently than in prior years, the adoption rate of the various elements of the new program are expected to ramp up beginning in 2024. With fairly robust enrollment in the new Efficiency Excellence Network RNC Trade group (55 builders enrolled so far), it is anticipated that as builders become more acclimatized to the new RNC structure and incentives become more diverse and accessible, that uptake will increase steadily over the coming years. With the next iteration of the Residential Building Energy Standard (RBES) going into effect in early 2023, builders will need increased support with code compliance, making RNC technical services and incentives even more attractive. The demand for new housing will likely remain high for the foreseeable future (VHFA State of Res Development Report) along with the supply chain and labor challenges that have increased through the course of the COVID-19 Pandemic. Therefore, it is likely that the demand for RNC services and incentives will increase in response to those market forces and the needs of builders, developers and other trade allies.

The model assumes that program participation will stay steady over the coming years at about 100 homes per year increasing to 200-300 homes per year by 2030. Overall program savings are expected to increase steadily as more above-code measures are adopted per project and an increasing number of builders join the EEN. At the same time as the adoption of new measures increases, energy savings per measure drops by 7 percent every three years, given the assumption that the energy code baseline will rise following the triennial code update cycle. Efficiency Vermont based this assumption on the discussion of modeling inputs and the impacts of changes in codes and standards with the DPS as shown in Figure 16.

Assumed Vermont Code Update Schedule

International Energy Code	VT Residential Building Energy Standard	VT Commercial Building Energy Standard	Effective Date in VT	Impact on Savings in Model (RBES/CBES)
2021 IECC	2023 RBES	2023 CBES	1/1/2023	-7% / -7%
2024 IECC	2025 RBES	2025 CBES	1/1/2026	-7% / -7%
2027 IECC	2028 RBES	2028 CBES	1/1/2029	-7% / -7%
Net Zero Ready by 2030 Code				
2030 IECC	2031 RBES	2031 CBES	1/1/2032	-0-1% / -0-1%
2033 IECC	2034 RBES	2034 CBES	1/1/2035	-0-1% / -0-1%
2036 IECC	2037 RBES	2037 CBES	1/1/2038	-0-1% / -0-1%
2039 IECC	2040 RBES	2040 CBES	1/1/2041	-0-1% / -0-1%

Figure 16. Schedule of anticipated Vermont Residential Building Energy Standard adoption cycles and impact on savings. (Source: Exhibit DPS-1, *Public Service Department Initial Draft Potential Study Demand Resource Plan Proceeding,* dated July 27, 2022, at page 30)

Figure 17 shows how small the impact of this these code changes is offset by the expected increased adoption of new measures on annual MWh savings for the residential new construction program in the model.

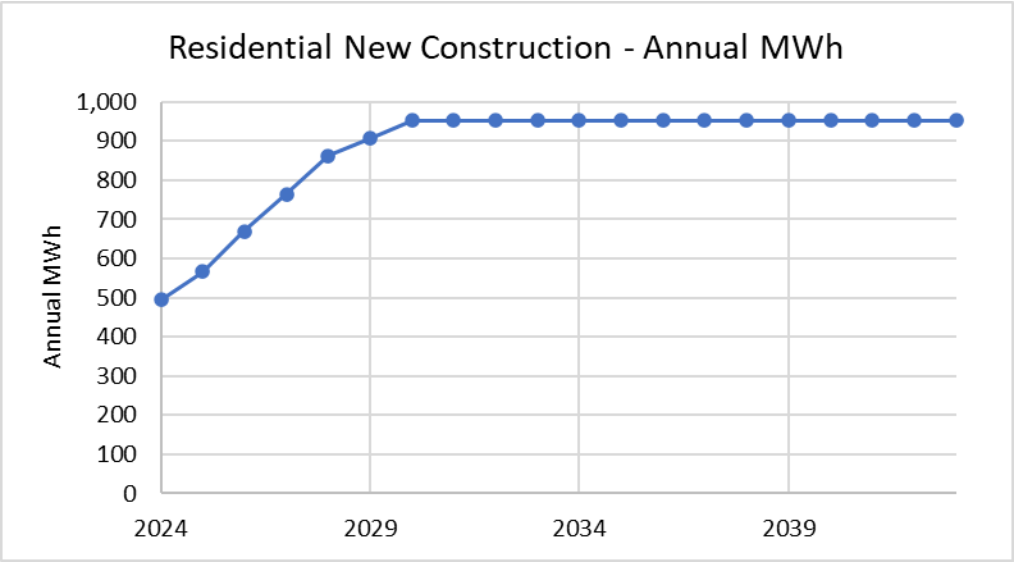

Figure 17. Annual MWh savings for the residential new construction program (electric only).

Low-Income Single family Residential

The low-income portfolio aims to leverage energy efficiency as a means to reduce the energy burden of Vermonters earning less than 80 percent area median income (AMI). Various programs deploy a range of services to drastically reduce or entirely remove cost barriers for customers by replacing inefficient equipment and appliances, resulting in lower monthly utility bills and increased affordability.

To fund the EEMA Low-Income Fuel Switch Program, the low-income incentive budget was increased by $840,000 per year to enable the installation of heat pumps for an estimated 190 low-income customers per year. This incentive budget also covers a portion of any electrical panel upgrades determined necessary. Based on experience running this program in 2022-2023, approximately 35% of these customers are expected to need some level of upgrade to their electrical panels to accommodate the additional heat pump electrical load. An additional $130,000 in non-incentive budget was shifted to the low income single family retrofit budget to cover EEMA thermal program support costs. As a result of these budget shifts to fund the EEMA thermal program, the low-income spending in the amended model increases from the originally proposed target of 12.1 percent spending level to an amended level of 14.6% of electric RA budget.

Traditionally the low-income market is one of the last to adopt new technology, but this is due not to a lack of interest but rather a lack of access. Efficiency Vermont's low-income programs look to directly address this inequity while serving the unique needs and barriers of this customer population. When energy costs are more affordable and homes more comfortable, low-income Vermonters are better able

to maintain secure housing, age in place, afford health care, sustain employment, and contribute as drivers of economic development.

Efficiency Vermont's low-income portfolio encompasses multiple programs reflected in the model, including:

- Continued limited screw-based lighting for the 2024-2026 performance period (14,700 bulbs in 2024, 13,200 bulbs in 2025, and 11,900 bulbs in 2026) then removed from the portfolio through 2043.
- Electrical efficiency add-on service to statewide weatherization services administered by the state's five Weatherization Assistance Program (WAP) agencies.
- Comprehensive electrical efficiency service for customers whose electric energy burden is greater than or equal to 6 percent of their income, also administered by energy coaches at all five WAP Agencies.
- Single appliance replacement voucher program aimed particularly at low-income customers whose electric energy burden does not qualify them for the above comprehensive program.
- Loan product underwritten and serviced by independent lenders that buys down market-rate loan interest rates to as little as zero percent (0%) for low-income customers to complete energy efficiency projects.
- EEMA thermal program includes full cost heat pump fuel switch installation for qualifying low income customers who have previously received weatherization through the WAP agencies.

Figure 18 shows the forecasted annual MWh savings by end-use for the single-family low income retrofit program.

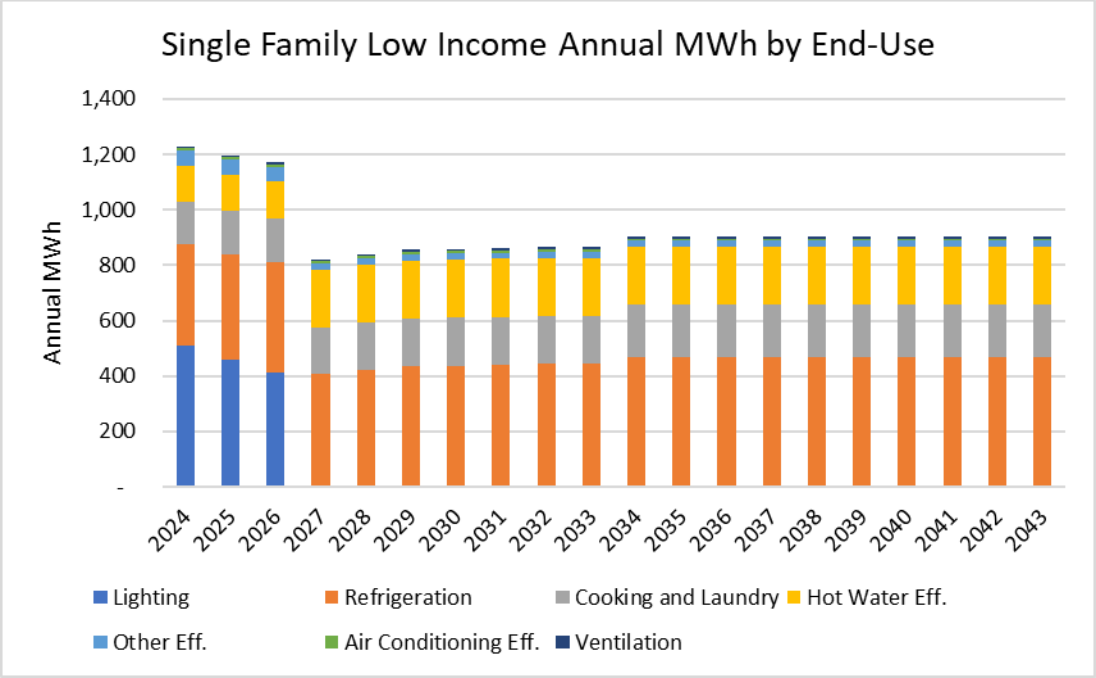

Figure 18. Annual MWh savings by end-use for single family low income retrofit program.

Low-Income and Market Rate Multifamily Housing

The multifamily portfolio of programs aims to increase the energy efficiency and affordability of rental units for both building owners, operators as well as tenants, 75 percent of which are low-income. This is primarily accomplished by:

- Providing a new construction checklist guide and project-specific technical assistance to developers through two separate tracks: 1) Efficiency Vermont Certified; and 2) High Performance. Both tracks provide a per unit incentive at varying amounts. The program seeks to guide developers who would otherwise opt for Efficiency Vermont Certified track to instead pursue the added efficiency requirements of the High Performance track.
- Supporting the retrofitting of existing multifamily buildings through a contract and partnership with a 3rd party vendor, 3E Thermal.
- Engaging with private owners by providing whole-building walk-throughs and specialized offers that reduce cost of ownership, enhance building value, and improve tenant retention.
- Providing prescriptive rebates to rental property owners.

Figure 19 shows the forecasted annual MWh savings by end-use for the multifamily low-income and market rate retrofit and new construction programs combined.

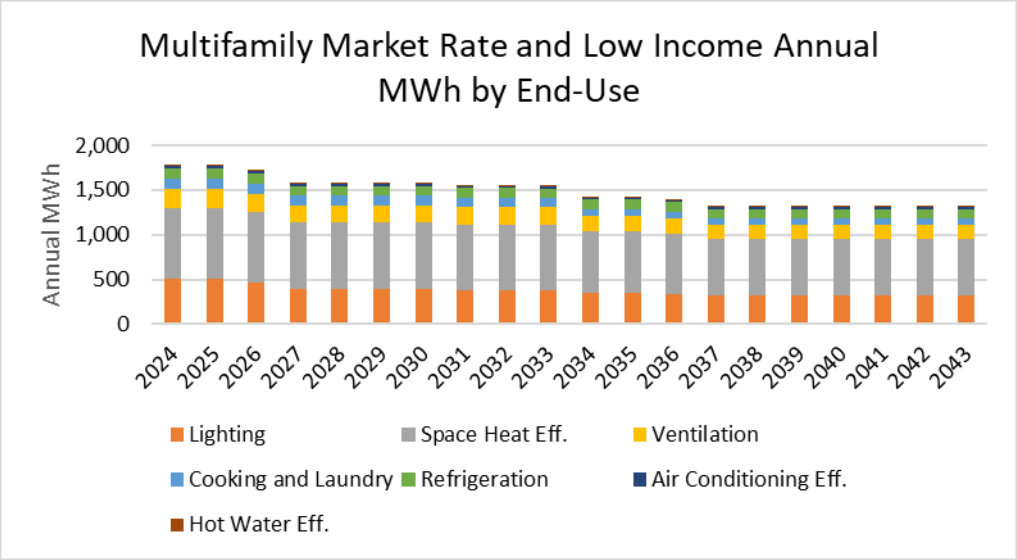

Figure 19. Annual MWh savings by end-use for multifamily low income and market rate retrofit and new construction programs.

Commercial and Industrial Model

Efficiency Vermont anticipates greater demand for energy efficiency and energy services in the next 20 years, across a broad and changing spectrum of technologies, services, and end uses within Vermont's CI sector. With expected large changes to the technologies in the portfolio (commercial lighting savings

projected to peak in 2024-2026, followed by a steady decline), Efficiency Vermont plans to continue diversifying the Efficiency Vermont CI portfolio.

The most significant opportunities for increasing CI savings come from a broad range of next-generation, more efficient technologies in refrigeration, industrial process, motors/motor controls, air conditioning, and space heat efficiency. Emerging services that use these "smarter" systems will help to optimize building system performance, allow for building monitoring and management, and use data analytics to provide insights to support further energy savings. Efficiency Vermont plans to use more of these new services to support CI customers and unlock significant, untapped, cost-effective electric savings potential. Examples are:

- Retro-commissioning and building "re-tuning"
- Continuous energy improvement
- Data analytics to target significant savings opportunities
- Building monitoring systems to help customers address building system performance issues and opportunities

To fully leverage the potential of these new services, Efficiency Vermont will expand partnerships with stakeholders in the energy services design and supply chain (e.g., architects, engineers, manufacturers, distributors, and contractors). Vermont's trade allies have a long history of collaborating with Efficiency Vermont and collectively constitute an extraordinary, influential partner in the successful adoption of energy efficiency measures and services across all sizes and sectors in the CI market. Expanding long-term partnerships in the non-energy sector, such as those with business associations or agencies, is equally critical to fulfilling the energy efficiency potential this model projects. The implementation strategies satisfy three essential customer values shared across the CI market sector:

- Providing solutions aligned with key business objectives
- Providing concise and timely information, guidance, and support
- Offering customers easy ways to participate

The long-term success of this program—that is, achieving the high levels of electric energy savings projected in this model—will require Efficiency Vermont to optimize its services and products in a new way, and expand its reach and impact through innovation and strategic partnerships.

To fund the EEMA transportation and thermal programs, $875,000 in incentives are proposed to be shifted from the Business Existing Facilities Retrofit program and $75,000 in incentives from the Business Existing Facilities Equipment Replacement program. To achieve this incentive budget shift a limited quantity of measures in custom commercial lighting, industrial process, air conditioning, and refrigeration measures were reduced. Additionally, $450,000 in non-incentives from the Business Existing Facilities budget are proposed to be shifted to fund EEMA program activities.

The steady decrease in lighting savings in the model from a peak in 2024 requires significant ramping-up of other technologies in the CI portfolio. The end use categories with the most significant growth in savings assumed over the 20 years:

- **Industrial process (including compressed air).** Ramps up from 15.4 percent (6,200 MWh) of CI savings in 2024 to a peak of 21.6 percent (8,500 MWh) by 2043.
- **Refrigeration (including refrigerant management)**. Ramps up from 13.3 percent (5,400 MWh) in CI savings in 2024 to 16.7 percent (6,600 MWh) by 2043.
- **Motors (including motor controls).** With a new generation of high-efficiency motors of about to come to market, savings are expected to ramp up from 4,800 MWh in 2024 to 6,700 MWh by 2043.
- **Air Conditioning.** Savings are expected to nearly double over the 20 years increasing from 2,100 MWh in 2024 to 4,300 MWh by 2043.
- **Space heating (including cold climate heat pumps)**. Increases steadily over the 20 years from 2,300 MWh in 2024 to 3,100 MWh by 2043.

Commercial and Industrial Results

The following graph, Figure 20, shows the annual MWh by end-use of the full CI portfolio over the 20 year DRP period.

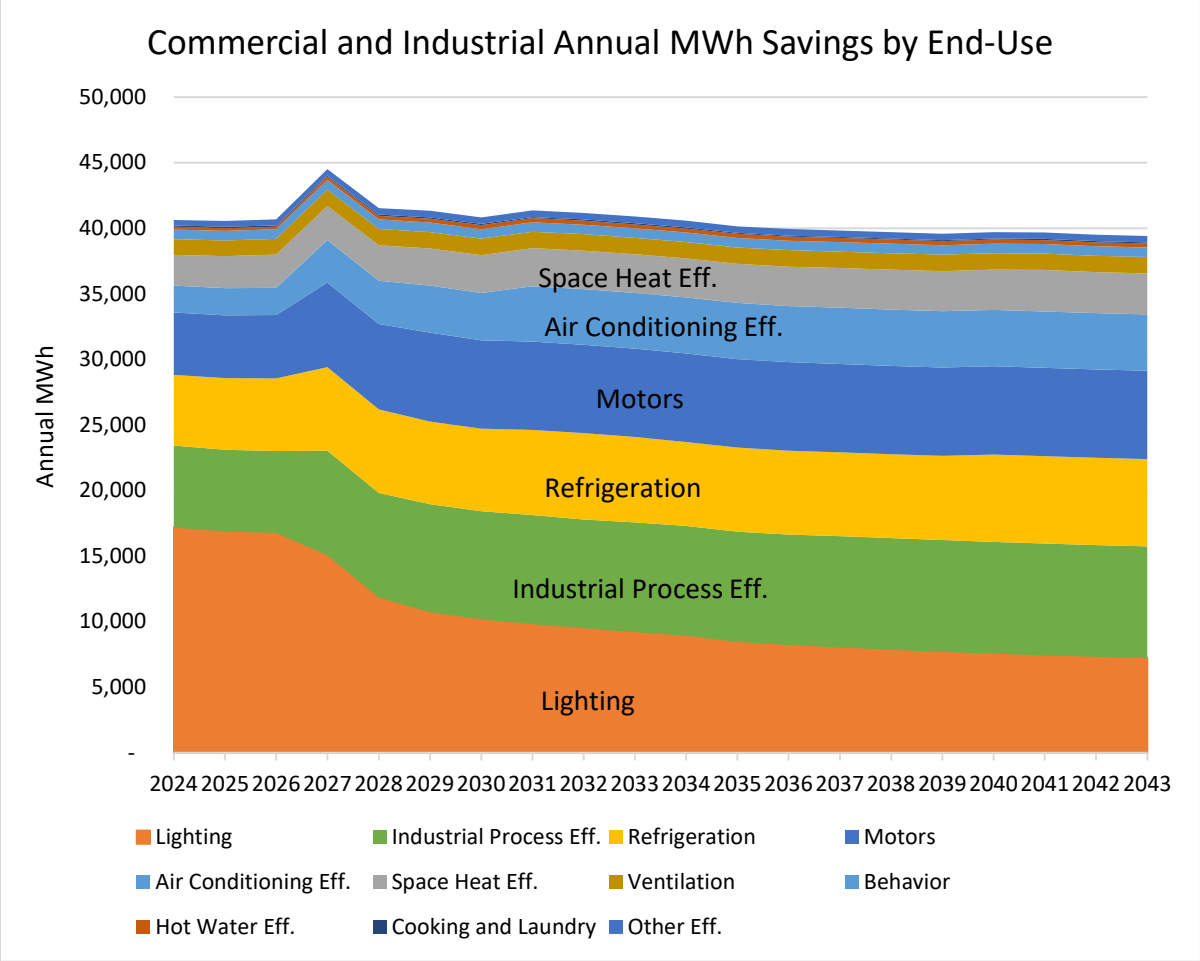

Figure 20. CI annual MWh savings by end-use. (Amended 11/17/23)

The following graph, Figure 21, compares the results of the DPS CI technical, economic, maximum achievable, and program achievable studies to the Efficiency Vermont CI model. The total CI annual MWh estimates of the Department's program achievable study are similar to Efficiency Vermont's model forecast over most of the 20 year period. There are however significant differences between the two models when comparing the potential savings available from certain end-use technologies. Figure 22 compares the total savings of the first 3 years (2024-2026) between the two models across 8 major end-use categories. Efficiency Vermont is forecasting higher savings potential in industrial process, refrigeration, heating and cooling, and motors. The DPS achievable Potential Study is forecasting higher potential in CI lighting, ventilation, and other types of efficiency.

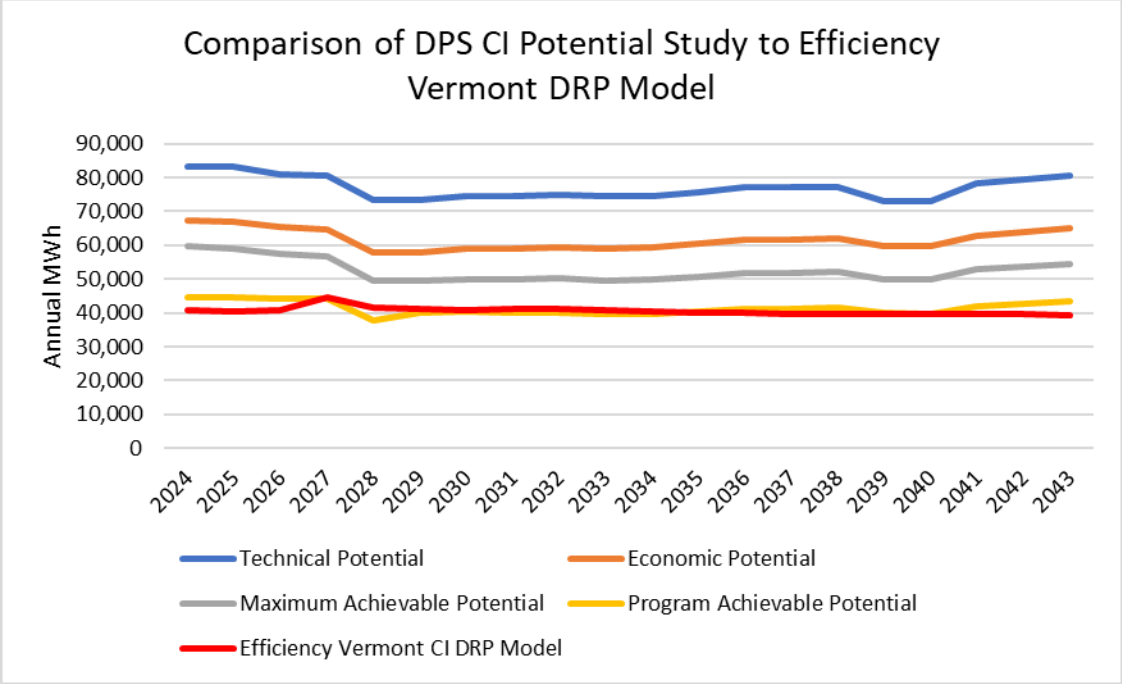

Figure 21. Comparison of the DPS CI technical, economic, maximum achievable, and program achievable potential studies to Efficiency Vermont's CI model results. (Data source: Vermont Department of Public Service, *MPS Final Results Summary File (EVT),* November 21, 2022) (Amended 11/17/23)

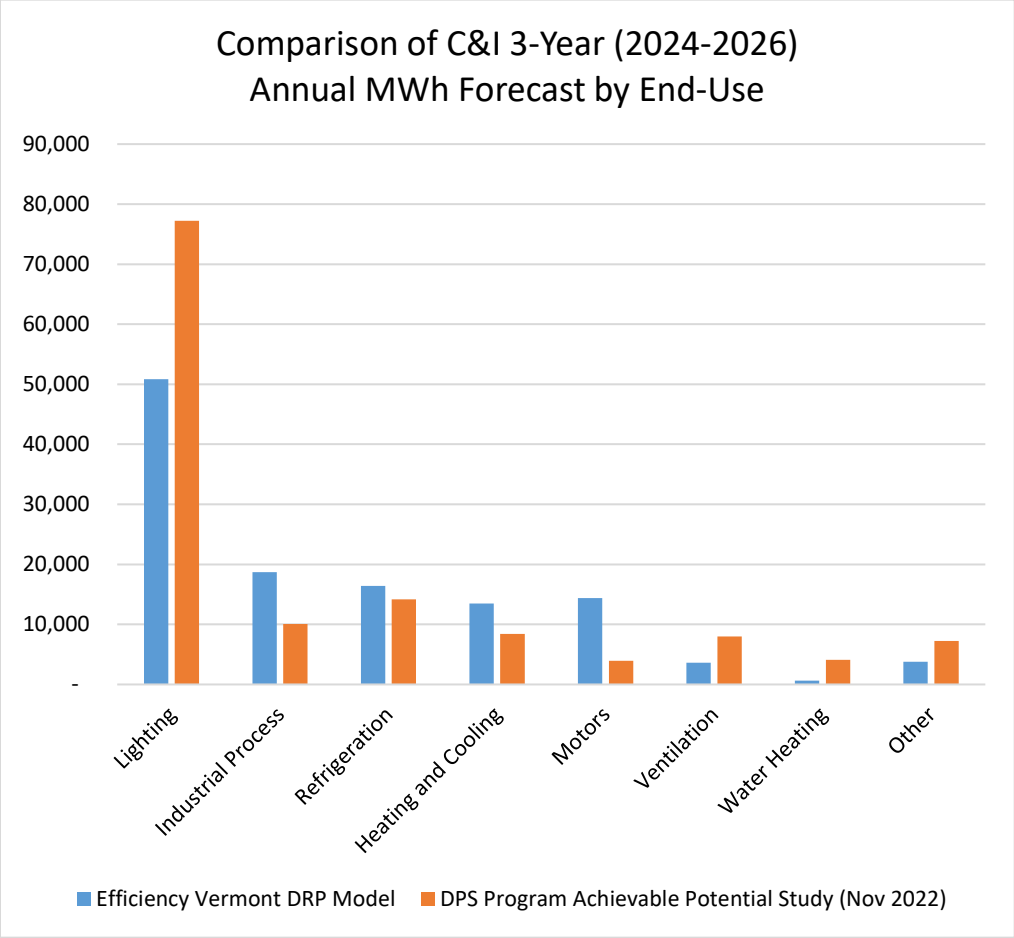

Figure 22. Comparison of 3 year (2024-2026) total annual MWh savings by major end-use for the CI portfolio between Efficiency Vermont DRP model and the DPS program achievable study. (Source: Vermont Department of Public Service, *MPS Final Results Summary File (EVT),* November 21, 2022) (Amended 11/17/23)

Commercial New Construction

The Commercial New Construction (CNC) program aims to improve best practices and transform the market so that all new construction work is performed to achieve the most cost-effective, technologically sound levels of energy efficiency that are readily attainable. Efficiency Vermont supports all CNC customers and projects, regardless of whether the project goals are Net Zero, Passive Haus standards, EnergyStar, LEED, "Code plus anything cost effective" or anything in-between. Efficiency Vermont staff support CNC projects across a broad number of technologies, but for the purposes of claiming savings, the program supports customers/partners in (4) foundational focus areas:

- Lighting Power Density (LPD)
- Air sealing
- Energy recovery ventilation (ERV)
- Efficient equipment (mechanical systems)

These four measures are common to all newly constructed buildings, and depending on the building, additional measures are added.

The Vermont Comprehensive Energy Plan (CEP) calls for all new buildings to be built to net zero design by 2030, and the Commercial Building Energy Standard (CBES) is currently on a path to align with this goal. The general trend is that CNC buildings are required to be very energy efficient and the incremental energy savings per project continue to shrink relative to the increasing CBES "baseline," which is a CNC building built to code, relative to CNC projects in past years, and relative to retrofit projects.

While the timeframe surrounding the pandemic has created unpredictable shifts in the demand for commercial new construction, Efficiency Vermont predicts that the multi-year trends will be similar to recent activity with project creation rates averaging about 80 projects per year over the past 4 years. The long-term goal of the new construction program is to have increasing percentage of the projects performing at the net zero and high performance levels. The following table, Figure 23, lists the level of savings impact and expected code update schedule that was agreed to as part of the modeling assumptions with the DPS. This is the same table as referenced for residential new construction (Figure 14), as it covers both markets and codes (residential and commercial).

Assumed Vermont Code Update Schedule

International Energy Code	VT Residential Building Energy Standard	VT Commercial Building Energy Standard	Effective Date in VT	Impact on Savings in Model (RBES/CBES)
2021 IECC	2023 RBES	2023 CBES	1/1/2023	-7% / -7%
2024 IECC	2025 RBES	2025 CBES	1/1/2026	-7% / -7%
2027 IECC	2028 RBES	2028 CBES	1/1/2029	-7% / -7%
Net Zero Ready by 2030 Code				
2030 IECC	2031 RBES	2031 CBES	1/1/2032	-0-1% / -0-1%
2033 IECC	2034 RBES	2034 CBES	1/1/2035	-0-1% / -0-1%
2036 IECC	2037 RBES	2037 CBES	1/1/2038	-0-1% / -0-1%
2039 IECC	2040 RBES	2040 CBES	1/1/2041	-0-1% / -0-1%

Figure 23. Schedule of anticipated Vermont Commercial Building Energy Standard adoption cycles and impact on savings. (Source: Exhibit DPS-1, *Public Service Department Initial Draft Potential Study Demand Resource Plan Proceeding* dated July 27, 2022 at page 30)

While the volume of projects is expected to remain consistent in future years, changes in the commercial building energy code noted above will decrease the savings the CNC program is forecasted to achieve over time. The decreasing impacts of the 3-year code cycle changes can be seen in the varying levels of annual MWh savings estimated for the model for the commercial new construction program shown in Figure 24.

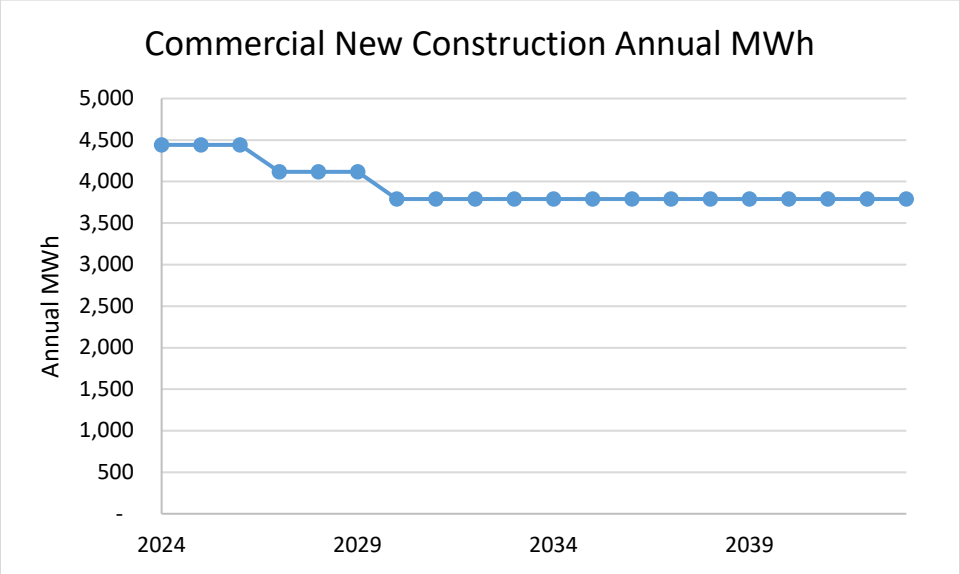

Figure 24. Annual MWh savings for the commercial new construction program (electric only).

Design Assistance Incentives

Incentive funding for design work supports the creation of new projects, primarily for large CI customers, by covering some of the costs associated with designing a plan for efficiency improvements. Such assistance can involve hiring third-party firms to perform system audits, engineering design services, project management, and the purchase and installation of analysis and/or monitoring equipment. The customer typically subcontracts these services directly to an engineering firm, which performs a system audit or design service. Examples of systems that typically offer benefits to customers, using this Efficiency Vermont "design incentive" approach include compressed air, chilled water, industrial water pumping, controls, large heating, ventilation, and air conditioning (HVAC) systems, water/wastewater systems, lighting "re-design" services, grocery refrigeration, and industrial refrigeration. As Efficiency Vermont's portfolio shifts from the lower savings that will occur from lighting measures to savings delivered by more complex systems like industrial process improvements, program staff built in a corresponding increase in design incentives to drive new forms of savings.

Small and Medium Businesses

The model assumes the minimum sector equity requirements of serving at least 2,000 small businesses over each three-year period, remains consistent with the current 2021-2023 performance period. Serving small and medium sized commercial customers remains an important core service for Efficiency Vermont and the CI savings levels are modeled to reflect that high level of engagement and support. For Efficiency Vermont, the small to medium sized business (SMB) market encompasses all CI electric customers in Efficiency Vermont's service area, excluding the top 300 energy users who are served through key account

management. The SMB market is diverse in terms of business size, building type, energy usage, and savings potential. The goal of market transformation for this market means that all businesses have the knowledge, tools, resources, and desire to make efficiency upgrades, the result of which is that all commercial buildings are operating at optimal efficiency.

Despite the diversity of this customer group, Efficiency Vermont's SMB market strategy can be boiled down to two objectives: 1) lead generation; and 2) project completion. The Business Energy Assessment program is one of Efficiency Vermont's primary engagement mechanisms and has proven successful in both generating leads and converting customers. Through an over-the-phone consultation or in-person site visit, the program helps SMB customers identify opportunities and navigate the resources available to move forward with their efficiency project. Customers can take advantage of Efficiency Vermont's standard rebate offerings or enroll their project to receive customized technical and financial assistance. While engagement through the Business Energy Assessment program is more tactical and transactional than long-term engagement of the largest energy users, the one-to-one support provided through this program is valued by business owners who may often lack the time, knowledge, or resources to make efficiency upgrades. The success of this approach is reflected in the long-term savings forecast for the CI model.

Technology Trends and New Measures

Lighting Assumptions

As discussed previously, Efficiency Vermont's residential and commercial lighting programs are currently facing significant market transformations driven by a combination of a long successful history of Efficiency Vermont and Burlington Electric Department's energy efficiency lighting programs and recent policy changes at the federal and state level. The residential lighting program is primarily impacted by the federal Energy Independence and Security Act (EISA) backstop provision (effective July 2023) that requires all general service lighting to meet a minimum 45 lumens per watt efficacy. This essentially requires most screw-based lamps, residential type fixtures, and downlights use LED technology. As a result, other than a limited number of LED bulbs for low-income customers and some limited multifamily lighting, most residential lighting savings is removed from the model beginning in 2024. This is a change from the previous DRP modeling assumptions which has residential lighting fixtures continuing in the electric portfolio beyond 2024 even though most screw-based lighting had been removed beginning in 2021.

The second major policy change at the state level primarily impacts the commercial lighting program. Due to the recently passed mercury ban legislation (Act No. 120) the sale of four-foot fluorescent lamps is prohibited in the state of Vermont beginning January 2024. As LED technology will be the assumed baseline for these four-foot lamps and fixtures Efficiency Vermont will not be continuing the "midstream" program in its current form. Instead, the program will focus financial and staff resources on supporting CI customers in retrofitting lighting systems in existing commercial buildings from fluorescent to LED. This

provides an opportunity to ensure the mercury containing fluorescent bulbs are properly disposed of while also ensuring the new lighting system is optimally designed for efficiency in terms of layout and integrating controls for dimming, occupancy, and daylight harvesting. This lighting retrofit program is expected to continue through 2026 before phasing out in 2027. At that point commercial lighting savings will be limited to lighting control and redesign upgrade opportunities, which will continue to offer savings and benefits for customers into the future, although at significantly lower savings levels.

The impact of this market transformation on Efficiency Vermont's residential and commercial lighting programs is reflected in the portfolio-wide lighting savings which is forecasted to ramp steadily down from 30.2 percent of the portfolio (18,200 MWh) in 2024 to 11.9 percent (7,600 MWh) by 2043. Figure 25 compares the previous DRP modeled forecast for lighting savings to actual recent savings and this DRP Update Proposal's current forecast. Because of the prevalence and highly cost-effective nature of lighting savings, more than any technology or market shift presented as part of this 2024-2026 DRP Update Proposal, this significant decrease in potential lighting savings has the greatest impact on total achievable savings of the portfolio and the cost per MWh to acquire those savings.

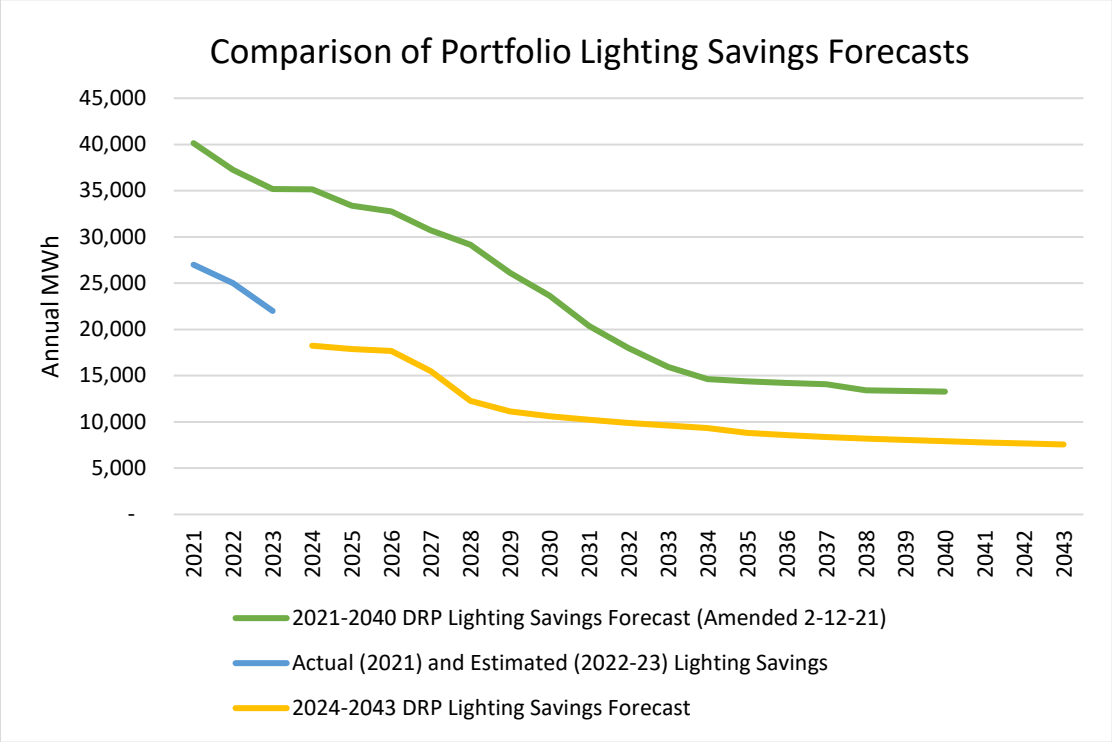

Figure 25. Comparison of portfolio-wide Annual MWh lighting savings of the previous DRP and current DRP Update models. (Amended 11/17/23)

Heat Pumps

The market for heat pumps has exceeded expectations in recent years and continues to expand in Vermont, with ductless heat pumps expected to continue to make up the vast majority of installations in

this category for the next several years. Over time ducted, air to water, and ground source heat pumps, which offer greater opportunity for a "whole house" heating and cooling solution will take over a portion of the share of the market. Efficiency Vermont will continue to partner with Distribution Utilities (DUs) to support heat pumps. For these measures, both Efficiency Vermont and DUs offer incentives and claim distinct savings, with Efficiency Vermont claiming electric efficiency savings while the DUs claim Tier III fossil fuel, fuel-switch savings. A small number of heat pump installations that are supported by Efficiency Vermont midstream incentives are unable to be matched to a particular DU account. In these cases, Tier III fuel switch savings are not claimed by a DU, and therefore those fuel-switch fossil fuel savings are funded and claimed through Efficiency Vermont's TEPF portfolio.

Whole building heat pump solutions continue to evolve. There are several iterations of whole building heat pumps that are now available. Ground and air source equipment can both be connected to a building's distribution system to deliver space conditioning through water or air. Ground source, though with a higher first cost, has the capability of providing 100 percent of a building's space conditioning needs without backup heating. Air source often requires a backup (whether air-to-water or centrally ducted);, however, these systems utilize integrated controls making the switch to backup heating automated and optimized. Air-to-water heat pumps are also funded through TEPF as there are no electric savings associated with this particular heat pump technology.

Efficiency Vermont continues to support evolving heat pump technology as it presents a cost-effective, low carbon and safe solution for Vermont buildings. The electric model has the following types of heat pumps identified, which are captured collectively in Figure 26, showing the expected rate of growth for the program over the next twenty years. These include both residential and commercial versions of these heat pumps including ductless, ducted, air-to-water, and ground source (geothermal).

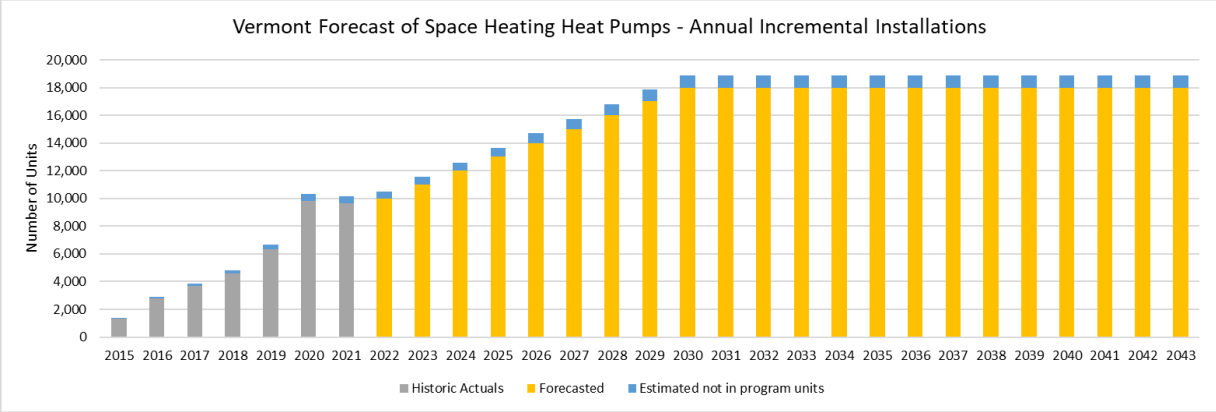

Figure 26. Efficiency Vermont heat pump actual installations (2015-2021) and forecasted (2022-2043).

Figure 26 represents an estimated sustained growth rate of about 1,000 units per year for the planning period. There are several factors which support this growth forecast:

- **Tier III.** Heat pumps have become a critical measure for Vermont DUs in meeting their Tier III obligations. DUs bring additional resources to bear such as increased rebate dollars, marketing,

and direct customer communications. Heat pumps also have load management potential, further making them a critical part of a DU's portfolio.

- **Regional influence.** Vermont's neighboring states such as New York, Massachusetts, and Connecticut all have very aggressive electrification goals. These initiatives bring incredible scale to regional heat pump adoption, driving down costs, raising awareness and driving cold climate specific innovation. The northeast market, in which Efficiency Vermont operates, is becoming a central focus for manufacturers with products being designed for this market.
- **Improved cold climate performance.** As innovation continues and the performance of equipment in a cold climate improves, the customer economics get better and better. Whole building, full replacement solutions are a part of this innovation that makes this a more desirable HVAC solution.

There has been a misperception that the total number of heat pumps installed cannot surpass the total number of buildings. Efficiency Vermont considers this assumption to be incorrect. Most buildings can support the installation of multiple systems, assuming these are ductless mini-splits, which are still overwhelmingly the most commonly installed type of heat pump. It is also important when considering the total cumulative volume of heat pumps this forecast represents that 10 percent of these units are expected to be installed in commercial buildings, so the total potential market includes not only the 300,000+ housing units in Vermont, but also the 40,000+ commercial buildings. Even at the consistent forecasted growth level modeled, the model predicts less than 50 percent market penetration by the end of the twenty-year planning horizon. Figure 27 shows a low, med, and high forecast of the cumulative number of heat pumps the figure 26 represents over the 20 years that are expected to add electric load, i.e., replacement heat pumps are not included in cumulative totals. The medium forecast aligns with both this DRP Update Proposal forecast and the Program Achievable Potential Study[14], while the low and high forecast represent the potential impact of either lower or higher levels of funding available from Efficiency Vermont, the DUs, the State, or federal governments.

[14] Exhibit DPS-1, *Public Service Department Initial Draft Potential Study Demand Resource Plan Proceeding,* dated July 27, 2022, at page 27.

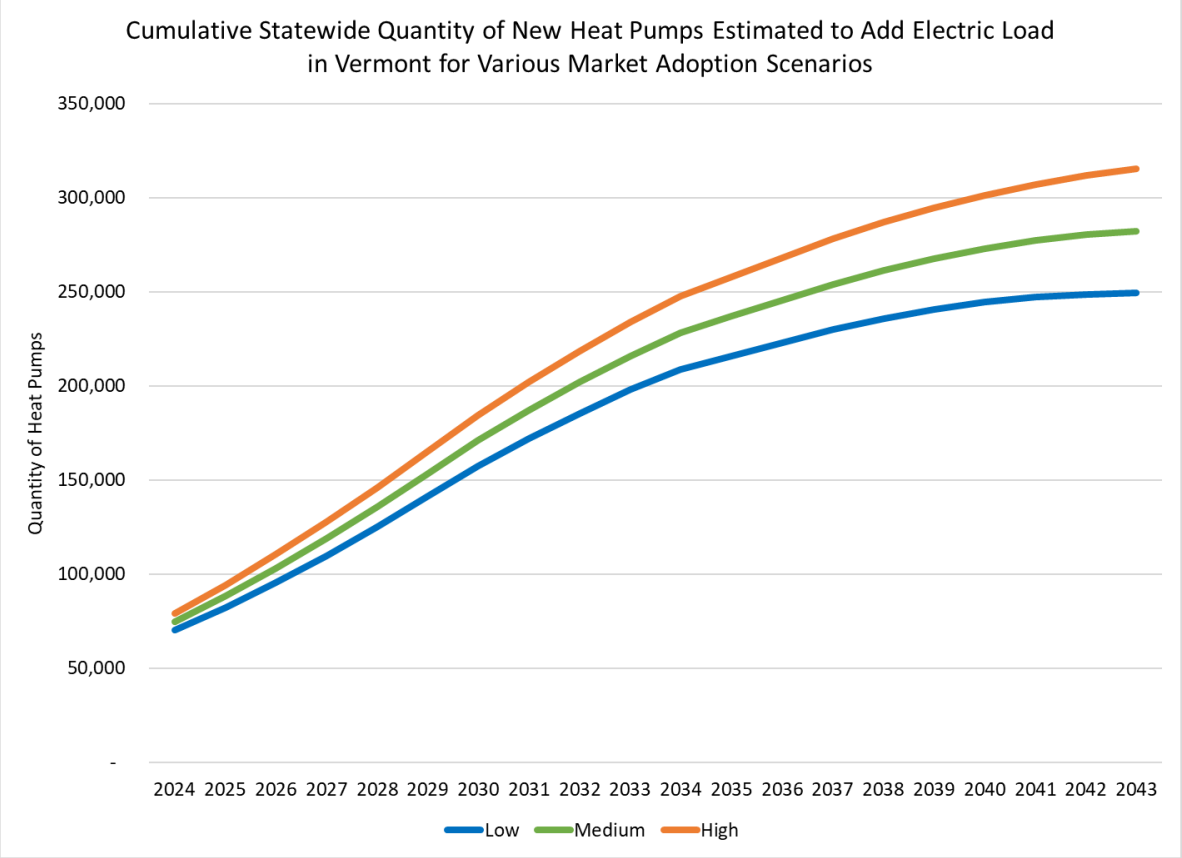

Figure 27. Efficiency Vermont's cumulative heat pump forecast (with replacements removed).

Heat Pump Water Heaters

Domestic water heaters utilizing heat pump technology extract heat from the ambient air and reject it into an insulated tank. Although most equipment on the market today are packaged units (i.e., a heat pump physically attached to the storage tank) there are also split systems entering the market that avoid the inherent parasitic load of this equipment. In the DRP electric model, heat pump water heaters installations are expected to continue at a consistent level of about 2,000 units per year across the 20-year forecast. These water heating technology offers significant energy and cost savings for customers compared to traditional electric resistance or fossil fuel fired water heaters. Combined, these units are estimated to delivery between 3,500 and 4,000 Annual MWh savings per year to the portfolio.

Refrigeration

Efficiency Vermont is currently engaged in a refrigeration acceleration initiative with a growing portfolio of refrigeration measures in the model to reflect this increased focus. Part of this focus is on increasingly moving toward comprehensive, packaged refrigeration systems and away from a component-based approach. For example, instead of supporting efficient compressors, retrofitting in floating head pressure

controls and efficient condenser fans, Efficiency Vermont has moved to supporting high efficiency condenser units, which incorporate a packaged piece of equipment that integrates all these components. The refrigeration measures in the model representing this expanded focus include:

- Refrigeration door heater controls
- Add doors to open cases
- Custom refrigeration measures
- Refrigeration floating head pressure controls
- High efficiency condensing units
- Refrigeration suction pressure increase - automated setback
- Refrigeration fan motor controls
- Outdoor high efficiency condensing units
- Reach-in refrigerators and freezers (natural refrigerant)
- Refrigeration zero energy doors
- High efficiency evaporators

Refrigerant Management

Introduced in the 2021 DRP, Efficiency Vermont is proposing to continue to focus on refrigerant management as a key strategy for reducing both energy and GHG emissions in the 2024 – 2026 performance period. Refrigeration system improvements offer significant energy and cost savings potential, as discussed in the previous section. Beyond energy savings, properly managing and replacing the refrigerant chemicals contained in these systems has emerged as a critical strategy to reduce GHG emissions and global warming. To leverage this GHG reduction potential, Efficiency Vermont is continuing to support several existing refrigeration measures in the DRP Update model targeted to refrigerant management services as well as introducing a few new measures related to refrigerant management in heating, ventilation, and air conditioning (HVAC) end uses (see section – *Technology Trends and New Measures*). The magnitude and scope of refrigerant management opportunities is extensive based on the vast number and types of refrigeration systems essential for storage of food and other perishables, manufacturing, heat pump water heating, and maintaining comfortable temperatures (both heating and cooling) in our homes, businesses and automobiles. The current GHG challenge associated with refrigerants typically used is related to the way these particular refrigerant chemicals interact with and impact the earth's environment. Refrigerants such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) were identified as harmful to the ozone layer and were phased out by the 1987 Montreal Protocol. Unfortunately the primary replacement, hydrofluorocarbons (HFCs), while having less impact on ozone, have an estimated 1,000 to 9,000 times greater Global Warming Potential (GWP) than carbon dioxide.[15] GWP is a scale developed to allow comparisons of the global warming impacts of different gases. According to the EPA definition, GWP is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time (usually 100 years), relative to the

[15] Drawdown: Refrigerant Management: https://www.drawdown.org/solutions/materials/refrigerant-management

emissions of 1 ton of carbon dioxide (CO_2).[16] To address this HFC problem, officials from 170 countries met in Kigali, Rwanda in 2016 to negotiate an amendment to the Montreal Protocol, phasing out HFCs for substitutes such as natural refrigerants. While the goals of the Kigali Amendment were well intentioned, the implementation of the agreement has fallen short of expectations as the shift away from HFCs in the US continues to be slow despite the serious GHG threat these chemicals pose. To support the intent of the Kigali Amendment, and support efforts to reduce GHG emissions, Efficiency Vermont is continuing its focus on refrigeration efficiency and its core refrigerant management strategies. These include leak mitigation, replacing high-GWP refrigerants in existing systems, and ensuring that new systems with lower GWP refrigerants, such as natural refrigerants, are available and installed in Vermont.

These three strategies included in the model offer customers both energy and cost savings while reducing the negative environmental GHG impacts of refrigerants. Each of these strategies include one or more measures in the model with characterizations that account for both energy and GHG impacts.

- **Leak detection and remediation**: Refrigerant leaks decrease equipment efficiency, increase maintenance costs, and contribute to climate change. According to one manufacturer, supermarket systems can easily leak up to 20% of their refrigerant contributing a significant amount of GHG emissions.[17] Following a general industry estimate of a 1:1 correlation (i.e., for every 1% leakage rate a system experiences, the refrigeration system efficiency decreases by 1%)[18], this would lead to a 20% loss in refrigeration system efficiency. Introduced into the program in 2021, this strategy continues to prove successful in reducing refrigerant leakage and is a popular solution for customers. Strategies include efforts to support permanent leak detection systems and periodic leak detection work done during regular preventative maintenance activities.
- **Replace high GWP refrigerants with lower GWP alternatives:** Removing and properly disposing of high GWP refrigerants, such as HFCs, from existing systems and replacing them with lower GWP refrigerants can increase the efficiency of the system and reduce climate impact that result from leaks of high GWP refrigerants (all systems leak to some degree). In some cases, these high-GWP refrigerants can be replaced with "natural refrigerants," which have the lowest GWP. In many cases, this is not possible as a viable retrofit to an existing system due to refrigerant compatibility issues. Another, relatively simple option is to "drop-in" a lower GWP HFC replacement in place of the high-GWP refrigerant, which can reduce the GWP by up to 50% and may require only minimal system changes.
- **Ensure new systems utilize low-GWP or natural refrigerants:** Using either low-GWP or natural refrigerants in new refrigeration equipment saves both energy and reduces GHG emissions associated with refrigerant leaks, some degree of which is inevitable. Natural refrigerants are defined by ASHRAE as "refrigerants that occur in nature's biological and chemical cycles without human intervention. These materials include ammonia, carbon dioxide, natural hydrocarbons,

[16] https://www.epa.gov/ghgemissions/understanding-global-warming-potentials
[17] http://danfoss.ipapercms.dk/refrigerationandairconditioning/RA/Infographic/danfoss-co2-infographic/#/
[18] https://trakref.com/the-environmental-impact-of-refrigerants/

water, and air." At this time Efficiency Vermont is considering CO_2, ammonia, and hydrocarbons (isobutane and propane) as natural refrigerants of interest. Manufacturers are moving quickly to add equipment to their product lines that utilize natural refrigerants in order to meet pending federal and state regulations on HFCs as well as increasing customer demands for greener refrigerant alternatives. In many cases the new refrigeration systems that are designed to utilize low-GWP or natural refrigerants are more energy efficient than standard systems, ensuring energy savings in addition to GHG emission reductions.

These strategies and measures contribute to Efficiency Vermont's electric performance indicator (QPI #6) for GHG Reductions, representing a combination of electric energy and non-energy GHG reductions, as measured in metric tons of CO_2e.

Flexible Load Management

Introduced in the 2021 DRP, Efficiency Vermont is planning to continue a focus on Flexible Load Management (FLM) as a key strategy for supporting the DUs in managing peak load that is shifting to late in the day and potentially increasing in the future as electrification of Vermont's space heating and transportation sectors intensifies. FLM utilizes a combination of data analytics, system communication platforms, and load-control measures to shift loads that are "flexible" from less optimal times of day to more optimal time periods. Actively managing these flexible loads by the customer or utility has the potential to offer multiple benefits including energy savings, lower customer costs, lower system peak, reduced GHG emissions, and grid system benefits. These activities are applicable to C&I facilities as well as residential homes. Grid optimization can include a variety of strategies deployed by utilities and/or customers. In the case of FLM, strategies typically focus on shifting loads from peak system times, when electricity is constrained, expensive, or producing higher GHG emission, to times when electricity is plentiful, cheaper, and cleaner.

Given today's changing energy supply portfolio and electric system load shape, load flexibility must be able to adapt to a wide and evolving range of peak scenarios, which can vary depending on the particular customer and utility needs. These peak times of interest and significance to customers and utilities are not necessarily in alignment with the current ISO-NE system peak times. For instance, on a sunny summer day Vermont's energy could be most abundant and cleanest in the middle of the day when solar electric supply is highest, and the system peak may hit after sunset, outside the current ISO summer peak time period of 1 – 5 pm on weekdays.[19] One challenge with including FLM measures in the portfolio is that the current methodology we use to measure performance in terms of summer kW and winter kW demand reduction do not necessarily align with the benefits of FLM. This is especially true when a Distribution Utility is shifting load in an attempt to lower electric demand at a time outside of the ISO-NE summer peak period. Enabling customers to install these FLM measures in partnership with the utilities and private

[19] ISO Summer Peak period is 1 – 5 pm, M – F, non-holiday, June – August. ISO Winter Peak is 5 – 7 pm, M – F, non-holiday, Dec-Jan. In recent years Vermont's peak has been shifting later in the day and now typically occurs between 8 – 9 pm due to the high volume of solar pv, currently at ~350 MW.

sector, will help transform Vermont's energy system to be more adaptable and resilient and will also lower the state's GHG emissions.

The amount of flexibility added to Vermont's electric system through FLM measures installed in a given year provides a way to quantify the total Flexible Load kW controllable by the FLM measures and will contribute toward Efficiency Vermont's electric performance indicator (QPI #7) for Flexible Load kW. Examples of potential FLM measures that would be tracked against this proposed metric range from controlling a large ice storage system in a commercial facility to adding a controller to an electric hot water tank in a home. In some cases, new energy storage systems will need to be added to a facility or home. In other situations, if a storage system already exists, such as a residential hot water tank, flexible load could be achieved simply by adding controls, to switch them from a passive load into an active demand management and storage asset. Data fields associated with this metric have been added to our existing modeling and data tracking tools, such as Navigator and Tracker, with unique measure characterizations as appropriate. When FLM measures also generate MWh, Summer or Winter Peak, Lifetime MWh, or TRB savings these savings will be captured in addition to the Flexible Load kW metric.

The amended DRP model reflects the $1.2M three year FLM program budget reduction, as ordered by the PUC[20], which reduced the quantity of FLM measures across the portfolio and reduced the Flexible kW modeling results and QPI value. The $1.2M was shifted to fund other non-FLM efficiency activities resulting in an increase of 1,956 Annual MWh and corresponding increase to TRB, Summer kW, Winter kW and Lifetime MWh[21]. These increases are reflected in the electric modeling results.

Figure 28 shows the amended forecasted flexible kW that each of the five FLM measures currently in the model are expected to provide over the 20 year period.

[20] *See* Case No. 22-2954-PET Order of 9/26/2023.
[21] *See* Case No. 22-2954-PET, Efficiency Vermont Compliance Filing of 10/16/2023.

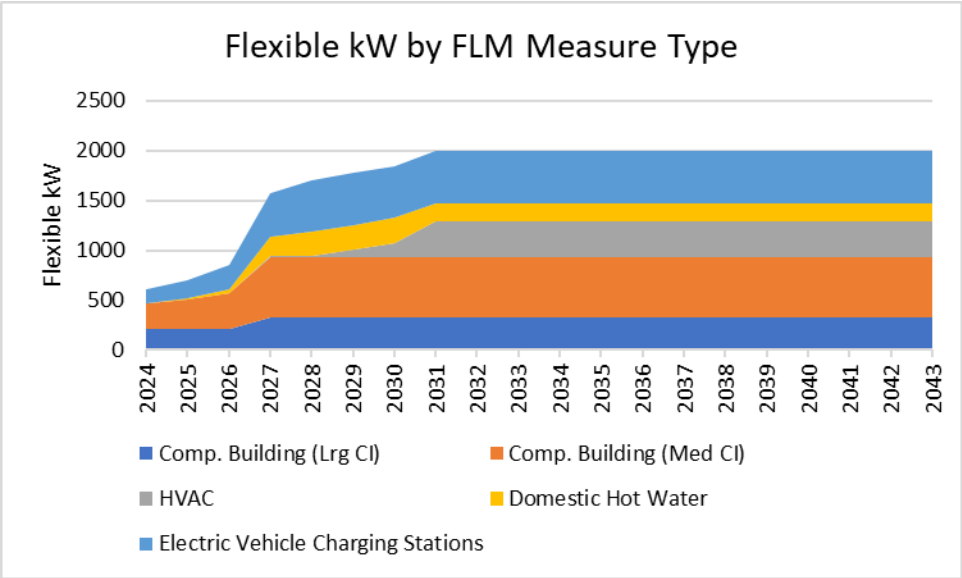

Figure 28. Forecast of flexible kW expected to available by FLM measure type. (Amended 11/17/23)

New Measures

The following new measures are being introduced in 2024-2043 DRP Update Proposal and are included in the forecast and modeling results presented. Although some of these measures are already included in the current performance period, they were not in the previous (2021-2040) DRP model so a brief description is provided here.

Controlled environment agriculture (CEA): This measure, which can include any facility which grows food or other products, is primarily focused on the cultivation of cannabis at this time. Indoor growing of cannabis and other products requires significant amounts of energy for lighting, heating, cooling, and dehumidifying. This represents a significant energy savings opportunity by optimizing these individual systems elements and their collective interaction. These are electric funded measures, using modeled interactive savings based on OpenStudio modeling software, which include measures for the following four system categories typically seen in these types of projects:

- CEA – HVAC
- CEA – Lighting
- CEA – Lighting Controls
- CEA – Dehumidification

Low-GWP compressed air dryer: This measure is a combination of a high efficiency refrigerated compressed air dryer that also uses a lower GWP refrigerant. This will be an addition to our current refrigerant management initiative. It reduces GHG emissions by using low GWP refrigerants and electric energy savings due to the higher efficiency of the unit. This is an electric funded measure.

Automated feed pusher: This is an electrically powered robot that reduces use of off-road (unregulated) diesel fuel on the farm by doing the work of distributing feed for the cows that a diesel-fuel powered skid

steer would normally perform. By saving diesel fuel it reduces GHG emissions on the farm. This will be a TEPF funded measure.

Phase change ceiling tiles: This measure uses a product that is designed to fit into a standard 2x4 or 2x2 suspended ceiling system, typical of commercial facilities, that absorb heat during the day by phase changing from solid to liquid, and then release that energy during the night. This reduces temperature swings within the facility during the day and allows the HVAC system to operate more efficiently resulting in energy savings. This is an EEC funded measure.

Low-GWP refrigerant heat pumps: These heat pumps reduce GHG emissions by using a lower GWP refrigerant that a standard heat pump. These measures are currently in the model as incentive with GHG savings only and are intended to be supplemental to the energy savings captured by the heat pump measures. By not claiming any additional energy savings on these measures we avoid double counting. We may change this approach in the future and link the two measures (electric savings from high efficiency heat pump + GHG savings from low-GWP refrigerant). Often, systems that use lower-GWP refrigerants are more expensive than standard heat pumps, meaning the incremental cost for the measure is greater than for a standard heat pump measure. This is an electric funded measure.

Biogas heating fuel switch: This measure involves capturing the excess methane biogas from an existing anerobic digester so that it can be used for space heating or other thermal energy purposes rather than being "burned off" through flaring as often occurs. It represents a combination of smaller installations, such as farms, and larger systems, such municipal wastewater treatment facilities. The energy saving is from the fuel switch from traditional fossil fuel to "renewable" methane which is created from biomass material and would otherwise have been burned off and wasted through flaring. This is a TEPF funded measure.

Embodied carbon in insulation materials**:** This measure compares the "embodied carbon" of different building material choices and quantifies the reduced GHG emissions when one product is chosen over another. Generally, embodied carbon is the GHG attributed to the manufacturing, transportation, installation, maintenance, and disposal of building materials. Similar to how the low-GWP heat pump were modeled, these thermal efficiency measures were added to the model as GHG savings only measures (to avoid double counting the energy savings of the insulation measures) which, in this case, are calculated by comparing the embodied carbon of two insulation materials, such as cellulose and spray foam. There are two commercial and two residential measures, one each for retrofit and one each for new construction. These measures reflect added non-energy GHG savings compared to standard insulation measures. The new construction measure is funded through the electric budget and the retrofit measure through TEPF.

Equity Initiative: These are incentive only, no savings residential and commercial measures which will provide additional funding to support focused efforts to reduce barriers to participation by underserved Vermont households, businesses and communities. The commercial and residential equity measures are split between electric and TEPF funding.

New measures added to the residential new construction program as "a-la-carte option":

- Drain Water Heat Recovery
- Balanced Ventilation
- Tri-pane Windows

- Continuous Insulation
- Air Sealing
- Embodied Carbon of insulation (as noted above)
- All-electric home incentive – (incentive only measure)
- Rater incentive – (incentive only measure)
- Certified Home (3.0)

Cost-Effectiveness of the Electric Portfolio

Energy efficiency measures promoted and supported by Efficiency Vermont are evaluated using a Societal Cost Test, in which measures are screened to determine their societal cost-effectiveness. In addition to screening individual energy efficiency measures, the entire electric and TEPF RA portfolios are screened for societal cost-effectiveness. Societal cost-effectiveness screening compares the present value of measure societal benefits and the present value of measure societal costs associated with energy efficiency measures or portfolios. When societal benefits (quantified as present value in units of dollars) are greater than societal costs (quantified as present value in units of dollars), then a measure or portfolio can be said to be societally cost-effective.

There are two ways to represent societal cost-effectiveness. The first method is to calculate net present value (NPV), which is determined by subtracting societal costs from societal benefits. If NPV is greater than zero, then it indicates societal cost-effectiveness. The second method is to compare a ratio of societal benefits divided by societal costs, which produces a benefit-to-cost ratio (BCR). If BCR is greater than 1, then it signifies societal cost-effectiveness.

Individual measures are said to be societally cost-effective when their measure benefits are greater than their measure costs. Beyond the measure-specific calculation, Efficiency Vermont aims to ensure that its RA portfolios of programs and services are societally cost-effective. For the portfolio calculation, program costs are included in addition to measure costs. Cost-effectiveness indicates that investment in the portfolio is beneficial to ratepayers, as the benefits are greater than the costs over the time frame of the portfolio model. Table 4 provides annual, performance period and cumulative NPV and BCR values for the 20-year electric portfolio model.

Table 4: Annual, performance period, and cumulative NPV and BCR values for the electric portfolio model (2024-2043). Present values are discounted to 2024 dollars. (Amended 11/17/23)

Year	Net Present Value (NPV)	Benefit-Cost Ratio (BCR)
2024	$51,849,992	1.92
2025	$53,237,551	1.94
2026	$54,169,821	1.96
2024-2026	**$159,257,364**	**1.94**
2027	$60,991,713	2.04

2028	$62,594,643	2.03
2029	$63,272,702	2.04
2030	$60,166,244	2.00
2031	$62,116,861	2.03
2032	$62,742,839	2.05
2033	$60,504,207	2.02
2034	$60,752,543	2.03
2035	$60,765,469	2.04
2036	$58,813,666	2.02
2037	$59,556,021	2.04
2038	$59,719,287	2.05
2039	$57,992,232	2.03
2040	$59,361,453	2.06
2041	$59,180,859	2.07
2042	$57,032,302	2.04
Total (2024-2033)	**$1,182,315,239**	**2.02**

Rate and Bill Impacts

Individual customer bill savings from the energy efficiency projects described above are relatively straightforward to calculate, and program participants will always have greater bill savings than non-participants. But the entirety of the programs described above constitute a portfolio of energy efficiency measures and services being implemented across the state, which will have impacts on utilities, which can affect both revenue requirements and the amount of energy sold over time. Depending on the efficiency measures deployed, and the specific utility's fixed and variable avoided cost, energy efficiency measures can put upward pressure on rates. However, the context of establishing the effect of the DRP Update proposal on the *bill* component is important because it takes into consideration the rate impacts over time, combined with the energy efficiency project-related savings to calculate the net bill impacts for customers by rate class.

The rate and bill impact of Efficiency Vermont's proposed budget and modeled program results were determined using the rate and bill analysis tool provided to the EEUs by the DPS.[22] This is the same tool and methodology developed by GDS/Cadmus and used for the Department's Potential Study. The major differences between Efficiency Vermont's Rate and Bill assessment and the Department's Potential Study are the inputs from savings (kWh, summer peak kW, winter peak kW) and budgets (resource acquisition and non-resource acquisition) over time. Efficiency Vermont analyzed rate and bill impacts using a 2% per year inflation rate, in-line with the 2% inflation rate applied to the DRP Update's screening tool and budgets. The forecasted estimated rate and bill impacts of the Efficiency Vermont proposal compared to a baseline without future investment in efficiency programs are shown in Table 5 below for residential

[22] The most recent version of the rate and bill analysis tool was provided to the EEUs by the DPS on December 6, 2022.

customers, CI customers with no demand charges, CI customers with demand charges, and averaged across all customers.

Table 5. Average rate and bill impact of Efficiency Vermont proposed budget and modeled results relative to a baseline without future investment in efficiency. (Amended 11/17/23)

Customer Class	Efficiency Vermont Proposal		
	Rates (2024-2043)	Average Participant Bill Impacts	Average Non-participant Bill Impacts
Residential	**5.1%**	**-5.6%**	**4.9%**
C&I (No Demand Charge)	**2.5%**	**-8.2%**	**2.0%**
C&I (Demand Charge Customers)	**1.0%**	**-9.6%**	**0.5%**
All Customers	**3.1%**	**-7.6%**	**2.7%**

Utility rates, across all customer classes, over the study period (2024-2043) are 3.1% higher than if there were no investment in efficiency programs. Despite this, customer bills across all customer classes for those that participate in Efficiency Vermont's programs are forecasted to decrease over the study period, with the average customer bills expected to be 7.6% lower than a future without efficiency program investment in Vermont.

TEPF Resource Acquisition Model

TEPF Summary

For the amended TEPF resource acquisition model, Efficiency Vermont used a revised assumption of a flat nominal budget based on the estimated FCM and RGGI revenue projections developed by the Department for the full ten-year period (2024-2033). Consistent with the approach to past DRP proceedings, the TEPF model spans a ten-year period, rather than a twenty-year period, as used for the electric resource acquisition model. Efficiency Vermont and the Department agreed in advance to the TEPF modeling assumptions, such as minimum RES and LI spending targets. Efficiency Vermont used these assumptions, to guide its creation of the model. Figure 24 presents the amended TEPF budget progression across the ten-years of 2024-2033. Consistent with the previous DRP for the 2021-2023 period, inflation is accounted for in the TEPF budgets, meaning that the modeled budgets are presented in real 2024 dollars over the ten-year period. This distinction between modeled (real) budgets and nominal budgets is illustrated in Figure 29.

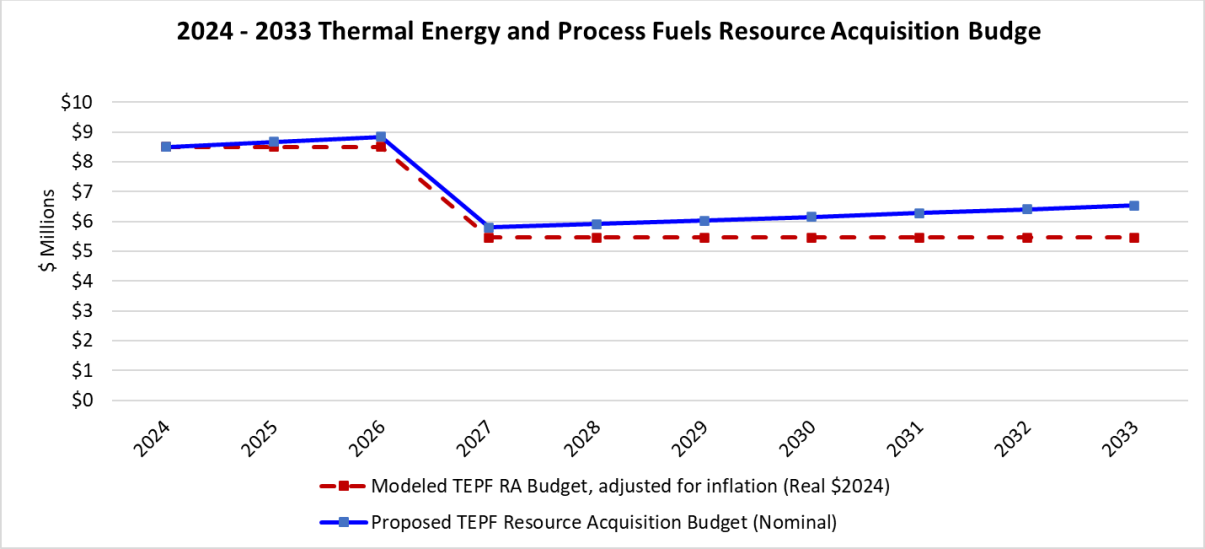

Figure 29. TEPF resource acquisition budgets, across the ten-year forecast period. (Amended 11/17/23)

TEPF Portfolio Results

Figures 30 through 32 show the TEPF modeling results over the ten-year period (2024-2033), for MMBtus, GHG emission reductions, and number of housing units comprehensively weatherized. For years 2027-2033 these values are reduced by approximately 5.8% to account for the correction to the modeled budget to accurately account for inflation between 2024 and 2027.

Figure 30 shows the expected portfolio performance for TEPF annual MMBtu savings.

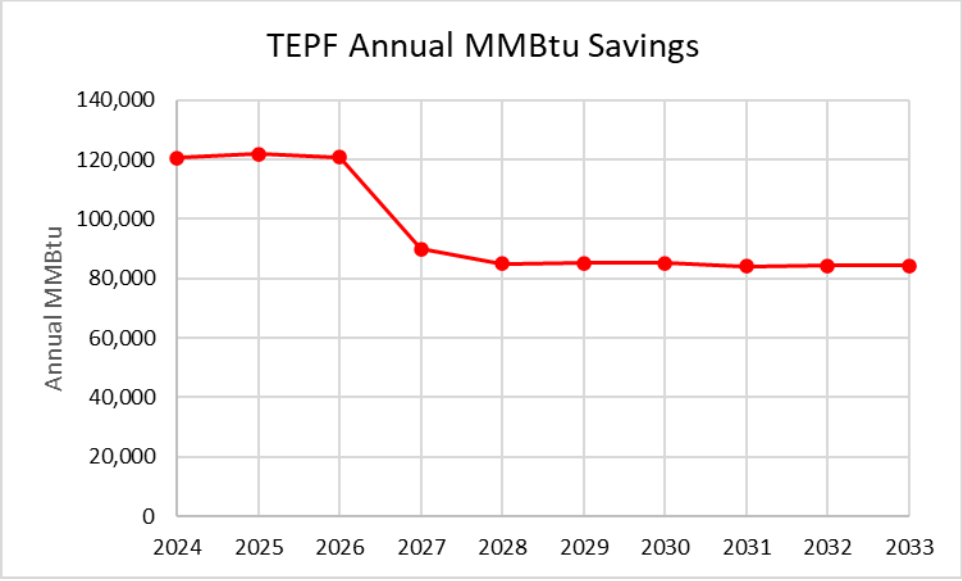

Figure 30. TEPF portfolio Annual MMBtu savings. (Amended 11/17/23)

Figure 31 shows the modeling results for TEPF energy and non-energy GHG reductions in metric tons over the period.

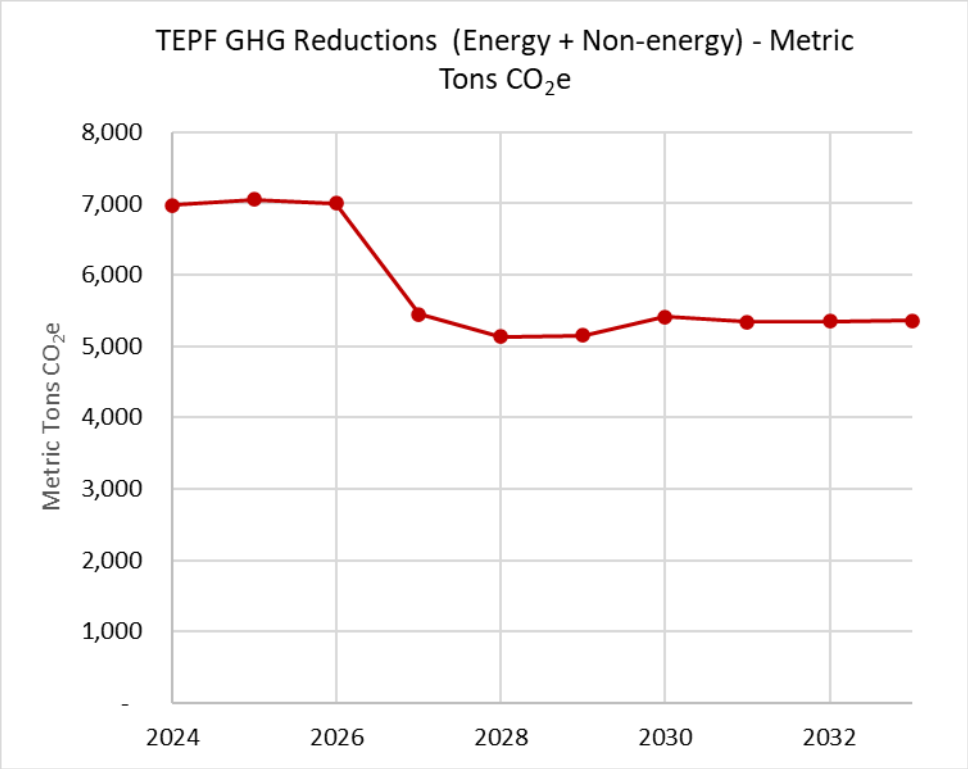

Figure 31. TEPF GHG reductions (energy and non-energy). (Amended 11/17/23)

Figure 32 shows the modeling results for number of residential housing units weatherized comprehensively, including both single family and multifamily resulting from using either TEPF or electric funds. The projects using electric funds are with housing units that are at least 50% heated electrically usually using heat pumps.

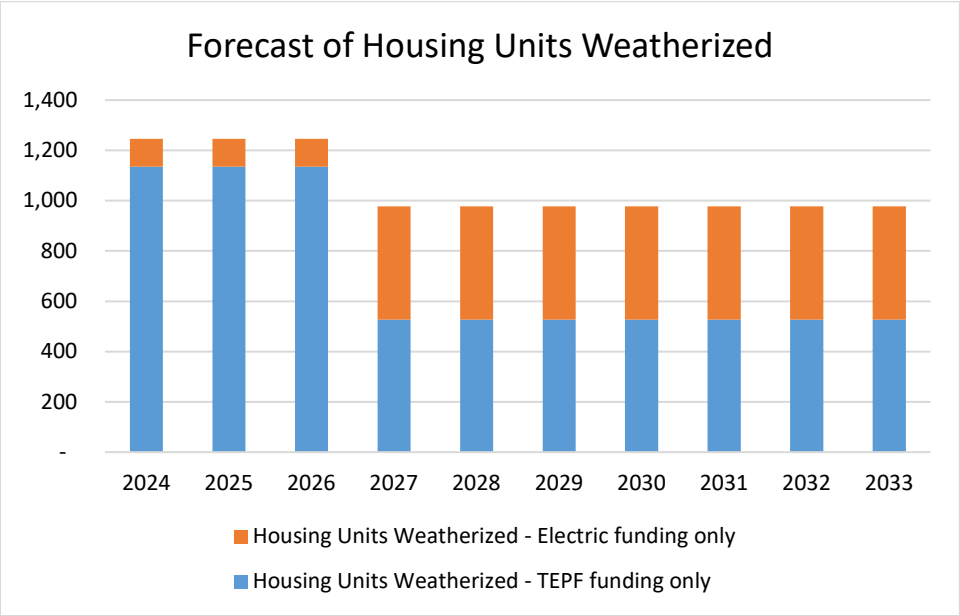

Figure 32. Number of housing units weatherized including electric and TEPF funded. (Amended 11/17/23)

TEPF Model Description

The TEPF resource acquisition model budgets are based on an assumption regarding anticipated net revenue into the TEPF Fund from the FCM and RGGI. The TEPF resource acquisition nominal budget is estimated to be flat at $8,500,000 for the first three years and then decrease to $5,460,470 for the remaining 7 years of the ten-year TEPF study period. FCM and RGGI revenue assumptions are fluid, and the EEUs have opportunity to revise them with the Commission if it becomes necessary to re-align based on updated revenue projections. Nonetheless, the budgets for this modeling effort are intended to support program and marketplace continuity by limiting budget variability from year-to-year while also ensuring all available funds are deployed within the performance period to benefit customers. As in previous DRP proceedings, the TEPF model may need to be adjusted if updated revenue projections for FCM and RGGI become available.

Approach

Because the model is based on 2024 real dollars, the modeled resource acquisition budget for the TEPF programs starts at $8,500,000 in 2024 and remains flat for the first three years while the actual amount collected through FCM and RGGI is slightly higher each year to account for the 2% assumed rate of inflation. The planning budgets and the inflation adjusted modeled TEPF resource acquisition budgets are shown in Table 6.

Table 6. Efficiency Vermont adjustments to the assumed TEPF resource acquisition budgets (assuming an annual 2 percent inflation rate). (Amended 11/17/23)

Budget year	Proposed TEPF resource acquisition budgets (Nominal)	Modeled TEPF resource acquisition budgets, adjusted for inflation (Real $2024)
2024	$8,500,000	$8,500,000
2025	$8,670,000	$8,500,000
2026	$8,843,500	$8,500,000
2027	$5,800,000	$5,460,470
2028	$5,916,000	$5,460,470
2029	$6,034,300	$5,460,470
2030	$6,155,000	$5,460,470
2031	$6,278,100	$5,460,470
2032	$6,403,700	$5,460,470
2033	$6,531,800	$5,460,470

Modeling began with the following spending assumptions as a percent of the total TEPF modeled budget:

- Low Income: 21 percent
- Residential spending: 75 percent,
- Commercial spending: 25 percent

These spending assumptions are consistent with those used for the previous DRP proceeding for 2021-2023.

Program staff created the portfolio of measures by importing existing TEPF measures from the 2021 Efficiency Vermont TEPF measure portfolio. They then modified these measures, as needed, to represent changes in incentive levels, penetrations, savings, TRM adjustments, avoided costs, and any changing federal and state standards. Lastly, they added new measures planned for implementation within the 2024-2033 period.

With the exception of some limited “unmatched” cold climate heat pumps and air-to-water heat pumps most of the space and water heating heat pump measures are funded through the electric rather than TEPF portfolio. As a result, all the thermal (fossil fuel) savings associated with these two measures are supported by Tier 3 and, therefore, associated fuel savings are claimed by the distribution utilities for these measures. Efficiency Vermont continues to support these measures and claim the electric savings as part of the electric funding and portfolio. Support for biomass measures increases significantly in the model compared to current levels, as this is an important focus area in addition to weatherization going forward.

Consistent with the current approach, the TEPF model characterizes fuel-switching measures where a renewable fuel source replaces fossil fuels such that there is no reduction or “penalty” associated with the

MMBtu content of the renewable fuel source. These measures are now reflected in the model, so that their savings are equivalent to the full MMBtu content of the fossil fuel of the baseline system being replaced. Other non-renewable fuel saving measures, such as high efficiency oil or propane boilers or furnaces, are not included in the TEPF model to be consistent with the current TEPF program. Efficiency Vermont has included no behavior measures in the TEPF model at this time.

Trends

TEPF budgets in 2024 – 2026 represent a slight increase from current budget levels. Beginning in 2027 TEPF budgets are expected to drop by 34% then remain flat at that level for the remaining seven years. Spending and savings for each year are modeled to align with these budget levels. The largest portion of MMBTU savings in the TEPF model overall is attributable to space heat efficiency, comprised primarily of weatherization activities for both residential and commercial facilities. The next highest volume of savings is attributable to space heat fuel switches, primarily for fuel switching to biomass, industrial process activities, and ventilation equipment. Figure 33 shows the savings trends by end-use for the TEPF programs and services over the ten-year study period.

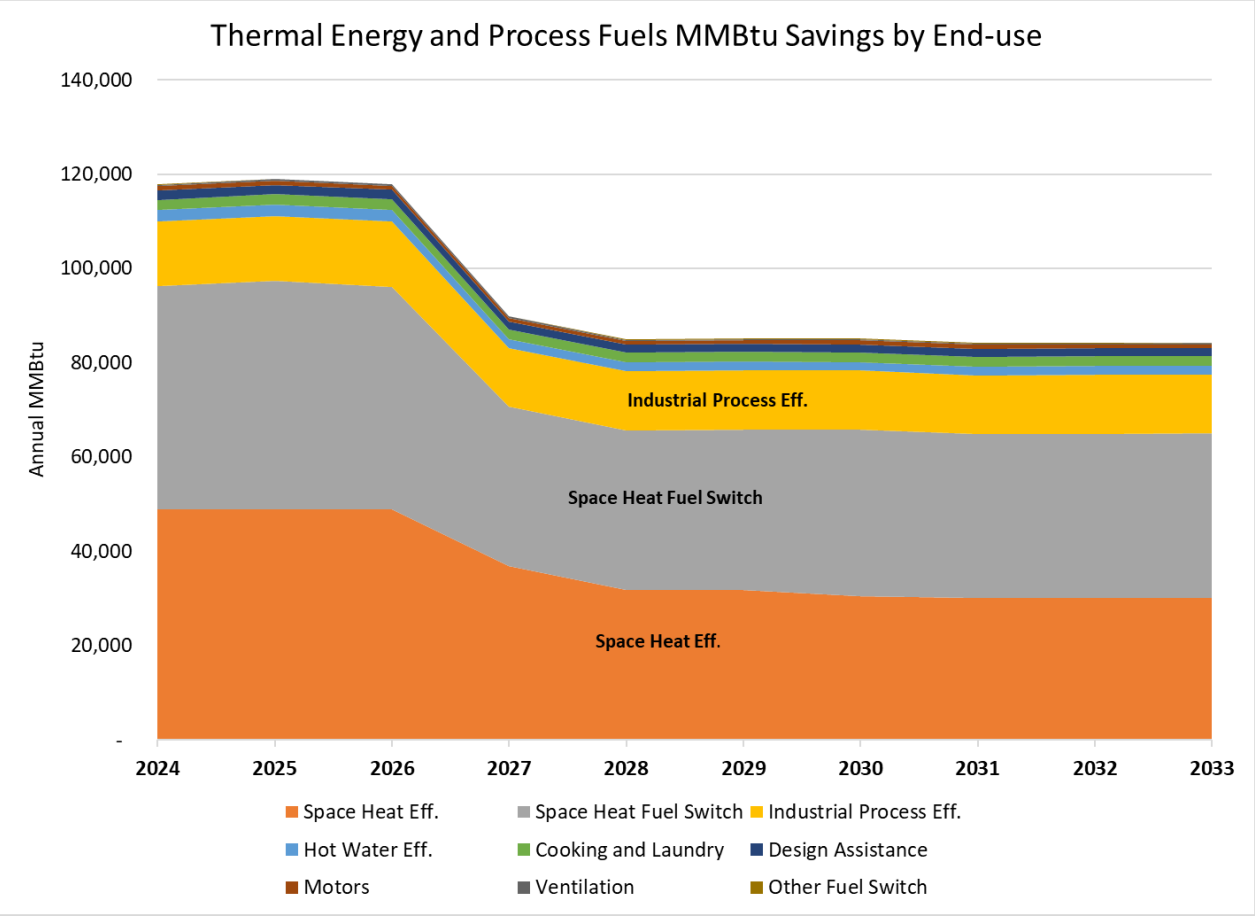

Figure 33: TEPF portfolio annual MMBtu savings by end-use. (Amended 11/17/23)

Residential Modeling Approach

The RES market consists of single-family and multifamily segments, existing homes, efficient products, and low-income housing. There is currently no residential single family or multifamily new construction measures in the TEPF model to be consistent with current program approach. The core of TEPF residential programs will continue to be comprehensive weatherization of homes, primarily through Home Performance with ENERGY STAR (HPwES). In support of Vermont's Comprehensive Energy Plan and consistent with the feedback from stakeholders, weatherization continues as a key method for delivering long-term RES energy savings and GHG emission reductions to Vermont, a core tenet of Vermont's Comprehensive Energy Plan. Weatherization also delivers many non-energy benefits to Vermont ratepayers. In the model, the number of HPwES projects corresponds generally to TEPF budget availability. That is, there will be greater numbers of HPwES projects in first three years when budgets are higher, and lower numbers in the remaining seven years that are forecasted to have lower budgets.

Low-income programs and services will continue to involve significant support for subsidized multifamily housing organizations. The modeling also assumes continued support for non-subsidized (market rate) multifamily properties, especially through the Building Performance weatherization program.

Existing Homes

- The TEPF budget includes funding for approximately 900 comprehensive/HPwES projects each year during the 2024-2026 performance period and reducing to 400 projects over the remaining seven years due to anticipated lower TEPF budgets. Efficiency Vermont will continue enhanced support for moderate-income customers to maintain at least 50% participation by these customers.
- Continued support of biomass systems, both fuel switching from fossil fuel as well replacing existing less efficient systems. Support for fossil fuel boilers and furnaces is not included in the model.
- Continued support for thermal measures through the Home Energy Loan (formerly the Heat Saver Loan), offering competitive interest rates based on customer income; includes interest rate buydowns and loan loss reserves for partner lenders.
- Two new measures in the TEPF existing homes portfolio include a DEI measure which provides additional support to reach underserved Vermonters and one addressing GHG emissions of the embodied carbon of insulation materials (see section on *New Measures*).

Efficient Products

- The majority of TEPF savings in the efficient products program is from advanced thermostats and biomass fuel switching.
- There are two categories of space heating heat pumps funded through the TEPF efficient products portfolio. "Unmatched" cold climate heat pumps are those units that are unable to match to an active utility account and therefore unable to utilize Tier III DU incentive funding. The fuel switch

portion of the incentive for these units is supported by the TEPF budget and fuel savings claimed. Air-to-water heat pumps are also supported by the TEPF budget and fuel savings claimed as these types of systems do not have electric high-efficiency option and therefore are unable to be supported through the electric budget as are other types of cold climate and ground source heat pumps.

Low Income and Market Rate Multifamily Services

Efficiency Vermont will continue its support to the subsidized multifamily market in this sector through 3E Thermal. In addition, the model reflects Efficiency Vermont's continued support of non-subsidized (market rate) multifamily property owners through an updated Building Performance approach, with increased incentives as part of the overall focus on increased weatherization activities.

Low Income Single-Family Services

The model increases support for low-income biomass fuel switches with an incentive adder for replacement wood stoves; the incentive adder allows for delivery and associated installation costs (e.g., specific construction-related work) that would ordinarily be a barrier for income-sensitive customers. Efficiency Vermont will continue support for thermal measures through the Home Energy Loan with 0% interest for customers under 80% AMI.

Commercial and Industrial Modeling Approach

While only comprising approximately 25 percent of the TEPF budget, TEPF savings from commercial and industrial represent about 50 percent of the total TEPF portfolio savings. The majority of these savings are from measures such as steam trap repair and replacement, biomass fuel switching, pipe insulation, new measures addressing agricultural feed pushers and biogas fuel switching (see section on New Measures), industrial process, heat pumps (unmatched and air-to-water), heating and ventilation controls, thermal shell measures, and commercial kitchen equipment. The TEPF model reflects enhanced support to business customers to reduce TEPF energy use and costs, increasing Building Performance support for small business customers. The model continues to exclude fossil-fuel-based heating equipment measures such as boilers and furnaces for consistency with current program, while shifting support to increased focus on weatherization, biomass, and the other measures listed above.

Cost-Effectiveness of the TEPF Portfolio

As discussed earlier for the electric portfolio, an EEU's portfolio of programs and services must be societally cost-effective. This ensures that it is appropriate to invest ratepayer funding in the portfolio as beneficial since benefits are greater than costs over the timeframe of the portfolio model. Table 7

provides annual, performance period, and cumulative NPV and BCR values for the 10-year TEPF portfolio model.

Table 7: Annual, performance period, and cumulative NPV and BCR values for the TEPF portfolio model (2041-2033). Present values are discounted to 2024 dollars. (Amended 11/17/23)

Year	Net Present Value (NPV)	Benefit-Cost Ratio (BCR)
2024	$57,795,003	4.00
2025	$58,058,249	4.05
2026	$56,734,508	4.04
2024-2026	**$172,587,760**	**4.03**
2027	$41,215,641	4.54
2028	$40,490,811	4.54
2029	$40,075,774	4.55
2030	$40,096,670	4.61
2031	$39,060,278	4.58
2032	$38,594,863	4.59
2033	$38,121,558	4.61
Total (2024-2033)	**$450,243,355**	**4.34**

Appendix A: Resource Acquisition Modeling Results (Amended 11/17/23)

Electric Model Outputs	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Total resource benefits, net $2024	$56,300,055	$57,589,354	$58,341,072	$61,976,814	$63,165,511	$64,410,714	$62,063,183	$63,397,506	$63,398,699	$61,543,530
Annual MWh, net	61,097	61,399	61,478	64,823	63,880	64,470	63,480	64,598	64,361	63,783
Summer peak kW, net	6,585	6,566	6,505	6,708	6,445	6,413	6,315	6,446	6,437	6,390
Winter peak kW, net	8,985	9,030	9,062	9,357	9,384	9,519	9,418	9,455	9,420	9,385
Lifetime MWh, net	792,742	801,052	806,503	866,028	870,836	882,316	872,205	892,049	887,155	882,141
GHG reductions, electric-funded, metric tons CO2e	40,994	41,627	41,663	42,650	41,449	41,353	39,919	40,670	44,353	44,269
Flexible load kW	612	694	850	1,594	1,731	1,797	1,869	2,020	2,020	2,020

Electric Model Outputs	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**
Total resource benefits, net $2024	$61,806,468	$61,868,160	$60,220,559	$60,931,202	$61,163,148	$59,731,796	$60,748,307	$60,790,140	$59,099,350	$59,680,831
Annual MWh, net	64,043	63,624	63,094	63,544	63,387	62,998	63,755	63,687	63,141	63,693
Summer peak kW, net	6,465	6,386	6,332	6,413	6,393	6,347	6,452	6,430	6,388	6,474
Winter peak kW, net	9,392	9,337	9,294	9,331	9,313	9,272	9,350	9,345	9,302	9,367
Lifetime MWh, net	885,251	880,521	875,355	881,285	878,987	874,946	885,648	884,682	878,818	886,456
GHG reductions, electric-funded, metric tons CO_2e	44,429	44,539	44,405	44,609	44,664	44,575	45,192	45,271	45,142	45,389
Flexible load kW	2,020	2,020	2,020	2,020	2,020	2,020	2,020	2,020	2,020	2,020

TEPF Model Outputs	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Annual MMBtu	120,581	121,784	120,697	89,908	84,986	85,161	85,102	84,153	84,231	84,304
Number of housing units weatherized	1,246	1,246	1,246	977	977	977	977	977	977	977
GHG reductions, TEPF-funded, metric tons CO_2e	6,972	7,059	7,001	5,450	5,134	5,149	5,410	5,344	5,350	5,359