2025 Annual Energy Report

Vermont's Energy Supply and Demand

Summary of Progress Toward Comprehensive Energy Plan Goals

January 15, 2025

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1. Introduction & Overview

Vermont's **energy policy**, as articulated in 30 V.S.A. 202a, is:

> To assure, to the greatest extent practicable, that Vermont can meet its energy service needs in a manner that is adequate, reliable, secure, and sustainable; that assures affordability and encourages the State's economic vitality, the efficient use of energy resources, and cost-effective demand-side management; and that is environmentally sound.

Vermont's Comprehensive Energy Plan, released in January 2022, recognizes that these goals are sometimes in competition. The plan balances the principles of Vermont energy policy which are all essential for a vibrant, resilient, and robust economy and for the health and well-being of all Vermonters. In doing so, the Comprehensive Energy Plan (CEP) builds upon and re-established long-standing high-level goals: To meet 25% of Vermont's energy needs from renewable sources by 2025, 45% by 2035, and 90% by 2050. In addition, the CEP sets sector specific targets.

This **Annual Energy Report** is designed to provide objective data as well as transparency regarding the policies pursued by the Department of Public Service (PSD), published pursuant to 30 V.S.A. 202b(e). It is organized with a slide format intended to increase accessibility. The report begins describing the major themes of the 2022 CEP, and provides an overview of the status of significant federal funding available. Next, this report describes major trends and initiatives for the energy sector as a whole, then specifically within each sector while providing objective data in simple exhibits throughout. Appendix A distills every recommendation in the Comprehensive Energy Plan and assesses progress on those recommendations. Appendix B includes the State Agency Energy Plan report.

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2022 Comprehensive Energy Plan Theme: Equity

The CEP recognizes that the current energy system is marked by systemic inequities that have a disproportionate impact on many of Vermont's communities, and that the transition required to meet our targets presents us with opportunities to root out and redress those existing inequalities.

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2022 CEP Theme: Equity

In **2024**, the Department worked to advance diversity, equity, inclusion, and justice within it's work through several avenues, including:

Participating in 6 meetings of the **Interagency Environmental Justice Committee ("IAC")**, several jointly with Environmental Justice Advisory Council ("EJAC"), to advance implementation of Vermont's Environmental Justice Law. Department staff contributed to efforts to advance numerous deliverables under Act 154 of 2024, including:

- The Department's initial report on Civil Rights and Environmental Justice complaint reporting and the IAC's response to recommendations from the EJAC,
- Supporting the finalization of the Core Principles of Community Engagement (now available here), and
- Participating in the task group work to develop guidance for historical environmental benefit spending reports

Supporting Regional Planning Commissions as they integrate equity and environmental justice considerations in Enhanced Energy Planning efforts, as detailed on pages 23-25 of the Guidance for Regional and Municipal Enhanced Energy Planning Standards.

Advocating for greater consideration of equity and environmental justice in distribution utility Integrated Resource Plans and other utility cases before the Public Utility Commission.

Complying with federal requirements related to the Justice40 initiative in all federal funding applications. This included initial planning for and engagement around implementation of Vermont's Solar for All program which will launch in 2025. More information is available here.

Convening a diverse array of partners to develop recommendations about a successor program to group net-metering and consider the future of community renewable energy programs in Vermont in fulfilment of the requirements laid out in Act 179 of 2024. This culminated in a report to the legislature, further discussed in the Electricity: Trends and Initiatives Section of this report.

The 2022 CEP outlines seven recommended actions for the Department and other agencies to take to advance equity and justice while striving to meet state energy goals. These recommendations and the progress towards meeting them made over the last year are outlined in Appendix A.

2022 Comprehensive Energy Plan Theme: Grid Evolution

The CEP calls for a secure and affordable grid that can efficiently **integrate, use, and optimize** high penetrations of distributed energy resources to enhance resilience and reduce greenhouse gas emissions

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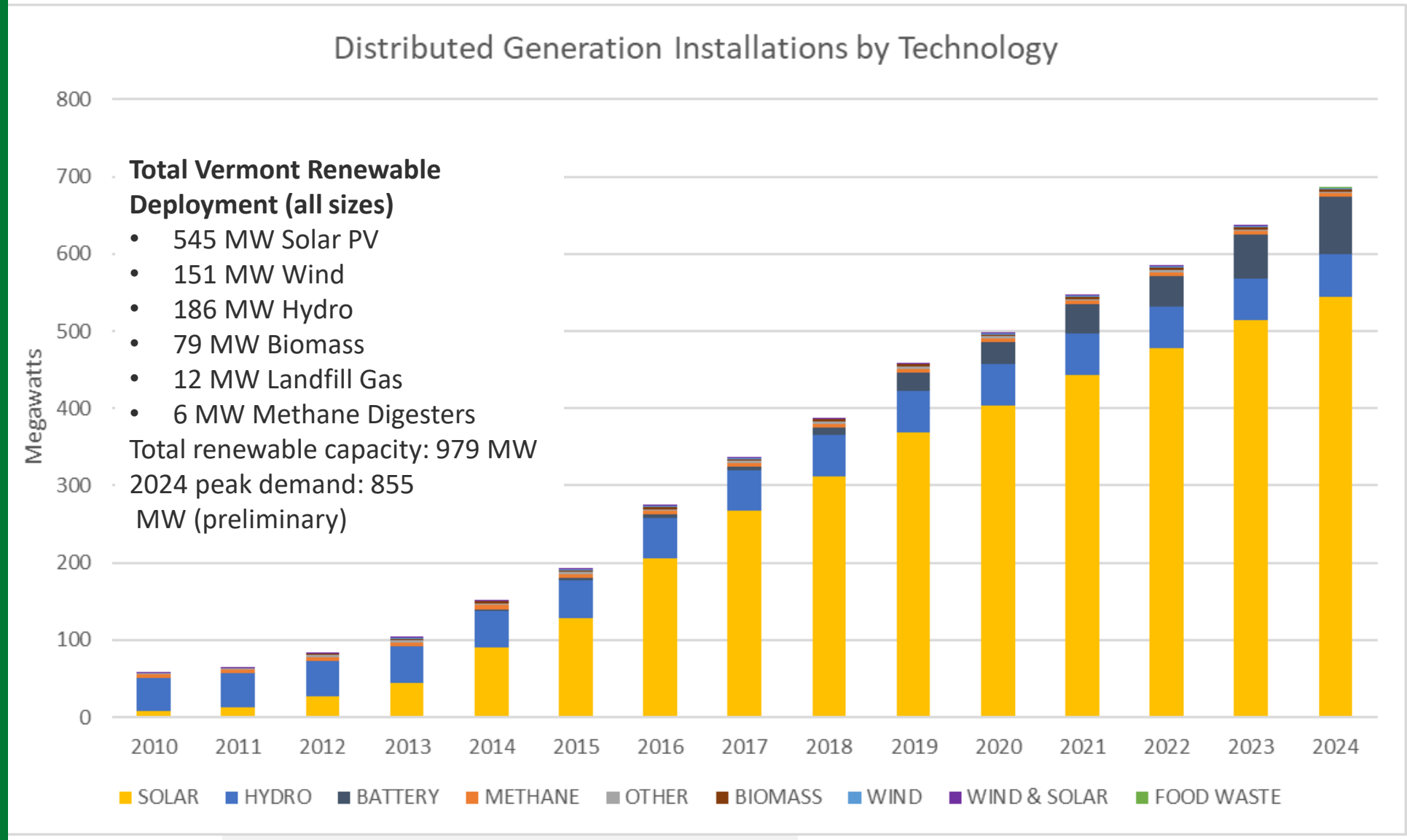
Vermont currently has significant penetration of renewables, especially Distributed Energy Resources.

See Section 2.d for Storage Deployment and Drivers



VT now has 686 MW of operational DERs including 74 MW of battery storage

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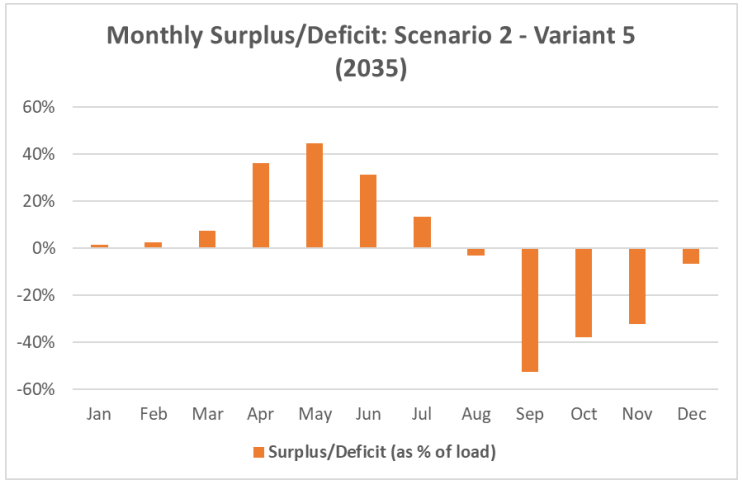
Variability of Load and Generation Creates New Challenges that underscore need for flexibility mechanisms

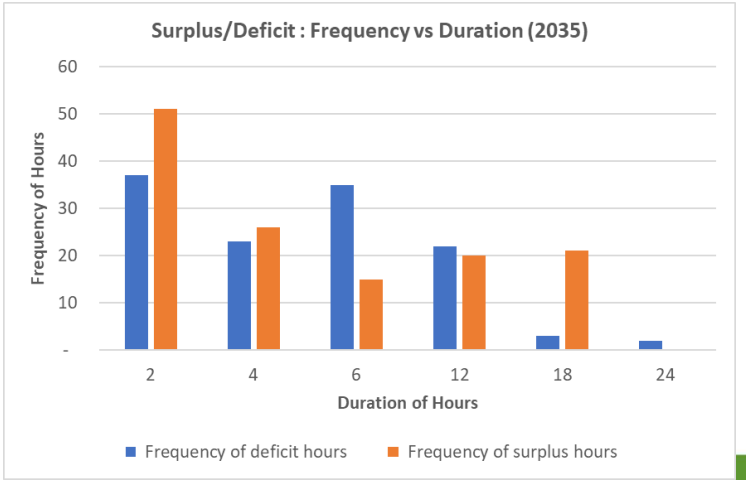
Vermont's Renewable Energy Standard (and all regional RPS) compliance is currently demonstrated on an annual basis, meaning that load that occurs when renewables aren't producing is often still being physically supported with non-renewable resources.

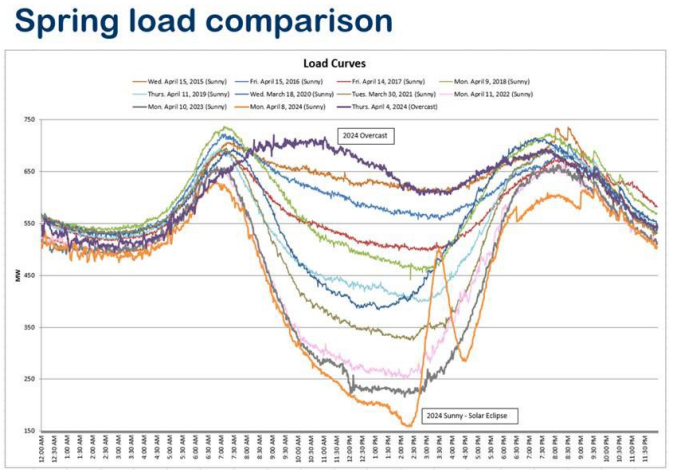
As policymakers consider quarterly, monthly, or hourly compliance, storage and load management options will be required to align generation and load.

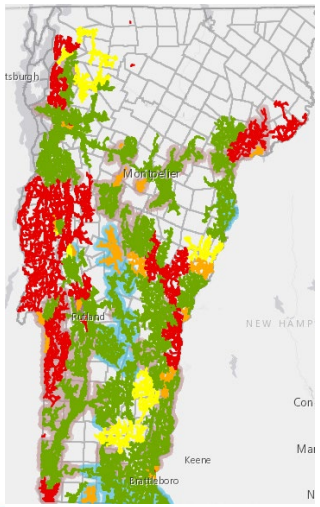
The bar charts on the left show an example from the Public Service Department's technical analysis, showing significant monthly energy surplus/deficit in the year 2035, assuming a 20% Tier II plus a 20% Regional Tier. The second bar chart shows the frequency of different surplus/duration deficits.

The line chart shows data from VELCO highlighting the impact of solar on load during the day, comparing a 2023 overcast spring day to sunny spring days from the last several years. The map shows Green Mountain Power's distribution circuits that have headroom to support additional solar (green) and those that don't (red).

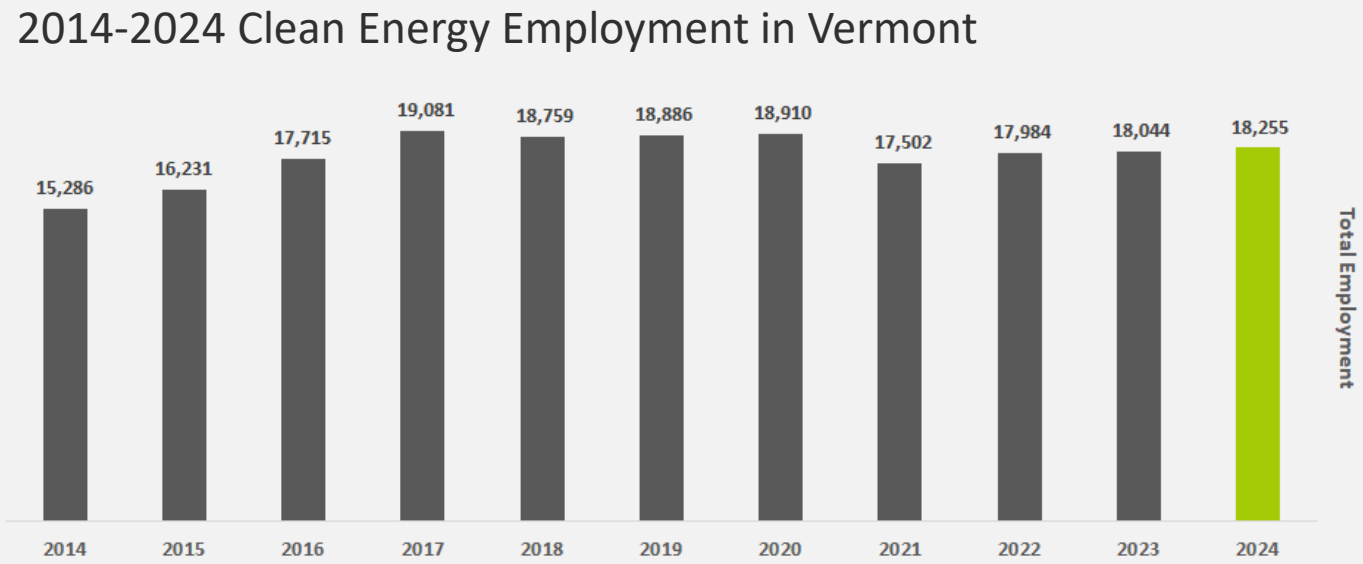


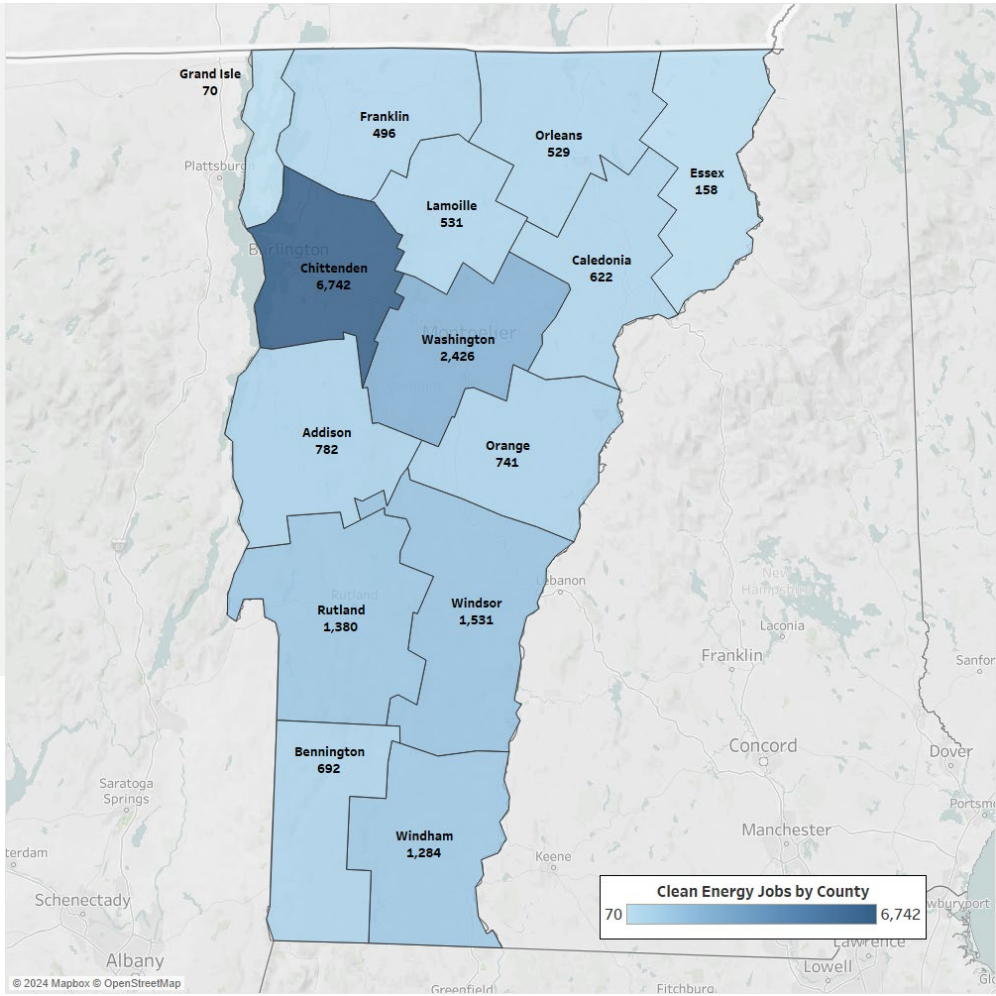






Vermont's Clean Energy Economy





Vermont is the nation's leader in clean energy employment per capita.

Vermont's clean energy sector accounted for 18,255 clean energy jobs, approximately 6 percent of the state's total employment and the highest level recorded since the COVID-19 pandemic. Each year, the Department's Clean Energy Development Fund issues the Vermont Clean Energy Industry Report, drawing on data collected by the U.S. Department of Energy and its well-established methodology to characterize employment trends.

Clean Energy Jobs by County shows Chittenden County accounts for the largest share of the state's clean energy employment, with 6,742 clean energy jobs.

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Vermont's Climate Action Plan

The *Global Warming Solutions Act* requires the State's *Climate Action Plan* be updated by July 1, 2025 and every 4 years thereafter.

In addition to sitting on the Council, Public Service Department supports work of four of the five the Subcommittees:

Cross Sector Mitigation	Rural Resilience and Adaptation	Science and Data	Just Transitions


Vermont Climate Action Plan

SUMMARY

The Vermont Climate Action Plan

Vermont and the world are facing the impacts of climate change and it's time to act. The initial Vermont Climate Action Plan, released on December 1, 2021, outlines steps to cut climate pollution and help Vermonters prepare for extreme weather and other impacts caused by climate change.

Vermont must get ready for a changing climate and cut its climate pollution, such as carbon and methane emissions, in half by 2030 to meet the target in Vermont's Global Warming Solutions Act. To do this, Vermont will need to prioritize helping the people who will be most affected by climate change.

The Legislature established the Vermont Climate Council to draft the plan. As they drafted the plan, the Climate Council incorporated ideas and feedback from a wide range of Vermonters. In addition, the Climate Council developed this plan in coordination with the State of Vermont's Comprehensive Energy Plan (released November 2021), which details energy opportunities and challenges for the state. Five subcommittees shaped the plan: Rural Resilience and Adaptation, Agriculture and Ecosystems, Cross Sector Mitigation, Just Transitions and Science and Data.

The initial Vermont Climate Action Plan is a first step in climate action and will be updated at least every four years. The plan includes an implementation section for legislators and other state-level stakeholders to inform decision-making. The Climate Council will continue to build out the framework for measuring and assessing progress that government, nonprofit, private sector and municipal partners across the state can use to evaluate their impacts in achieving plan goals.

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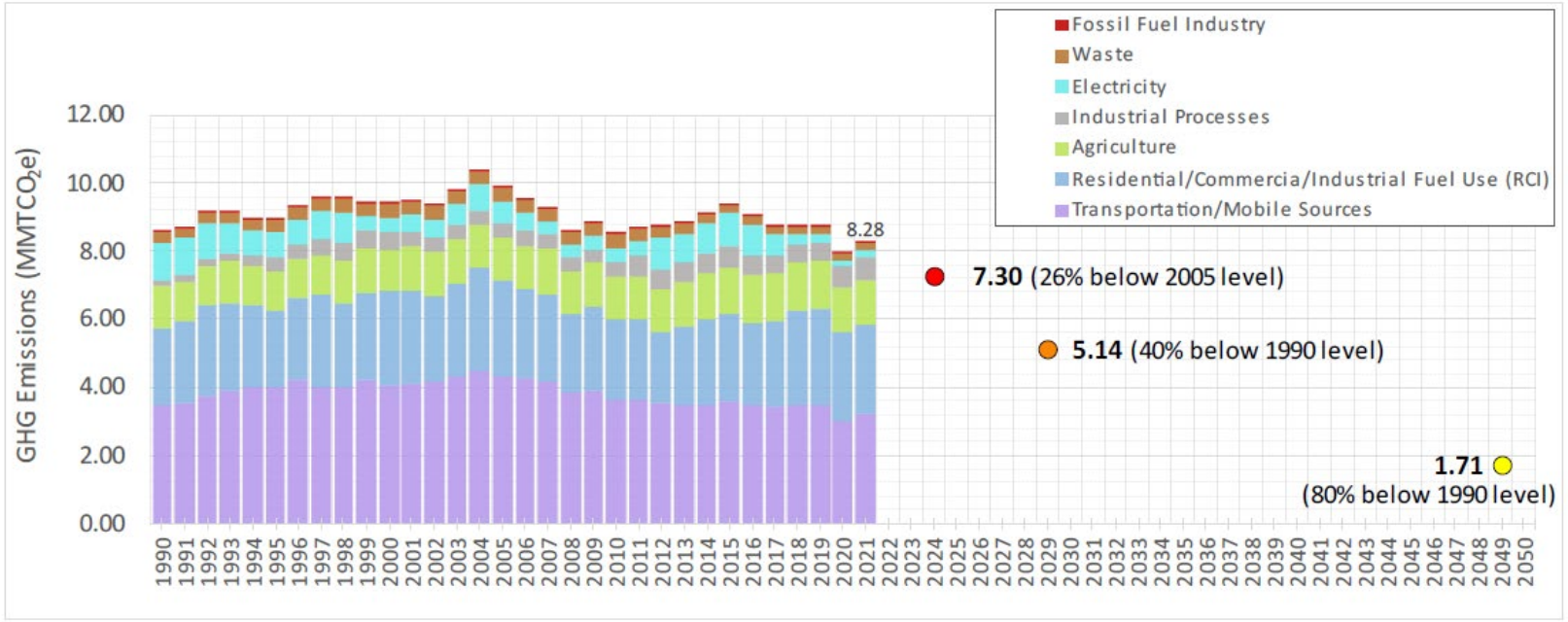
Past GHG Emissions and Future Targets

Vermont's Agency of Natural Resources, provides annual estimates on the amount of greenhouse gas emissions (GHG) by sector. The Vermont Greenhouse Gas Emissions Inventory and Forecast (GHG Inventory), completed pursuant to 10 V.S.A. § 582, establishes historic baseline greenhouse gas levels and tracks changes in emissions through time to determine progress toward Vermont's GHG requirements. As in prior years, the largest emitting sectors of GHG emissions in 2021 were transportation, building energy use, and agriculture.

Vermont's GHG emissions declined 10% percent from 2017 to 2020 but increased slightly again in 2021.The decrease in transportation emissions was responsible for most of this decline and was largely due to the global pandemic and Vermonters staying home.



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Federal Funding

Vermont, like other states, has received, will receive, and has the potential to access unprecedented amounts of federal funding for energy-related initiatives and projects through the American Rescue Plan Act (ARPA), the Infrastructure Investment and Jobs Act (IIJA, also called Bipartisan Infrastructure Law or BIL), and the Inflation Reduction Act (IRA).

Applying for and receiving federal funding takes time. There are often significant restrictions on use of funds, and matching funds must be obligated to access many of the available dollars. Enormous amounts of resources are being dedicated to securing, distributing, and reporting on federal funds. Formula distributions from the federal government combined with responses to competitive solicitations provide opportunity to further *Comprehensive Energy Plan* goals. The following few slides provide an overview – select program specifics can be found in appropriate sector sections of this document.

American Rescue Plan Act (ARPA)

- **$74 Million ARPA Funds allocated to Public Service Department via FY 2022 and 2023 Budgets**
  - $2 M to EVT and NeighborWorks for workforce development (being deployed)
  - $30 M to EVT for moderate income weatherization
  - $10 M redeployed in 2023 to support flood impacted LMI HH with equipment replacement
  - $20 M to support home electric upgrades for low and moderate income (LMI) households
  - $5 M to install heat pump hot water heaters for LMI households
  - $7 M for Energy Storage Access Program for storage systems in VT homes, municipal buildings, support muni/coop software solutions
  - $10 M to Affordable Community Renewable Energy
  - $5M (+ $2M 2023 General Fund + 1M Congressionally Directed Spending) to School Heating Assistance for Renewable Energy (SHARE) Program

Bipartisan Infrastructure Law (BIL)/ Infrastructure Investment and Jobs Act (IIJA)

November 2021 – Formula Funding

$3M IIJA funds through State Energy Program (over 5 years) to be used for:

- Workforce development
- Staffing to support deployment of federal funds
- Equity and engagement work

$1.6M IIJA Funds directed by Legislature to BGS State Energy Management Program for Municipal Energy projects

$900K Energy Efficiency and Conservation Block Grant funds to be sub-granted to eligible municipalities.

$16M **(over 5 years) for utility grid investments** to reduce the frequency & duration of outages

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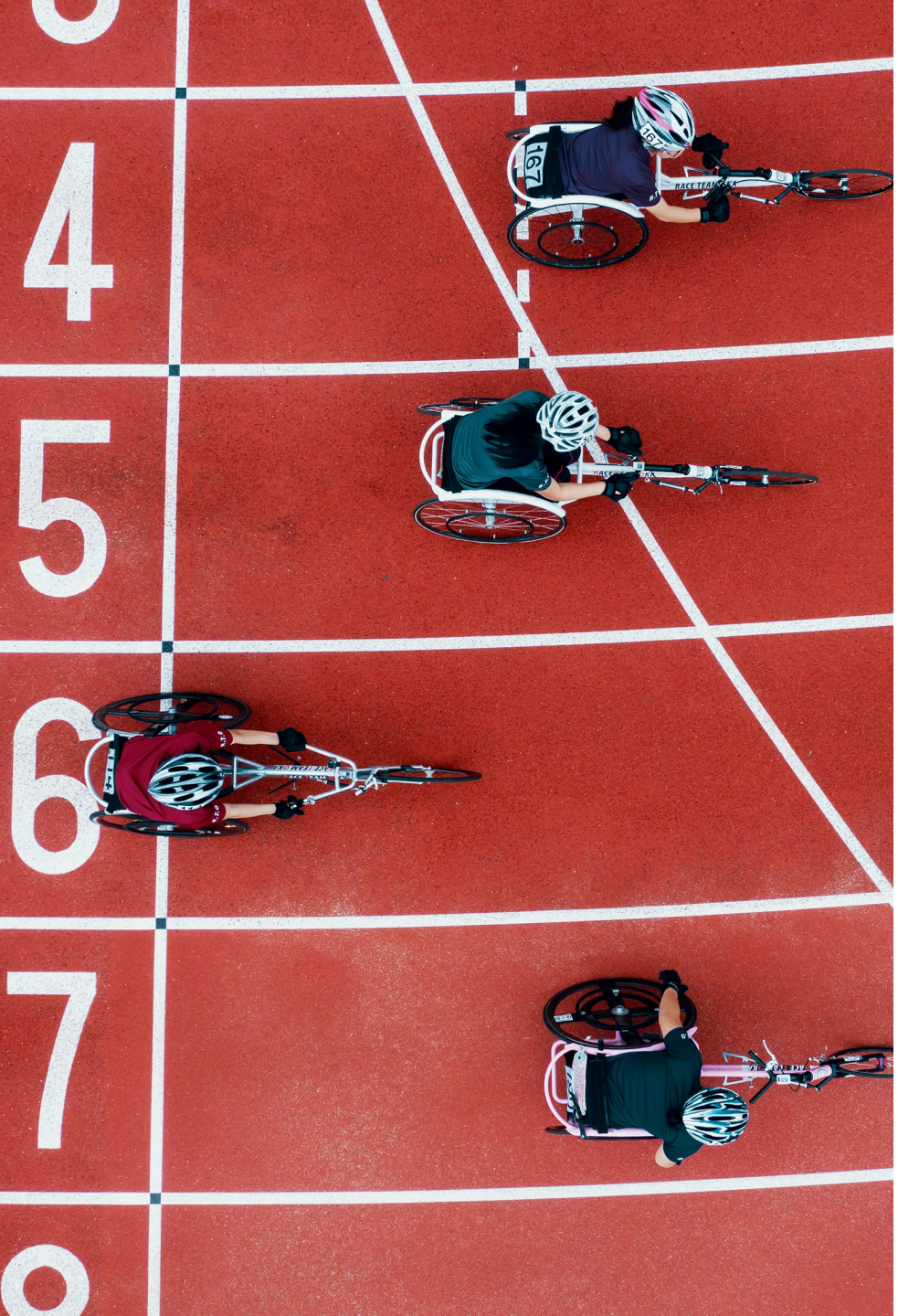

Bipartisan Infrastructure Law (BIL)/Infrastructure Investment and Jobs Act (IIJA)

Competitive Funding Applications – Grid Resilience & Innovation Partnerships

Approval of joint funding with NE states for projects to facilitate the future connection of offshore wind, including:

- Shoreline transmission substation reinforcement
- Long duration battery energy storage system

Vermont applied for but did not receive funding for:

- Over $100M to support New England Clean Power Link
- Approx $60M to support installation of battery storage in disadvantaged communities

Vermont utilities received funding for projects, including:

- VELCO – Solid state flow control device on NY transmission tieline
- GMP – Vehicle-to-Grid (V2G) pilot

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Inflation Reduction Act (IRA)

Passed August 2022, funds expected to flow late in 2025

$59 Million Formula funds via Department of Energy

- $29 M for **weatherizing** low-income households through the WAP program (HOMES)
- $29 M for **rebates for** heat pumps and associated panel upgrades for low- and moderate- income households.
  - $9 million for moderate-income heat pump incentives through EVT
  - $10 million for low-income heat pump incentives through the WAP
  - $10 million for electrification assistance for new affordable housing construction
- $1 M for Training for Residential Energy Contractors (TREC)

Competitive Solicitations via EPA:

- Greenhouse Gas Reduction Fund – Solar for All -- **$62.5 Million**

Tax Credits Available Now

- Efficient Appliances
- Renewable Energy Development

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Act 18 of 2022 directed the Public Utility Commission to undertake the design of a proposed Clean Heat Standard ("CHS") and to present a proposed rule to the Legislature in January 2025. Since beginning this work nearly 18 months ago, a great deal of effort has gone into the designing the proposed rule. Hundreds of public comments have been provided to the Commission (see PUC Case No. 23-2220-RULE, and PUC Case No. 23-2221-INV), technical and equity advisory groups have held numerous meetings discussing the details of a proposed standard, and the Commission and Department of Public Service have issued several reports.

The Commission issued the first of two check back reports in February 2024 concluding that " the schedule required by statute is untenable and will preclude a thoughtful approach".

In October 2024, the Commission issued a Draft CHS Rule and a companion report which states: "Our work over the past year and a half on the Clean Heat Standard demonstrates that it does not make sense for Vermont, as a lone small state, to develop a clean heat credit market and the associated clean heat credit trading system to register, sell, transfer, and trade credits." The Commission will provide it's final proposed Rule and second checkback report, including economic analysis, to the legislature in January 2025. The CHS is discussed further in Section 4.

"Affordable Heat Act" (Act 18) of 2023

The Clean Heat Standard

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2. Electricity

a. Trends and Initiatives

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Renewable Energy Standard Update (Act 179)

Act 179 of 2024 reformed Vermont's Renewable Energy Standard, creating a pathway for the state's distribution utilities to purchase 100% of their electricity from renewable energy by no later than 2035. These reforms included:

- **Updating & Expanding the RES "Tiers":** The Renewable Energy Standard now includes five distinct "tiers" of requirements. Act 179 of 2024 updated the requirements for Tiers I, II, and III and added new requirements under Tiers IV and V. See Slides 20-21 for an overview.

- **Changing the Requirements from Retail Sales to Total Load:** The initial RES placed requirements on utilities based on their annual retail sales of electricity. The reforms in 2024 shift this requirement to be on a utility's "total load", which includes both the retail sales to their customers, any additional electricity used by the utility itself, and transmission and distribution line losses.

- **Elimination of Group Net-Metering:** Act 179 created a sunset date for the group net-metering program and tasked the Department with developing a report to make recommendations for a successor program. The report and the Department's recommendations are reviewed on Slides 22-23. The full report is available on the Department's website.

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Renewable Energy Standard Update (Act 179)

The Renewable Energy Standard now includes five distinct categories ("tiers") of requirements. These tiers are described here. The next slide (Slide 21) illustrates how these requirements will impact Vermont's electricity supply by 2035.

Tier I: Total Renewable Energy

- **Previously** 75% of retail sales by 2032 for all utilities (Certain utilities already100% renewable)
- **Updated:**
  - 100% of total load by 2030 for Green Mountain Power ("GMP") & Vermont Electric Cooperative ("VEC")
  - 100% of total load by 2035 for municipal utilities and Global Foundries ("GF")
- **Eligible Resources** include wind, solar, hydropower, biomass, and landfill gas, among others

Tier II: Distributed Generation

- **Previously** 10% by 2032 for all utilities
  - 100% renewable utilities are exempt from Tier II
- **Updated:**
  - 20% by 2032 for GMP and VEC
  - 20% by 2035 for municipal utilities and GF
- **Eligible Resources** include new renewable energy plants that are 5MW or less, hydroelectric plants that are owned by municipal utilities and/or are Low Impact Hydropower Institute ("LIHI") certified, or net metering that are in Vermont

Tier III: Energy Transformation

- Encourages utilities to support additional distributed generation or other projects to reduce fossil fuels consumed by their customers
- Was not substantially changed by the reform to the RES

Tier IV: New Renewable Energy

- **New Category!** Seeks to encourage the use a new renewable generation (developed after January 1, 2010) to support the reliability of the ISO-New England electric system.
- **Requirements:**
  - 20% of total load by 2035 for GMP
  - 10% of total load by 2035 for VEC, municipal utilities, and GF
  - 100% renewable utilities are exempt from Tier IV

Tier V: Load Growth for 100% Renewable Utilities

- **New Category!** For utilities that are 100% renewable already (Burlington Electric Department, Swanton Electric Department, and, Washington Electric Cooperative), sets requirements for the percentage of the load growth above the 2024 baseline that must come from new or existing renewable energy.

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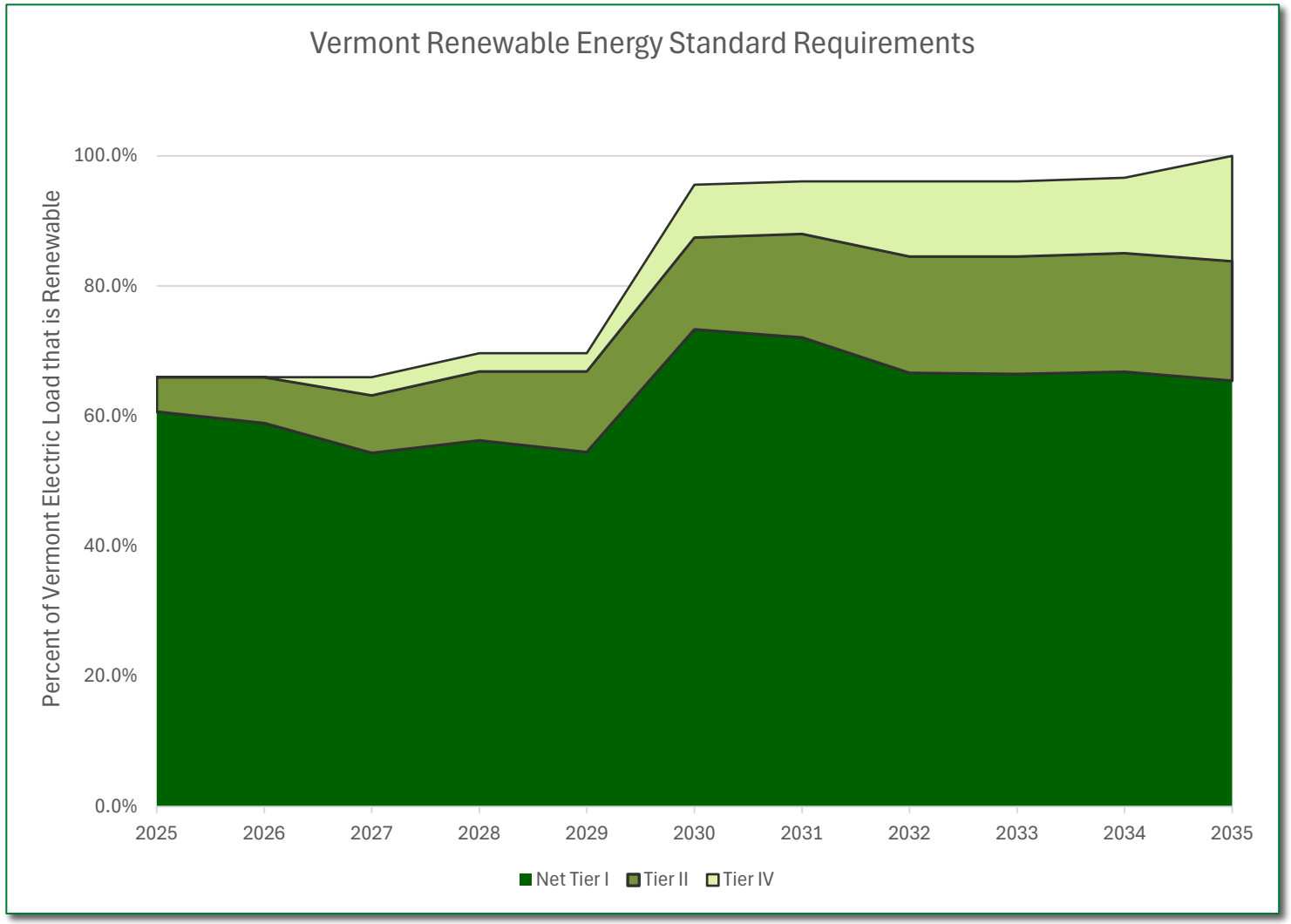
Renewable Energy Standard Update (Act 179)



This figure illustrates how Vermont's total electricity supply will likely change between 2025 and 2035 under the new RES. However, please note:

(1) This approximates the statewide requirements for Tiers I, II and IV under the RES. Actual requirements vary by utility and therefore actual percentages will vary based on an individual utility's proportional share of statewide load.

(2) Tier V load growth requirements are not projected here using a statewide load forecast because those requirements are dependent on each existing 100% renewable utility's individual load growth projections.

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Renewable Energy Standard Update (Act 179)

In addition to reforming the RES, Act 179 of 2024 sunsets the current group net metering program as of January 1, 2026 and requires the Department of Public Service to write a report making recommendations for a replacement program. As stated in Act 179:

> *"The goal of this report is to develop a replacement program for group net metering to reduce operating costs, reduce resident energy burdens, and encourage electrification and decarbonization of buildings and enhance the financial capacity of housing providers to electrify the buildings developed or rehabilitated and provide relief to residents of manufactured home communities from their energy burdens."*

Developing the Report
From July 2024 – January 2025, the Department worked to develop recommendations aligned with the requirements of the Act through several avenues:

- **A three-part working meeting series** in September & October with a diverse array of invited participants, discussing priorities and potential models for connecting communities with renewable energy
- **Information requests** to electric distribution utilities and affordable housing developers and funders to understand current utility programs for income-eligible customers and progress of affordable housing on connecting developments with solar
- **Reviewing existing community engagement efforts** related to renewable energy and climate
- **A public comment period** in December to allow for review and refinement of the draft report and recommendations

A more detailed overview of the report requirements is available in Section One of the final report. An overview of the process taken by the Department is available in Section Three of the final report, available on the Department's website: https://publicservice.vermont.gov/renewables

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Renewable Energy Standard Update (Act 179)

The final report offers four recommendations for next steps:

1. Establish the Renewable Energy for Communities ("RE4C") program.

The legislature should direct the Public Utility Commission ("PUC") to establish a "Renewable Energy for Communities" program to guide and support development of renewable, distributed generation that seeks to benefit communities who have historically faced barriers to accessing the benefits of investing in renewable energy, while also helping utilities cost-effectively meet their distributed generation requirements under the Renewable Energy Standard.

2. Implement renewable energy policy cost containment mechanisms.

While the Renewable Energy for Communities program will likely support development of lower-cost community renewables than the former group net metering program, it will likely come at an economic cost to ratepayers greater than what renewable energy could otherwise be procured for given 100% renewable or carbon free resources. Thus, cost containment mechanisms are necessary to mitigate any possible increases in rates associated with the program.

3. Initiate a proceeding to review and modernize net-metering and consider other potential distributed generation programs available to Vermonters.

The Public Utility Commission should open a proceeding to review and modernize the structure and compensation in the net-metering program. This should include exploration of additional program mechanisms that connect Vermonters with distributed generation, with due consideration to how changes might impact existing systems. Such a review would at a minimum seek to ensure compensation provided to future net metering projects appropriately reflects the value they provide to ratepayers. It would also allow for consideration of other changes to the program, including reinstating virtual group net-metering.

4. Renewable energy procurement programs are not the appropriate mechanism to support electrification programs.

Alternative mechanisms should be considered to broadly support reducing the financial barriers to advancing decarbonization and electrification of buildings, particularly affordable housing. The best way for a group net-metering successor program to help affordable housing and others facing financial barriers to electrification is by ensuring that net-metering and other renewable energy programs do not increase electric rates more than absolutely necessary.

A detailed explanation of the recommendations and the rational for them is available in Section Two of the final report.

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2. Electricity

b. Security, Reliability, and Resilience

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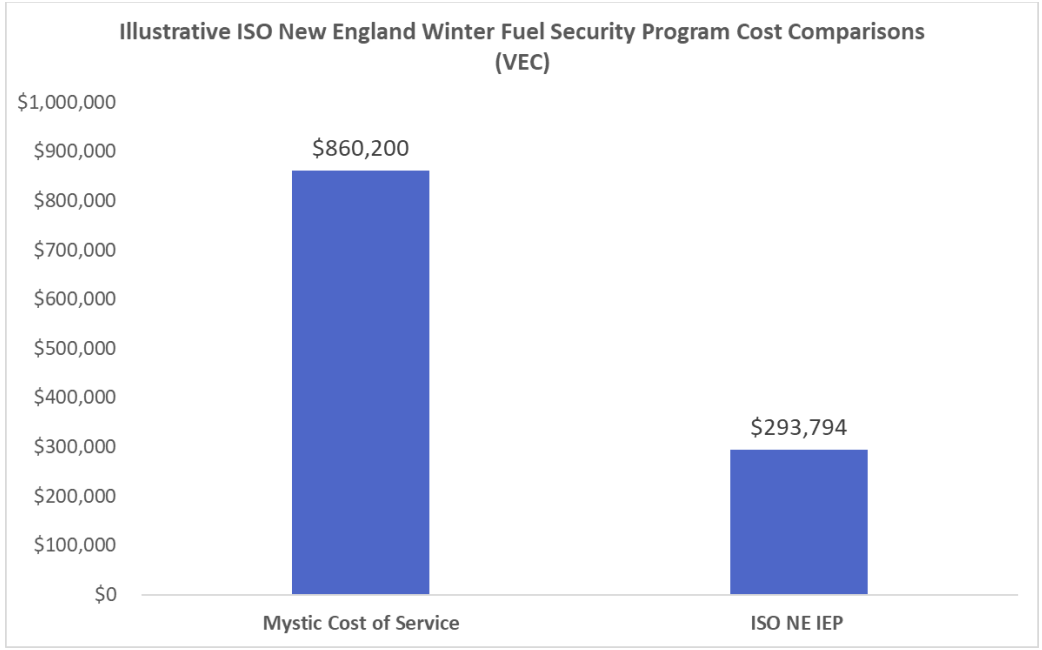
Winter Energy Security

Over the past decade, many fossil and nuclear generating units have been retired from ISO New England's system, increasing the reliance on natural gas as a generating resource. Natural gas pipeline import capability in New England can become constrained in the winter as gas for electricity generation competes with demand for heating purposes in other New England states. (Vermont Gas is supplied by a Canadian pipeline and its load does not impact the New England electricity prices.) As a result, when there is a prolonged cold snap and home heating requires more natural gas, New England risks electric supply shortages. With milder temperatures projected for this winter, the likelihood of such an event is greatly diminished.

ISO New England published its seasonal outlook for the 2024-2025 winter regarding system readiness. ISO-NE anticipates that there will be sufficient generation resources to meet consumer demand this winter with forecasts slightly above average temperatures and normal precipitation in the region. Utilizing its rolling 21-day energy supply forecast, the ISO Operations team will monitor resource availability and fuel supply levels to ensure adequate transmission service. This winter will be the first with the Mystic generating station having fully retired, and the second winter with the Inventoried Energy Program in place. This program provides incremental compensation to certain resources that maintain fuel reserves on site in reserve for an emergency. It is expected to cost substantially less than previous support for the Mystic Generating Station.



From: case 24-3432-TF, VEC Rate Case Test Year Actuals 7/1/23-6/30/24

Mystic Generating Station in Everett, MA

Vermont Long-Range Transmission Plan

VELCO completed its 2024 Long-Range Transmission Plan and identified several reliability issues, and potential solutions. Affected utilities are now analyzing least cost solutions, including demand management, efficiency, and storage. Load related constraints are listed below; generation constraints are also identified in the plan and if not addressed could cause significant costs for meet their Renewable Energy Standard requirements.

- Northern Area – 2032, winter (pictured)
  - $120M 115 kV line + 3x $11M transformer
  - Or, 75 MW of peak load reduction
- Northwest Area – 2029, summer
  - $215M 115 kV line + $13M transformer
  - Or, 5 additional MW of load reduction
- Central Area – 2034, summer
  - $185M 115 kV line + 3x $13M transformer
  - Or, load reduction to 2033 peak load level
- Southern area – 2034, summer
  - 115 kV line + transformer
  - Or, load reduction to 2033 peak load level
- Statewide – 2034, summer
  - 345 kV line + $13M transformer
  - Or, load reduction to 2033 peak load level

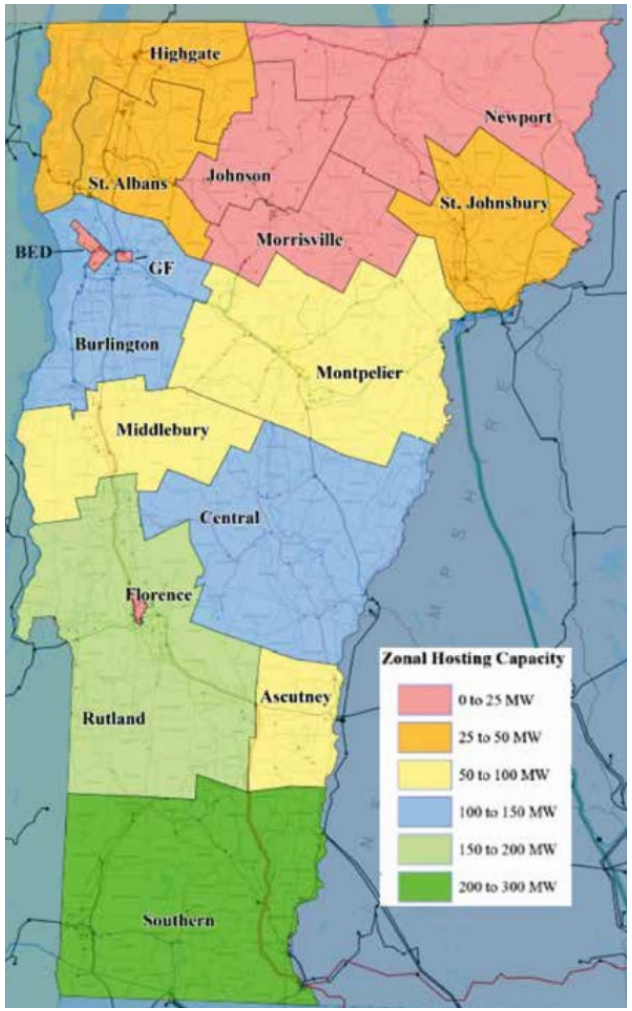
AREA OF CONCERN

- Install a new 115 kV line between Essex and Williston
- N-1-1 contingency causing thermal overload and voltage collapse exposure
- Affected transformers: Queen City, Tafts Corner, Barre
- Timing is 2032 based on winter *VT Roadmap* forecast by 2033
- 75 MW of load reduction in northern area by 2033
- Grows over time

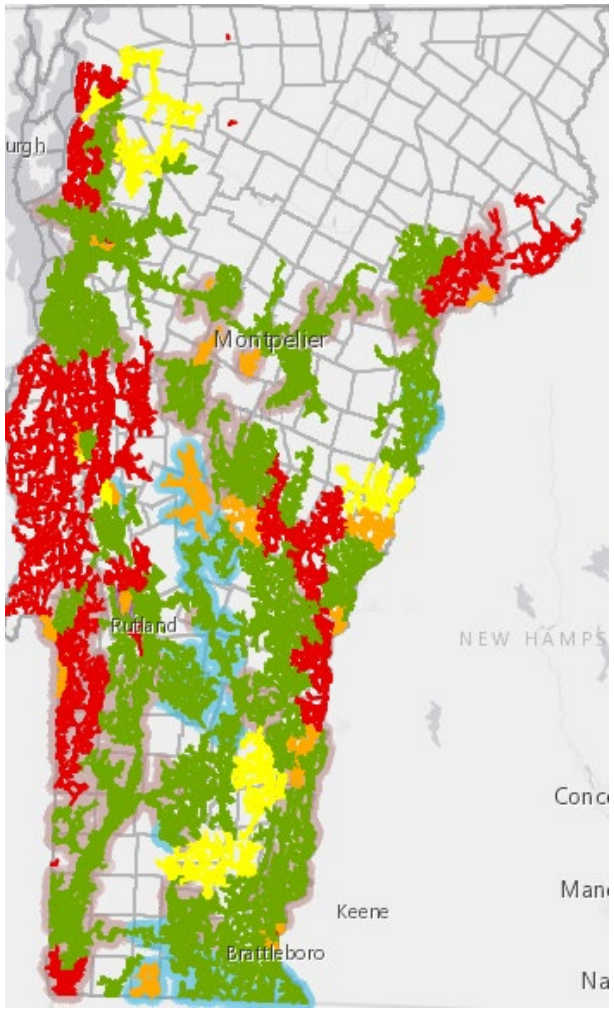
UTILITY

- The affected utilities are all utilities, and the lead utility is GMP

Generation Constraints



Transmission hosting capacity by region from 2024 VELCO Long-Range Transmission Plan



GMP distribution system hosting capacity from Green Mountain Power Solar Map

Vermont has experienced a high rate of growth in distributed energy resources, specifically in the deployment of solar installations. Having seen almost 50 megawatts (MW) of small-scale solar installations each year for the better part of the past decade, and with total Distributed Energy Resource (DER) capacity close to 600 MW, there are certain parts of the Vermont grid that are saturated with generation resources. Particularly in western Vermont, several distribution substations are no longer able to accommodate the connection of additional distributed generation resources above a certain size. Reverse power flow from these resources would exceed utility system equipment ratings. Additionally, a transmission constraint in the northern part of Vermont, in an area referred to as the Sheffield-Highgate Export Interface, means that utility-scale generation within this area is subject to limits and curtailment by the ISO-NE system operator to maintain system reliability. The curtailment events have been lessened in the past year due to lower import levels from Hydro Québec over the Highgate converter. For how long this trend will continue depends largely on prevailing regional market factors.

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Reliability and Resilience

- Utilities improving resilience planning including evaluating threats, hazards, and system vulnerabilities, then evaluating solutions
  - **PSD to pursue resilience proceeding at PUC with technical assistance from national labs**
- Utilities continue to implement reliability & resilience solutions by planning for and implementing least-cost solutions including:
  - Undergrounding lines
  - Relocating lines to roadside
  - Line hardening (i.e. tree wire)
  - Vegetation management
  - Islandable energy storage
- Utilities continuing/improving short/mid-term winter weather forecasting efforts, preparatory exercises, and response practices
- Coordination between State Energy and Security Plan and State Hazard Mitigation Plan, participation in state Resilience Implementation strategy and on Climate Action Plan Rural Resilience & Adaptation Subcommittee

Credits from top, clockwise: VTDigger, David Young/WEC, GMP, GMP, VTDigger

Grid Resilience and Reducing Outages Program

- PSD is the recipient of ~$15 million over four years via the US Department of Energy's (DOE) Grid Resilience State Formula Grant Program
- Received allocations for year 1-3 (combined) in two tranches totaling $8.4 million – Tranche 1 inclusive of year 1 & 2 allocations
- Additional expected allocations: $2-4million in '25, '26*
- Eligible measures reduce duration and frequency of electric outages, with focus on disadvantaged communities
- PSD expects Distribution Utilities will be the likely subrecipients of this funding

*Pending allocation of funding in future federal budgets

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Affordable Community Renewable Energy (ACRE) Program

$10 million for “the Affordable Community-Scale Renewable Energy (ACRE) Program…to support the creation of renewable energy projects for Vermonters with low-income”

- Distribution Utilities (DU) developed four subprograms: Green Mountain Power, Vermont Public Power Supply Authority, Vermont Electric and Washington Electric Cooperatives, and Stowe Electric Department
- Benefits delivered as monthly on-bill credit to eligible customers – 185% Federal Poverty Guideline
- Credits range $12-45 monthly savings each of the 8,000 participants for 5-10 years - $240-500 annual savings
- Each DU subprogram serves as a pilot, ideally leading to a future statewide low-income energy assistance program
- Provides a model for alternative to net-metering
- Currently providing benefits to more than 1,600 participants with other projects coming on-line to deliver more energy burden reductions for Vermonters

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Solar For All

- PSD received an award of $62 million from EPA's Greenhouse Gas Reduction Fund (GGRF) Solar For All (SFA) Competition (IRA Funding)
  - $14.6 million - Residential Assistance In Solar Energy (RAISE) Program – for single-family homes
  - $22.3 million – Multifamily Affordable Solar Housing (MASH) Program - for MFAH developments
  - $20.5 million – Affordable Community Renewable Energy (ACRE) Program – expansion of ACRE
- Each subprogram designed to offer participants the benefits of solar providing a >20% electrical bill reduction up to 20 years

July 2023 EPA Opened Competition → **July – October '23** PSD Developed Proposal → **October '23** PSD Submitted Proposal → **April 2024** EPA Funding **Announcement** → **July** - December **'24 Agreements** w/ EPA finalized → January – December **2025** Planning Year → 2025 Programs **Rollout** as Finalized → **September 2029** - Expenditure Deadline

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2. Electricity

b. Electricity Demand and Load Management

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Historical ISO-NE and Vermont System Peak Demand

The regional grid continues to reach system-wide peaks during hotter summer weather. In the past decade, peaks have shifted later into the evening over time due to the penetration of behind-the-meter solar production which reduces metered demand the most during peak daylight hours (noon and the few hours around noon). Vermont, on the other hand, has reached its peak demand during colder winter months in three of the six years prior to 2024. Most monthly peaks (not shown), which form the basis of regional transmission cost allocation, occur late in the evening near or after dark.

ISO New England System					Vermont		
Year	Peak Date	Hour Ending	System Peak Load (MW)	Vermont Coincident Peak (MW)	Peak Date	Hour Ending	System Peak Load (MW)
2018	8/29/2018	17:00	25,559	837	7/2/2018	20:00	935
2019	7/30/2019	18:00	23,929	792	1/21/2019	18:00	892
2020	7/27/2020	18:00	24,727	825	7/27/2020	20:00	890
2021	6/29/2021	17:00	25,280	796	8/26/2021	20:00	962
2022	8/8/2022	16:00	24,396	706	1/29/2022	18:00	904
2023	9/7/2023	18:00	23,623	735	2/3/2023	18:00	910
*2024**	*7/16/2024*	*18:00*	*24,366*	*855*	*6/19/2024*	*21:00*	*877*

**2024 data is preliminary*

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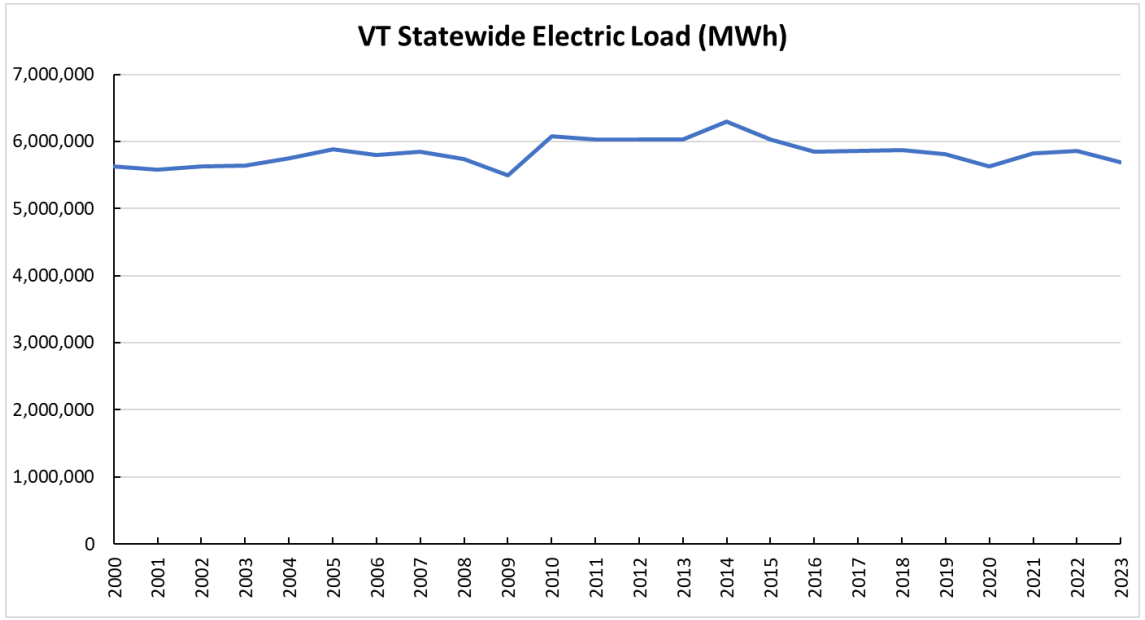
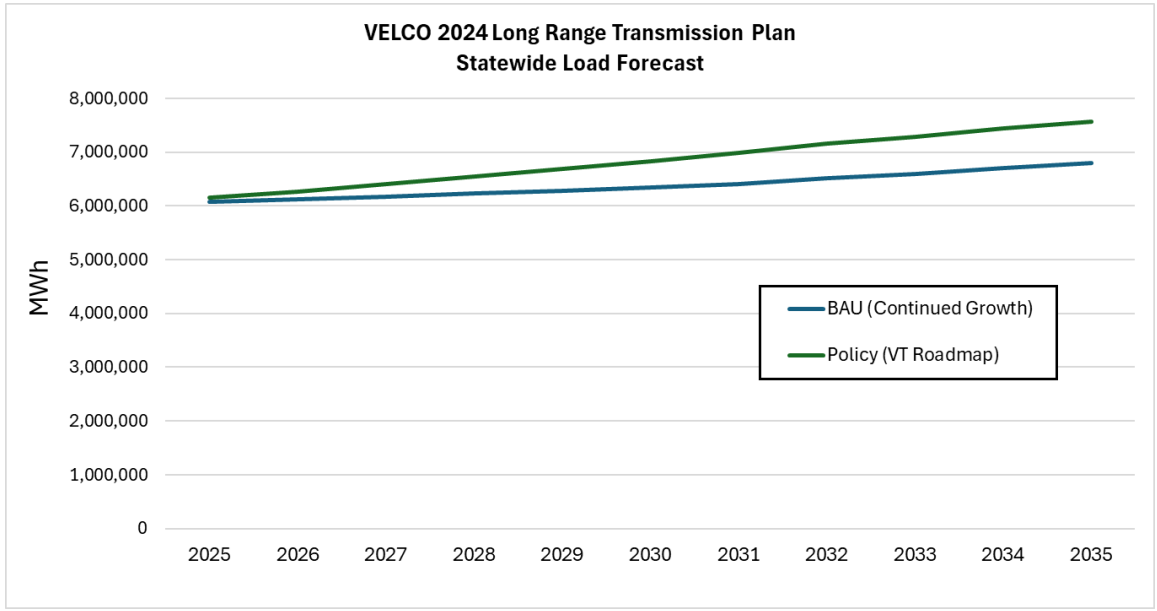
Historic and Projected Annual Demand





As shown in the first chart, overall demand has remained relatively flat in recent years, lower than that seen in the early 2010s, despite increases in the use of electricity for thermal and transportation uses (via heat pumps and electric vehicles, respectively). The chart on the right shows forecast annual demand scenarios developed for thee Vermont Long Range Transmission Plan, detailing a possible “Business-As-Usual” scenario and a “Mitigation” scenario assuming greenhouse gas reduction requirements are achieved.

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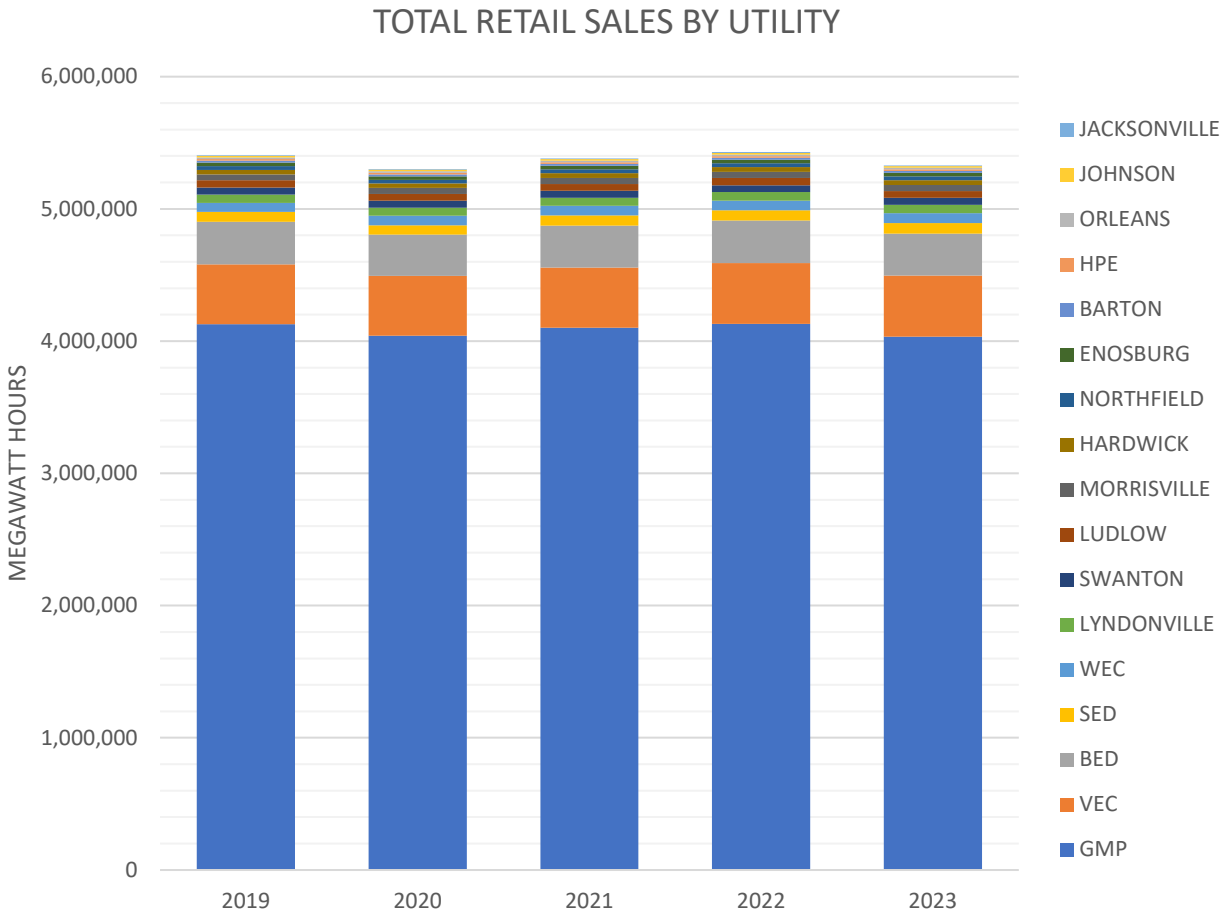
Retail Sales by Utility

Utility	2019	2020	2021	2022	2023
BARTON	13,565	14,024	14,232	14,174	14,506
BED	323,108	311,298	318,397	320,613	318,589
ENOSBURG	26,262	26,393	26,602	26,812	26,920
GMP	4,128,426	4,040,762	4,100,502	4,129,431	4,033,028
HARDWICK	33,785	34,606	35,488	35,253	35,170
HPE	11,998	12,334	12,442	12,912	13,288
JACKSONVILLE	4,906	4,966	5,195	5,263	5,374
JOHNSON	12,583	11,553	12,099	12,138	12,051
LUDLOW	55,340	50,521	51,379	54,765	49,788
LYNDONVILLE	61,855	59,985	62,077	64,826	64,441
MORRISVILLE	45,180	46,065	46,390	46,532	46,761
NORTHFIELD	28,824	26,929	28,363	29,372	29,116
ORLEANS	12,688	11,949	12,859	12,835	11,931
SED	74,798	70,121	76,965	76,965	79,920
SWANTON	53,139	53,737	52,571	52,383	52,243
VEC	451,381	453,300	455,401	461,974	462,308
WEC	68,358	73,165	71,503	72,593	73,651
Total	**5,406,194**	**5,301,708**	**5,382,464**	**5,428,841**	**5,329,084**



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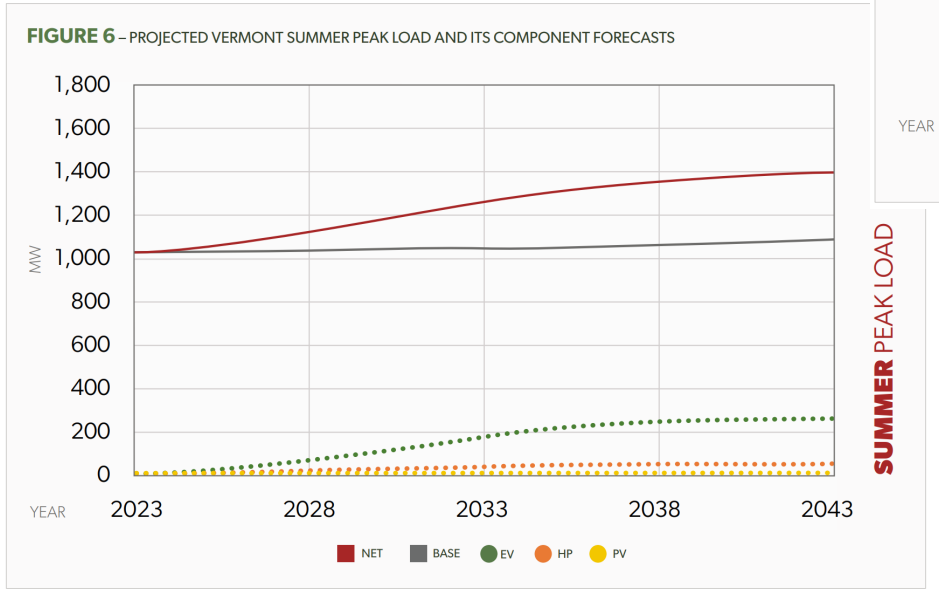
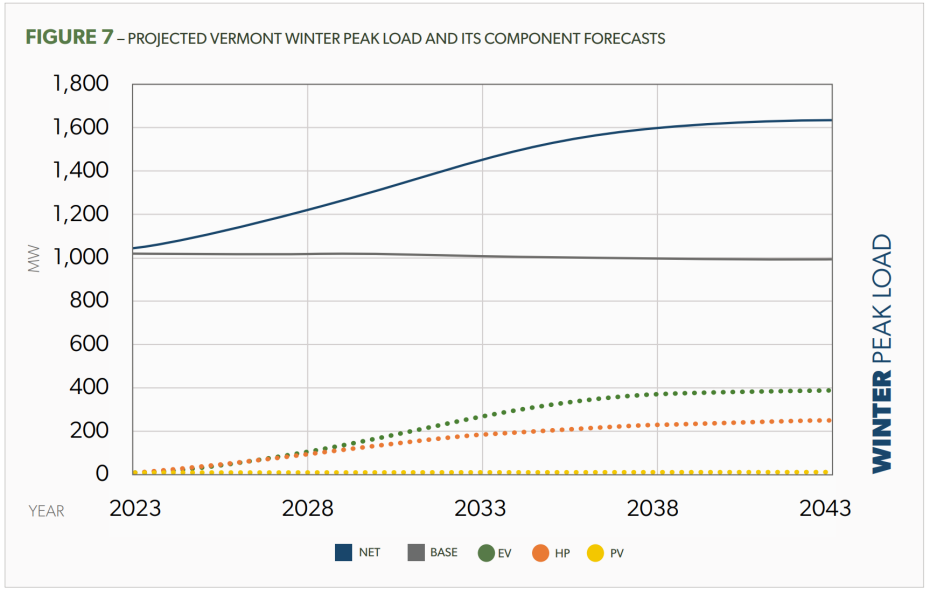
Vermont Peak Demand Forecast

Though the annual peak in Vermont peaks has remained flat or even declined over the past years, that trend is expected to change with upcoming growth in electrification of the heating and transportation sectors, if the load is not effectively managed. **These charts do not include any effects of load flexibility**, which will be a critical tool in managing the impacts of peak load on the transmission and distribution systems.





Vermont seasonal peak forecasts, from the [VELCO 2024 Vermont Long-Range Transmission Plan]

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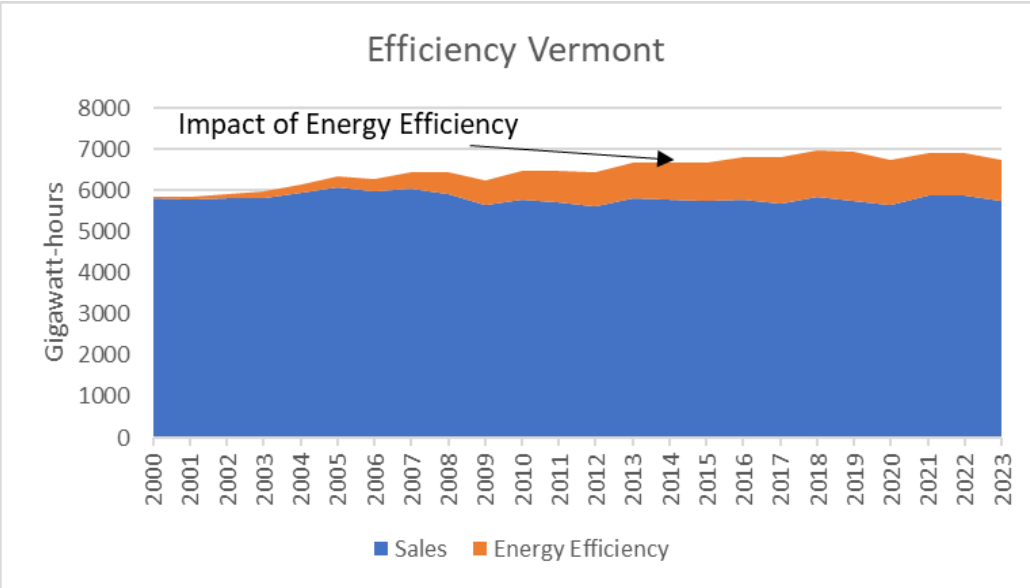
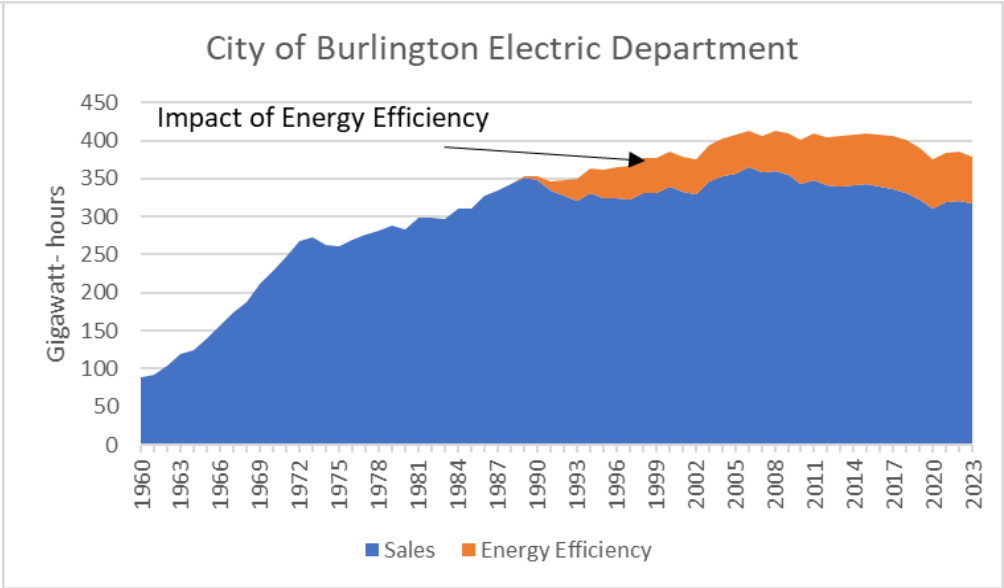
Energy Efficiency Impacts





The Public Utility Commission sets EEU budgets to acquire “all reasonably available cost effective” electric efficiency, pursuant to 30 V.S.A. § 209(d) and least-cost planning principles of 30 V.S.A. § 218c. Since 2000, Vermont’s energy efficiency utilities (EEUs) have acquired electric efficiency resources that have met a significant portion of Vermont’s electric needs, at a lower cost than supply resources. The chart on the left shows Efficiency Vermont (EVT) cumulative savings over time, while the chart on the right illustrates the results of Burlington Electric Department (BED) efforts. EVT serves all of Vermont except Burlington.

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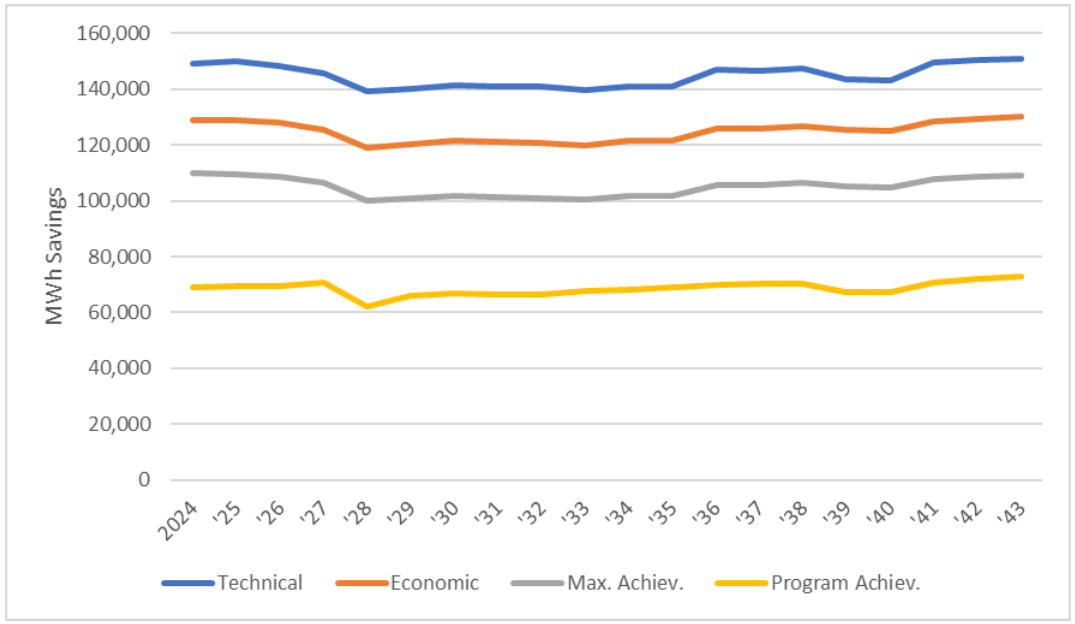
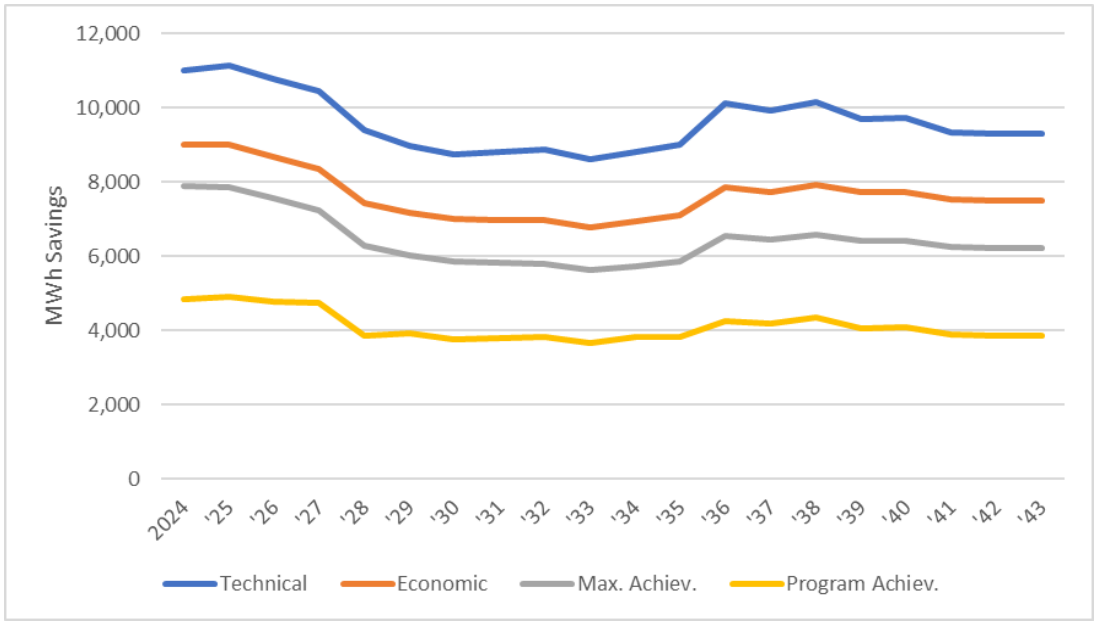
Electric Efficiency Potential

The efficiency potentials for both Efficiency Vermont and Burlington Electric Department decrease during the first decade of the forecast, largely reflecting the impact of legislation (Act 120 of 2022) addressing commercial lighting and the increased pace of retrofitting four-foot lamps containing mercury, which will be replaced with LED bulbs. The near-term dip in Program Achievable savings potential starting in 2027 will inform an evaluation of budgets for the 2027-2029 Performance Period, and is a direct result of the progress Vermont has made on electric efficiency.



EVT Potential Incremental Annual MWh Savings



BED Potential Incremental Annual MWh Savings

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Electric Energy Efficiency Budgets

The Public Utility Commission sets EEU budgets to acquire “all reasonably available cost effective” electric efficiency, pursuant to 30 V.S.A. § 209(d) and least-cost planning principles of 30 V.S.A. § 218c. In the Commission's recent Demand Resource Plan proceeding, Case No 22-2954-INV, the following electric energy efficiency budgets (program and compensation, not including evaluation and some other program administration costs) were approved for Efficiency Vermont and the City of Burlington Electric Department. The Commission's case to set budgets and performance targets for the 2027-2029 Performance Period is anticipated to start mid-year 2025 with an updated Potential Study from the Department of Public Service.

	2024	2025	2026	Total
EVT Electric Efficiency	$46,493,225	$47,684,264	$48,483,214	$142,615,704
BED Electric Efficiency	$2,662100	$2,705,101	$2,767,820	$8,135,821
Total	**$49,155,325**	**$50,389,365**	**$51,251,034**	**$150,751,525**

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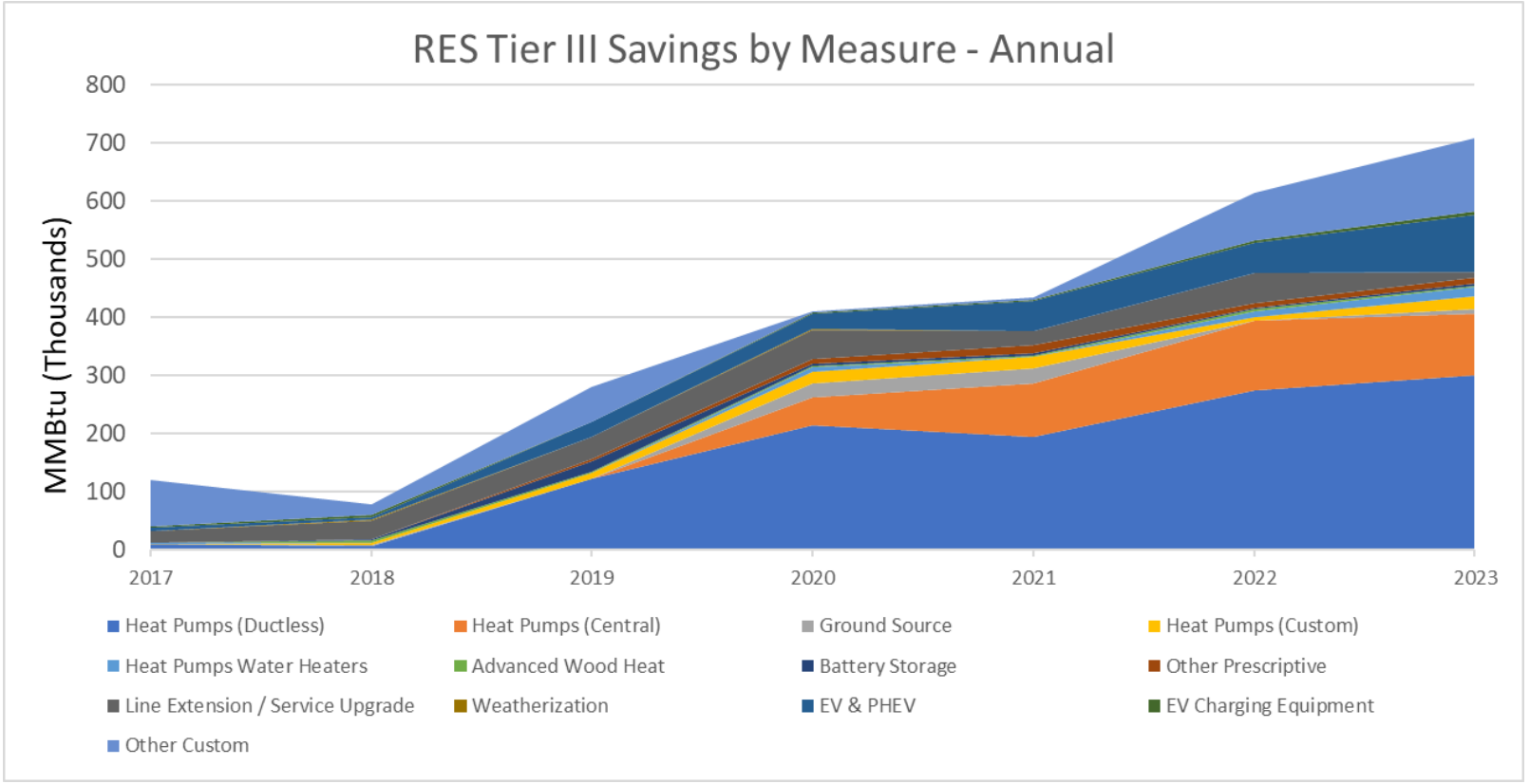
Renewable Energy Standard Tier III

Tier III of the Renewable Energy Standard requires utilities to cause fossil fuel reductions for their customers. Many of the measures taken by utilities electrify fossil fuel end uses, such as thermal demand, water heat demand, or maple sugaring operations. Measures implemented have changed over time, with the more recent mix dominated by cold climate heat pumps.



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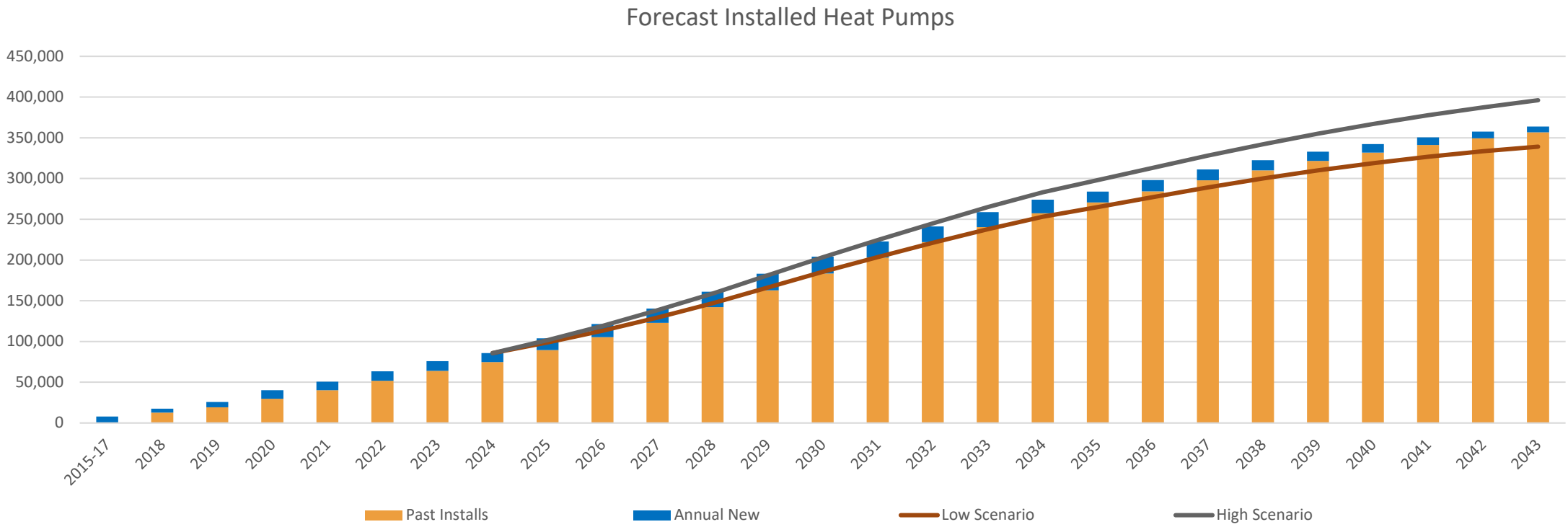
Electrification – Heat Pump Forecast



The above chart shows historical and forecasted cumulative and annual cold climate heat pump (CCHP) installations for the state. The forecast represents high efficiency CCHP units supported by EVT and BED efficiency programs (including units supported by DUs through Tier III programs). Starting in 2024, on an annual basis, the number of new CCHP installations reaches approximately 11,000, then gradually increases to peak at 20,700 in 2030, then tapers gradually to 7,200 in 2043. Even in the low scenario, Efficiency Vermont expects over 185,000 CCHP to be installed by 2030.

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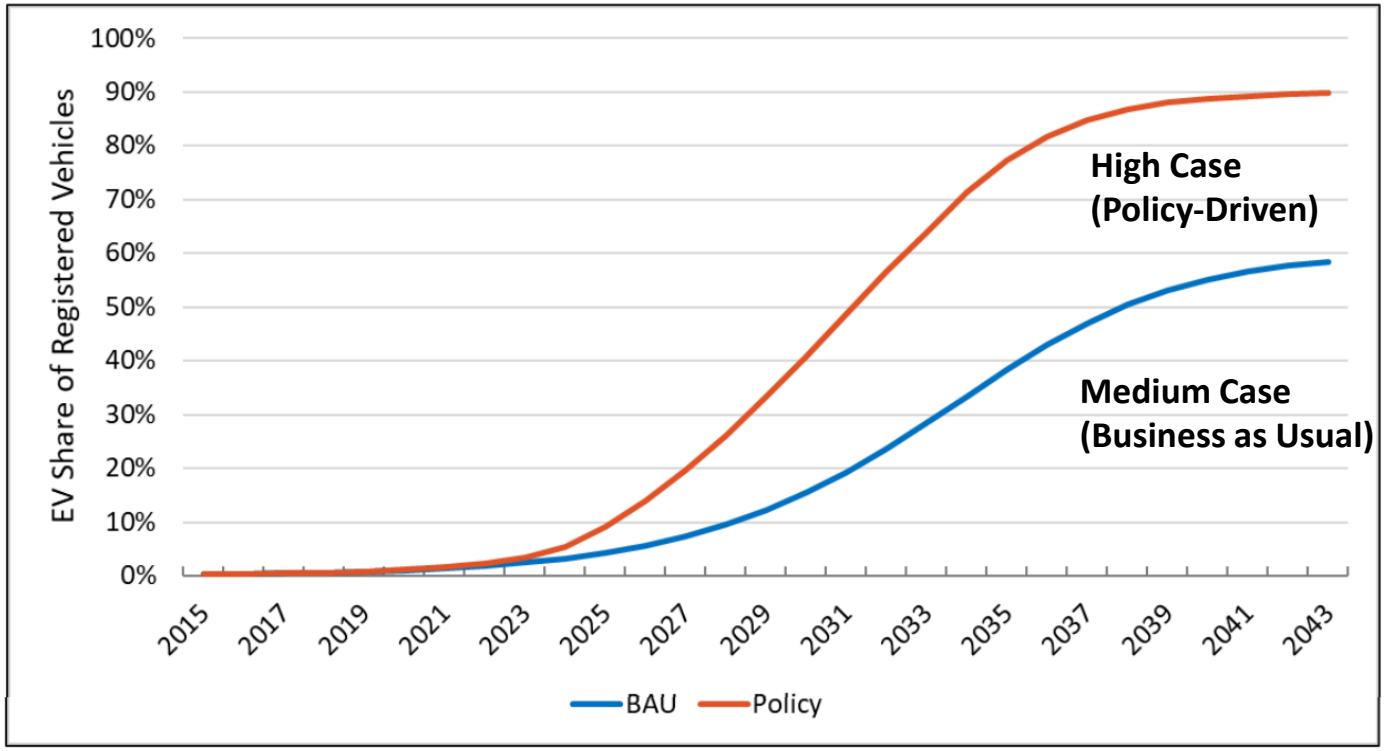
Light-Duty EV Adoption Forecast

Although electric vehicle adoption continues to grow, the exact pace of adoption is unpredictable. Itron, a consultant assisting VELCO update Vermont's Long-Range Transmission Plan, prepared two scenarios to estimate impacts on the electric grid. The Transmission Plan was finalized in June 2024.

Each distribution utility conducts a similar analysis as part of the Integrated Resource Plan required every three years.



Data Source: Itron / Drive Electric Vermont for VELCO, 2023

2. Electricity

c. Electricity Supply and Flexible Resources

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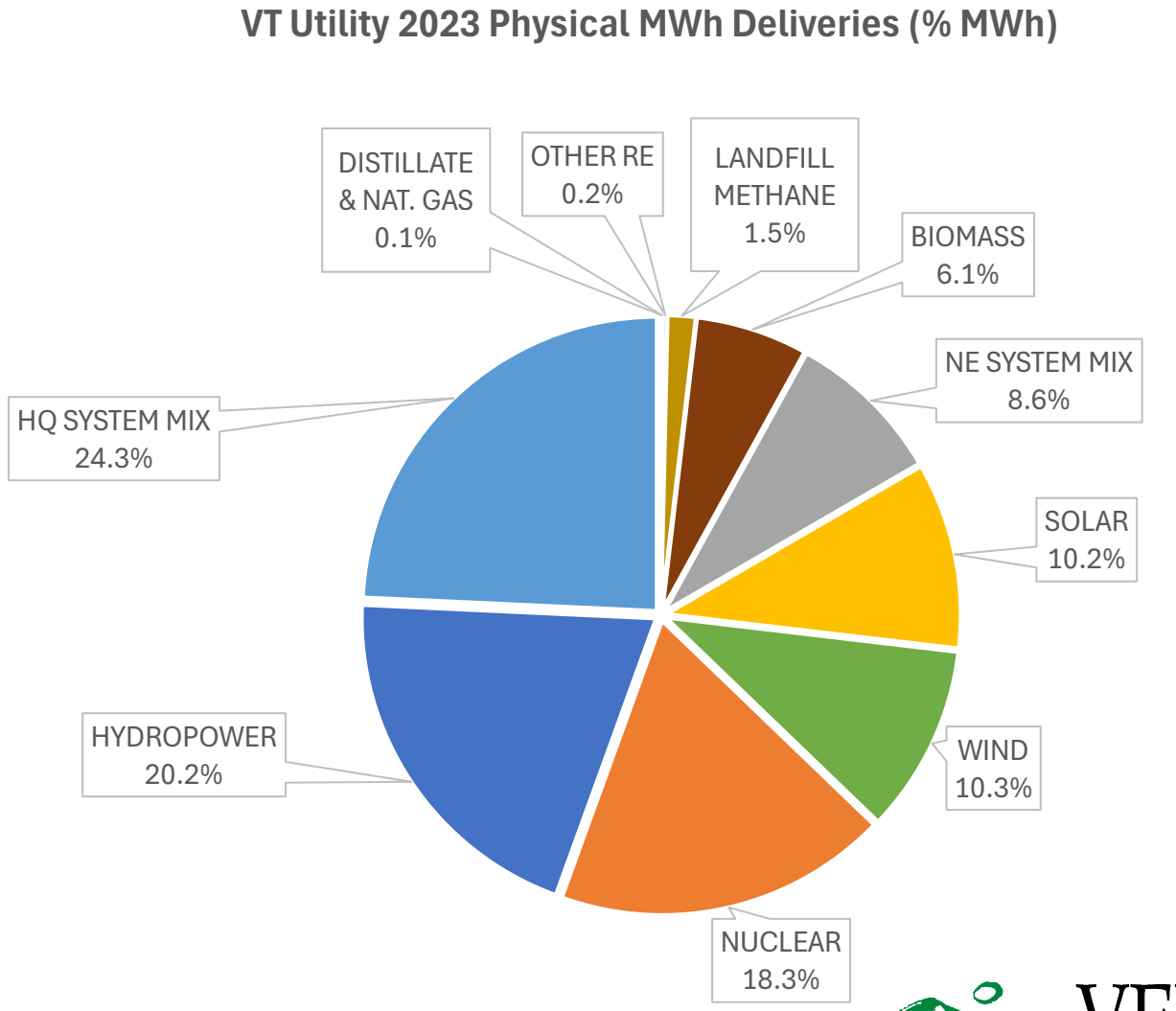
Vermont's 2023 Electric Power Mix Based on Physical Deliveries

In 2023, Vermont distribution utilities purchased 5.7 Million megawatt-hours of electricity to meet the demand of their customers. Of this: 73% came from renewable resources and an additional 18% came from carbon-free resources (nuclear)



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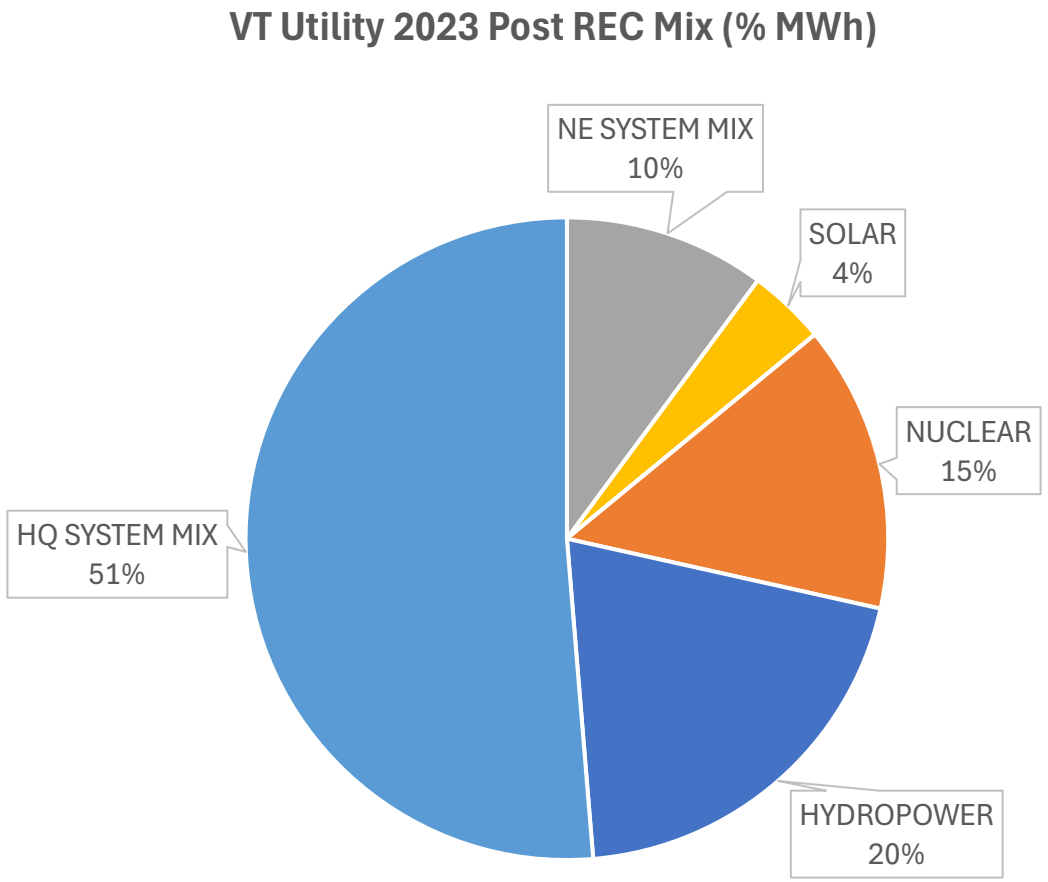
Vermont's 2023 Electric Power Mix After Renewable Energy Credit Retirements



In 2023, Vermont distribution utilities retired 5.1 million renewable energy certificates (i.e. equivalent to 5.1 million megawatt-hours of electricity) to meet their obligations under Vermont's Renewable Energy Standard. These RECs accounted for 80.5% of Vermont's retail electricity sales in 2023.

Note – this chart depicts Vermont's electricity mix based on total load, which approximately 7-8% higher than retail sales

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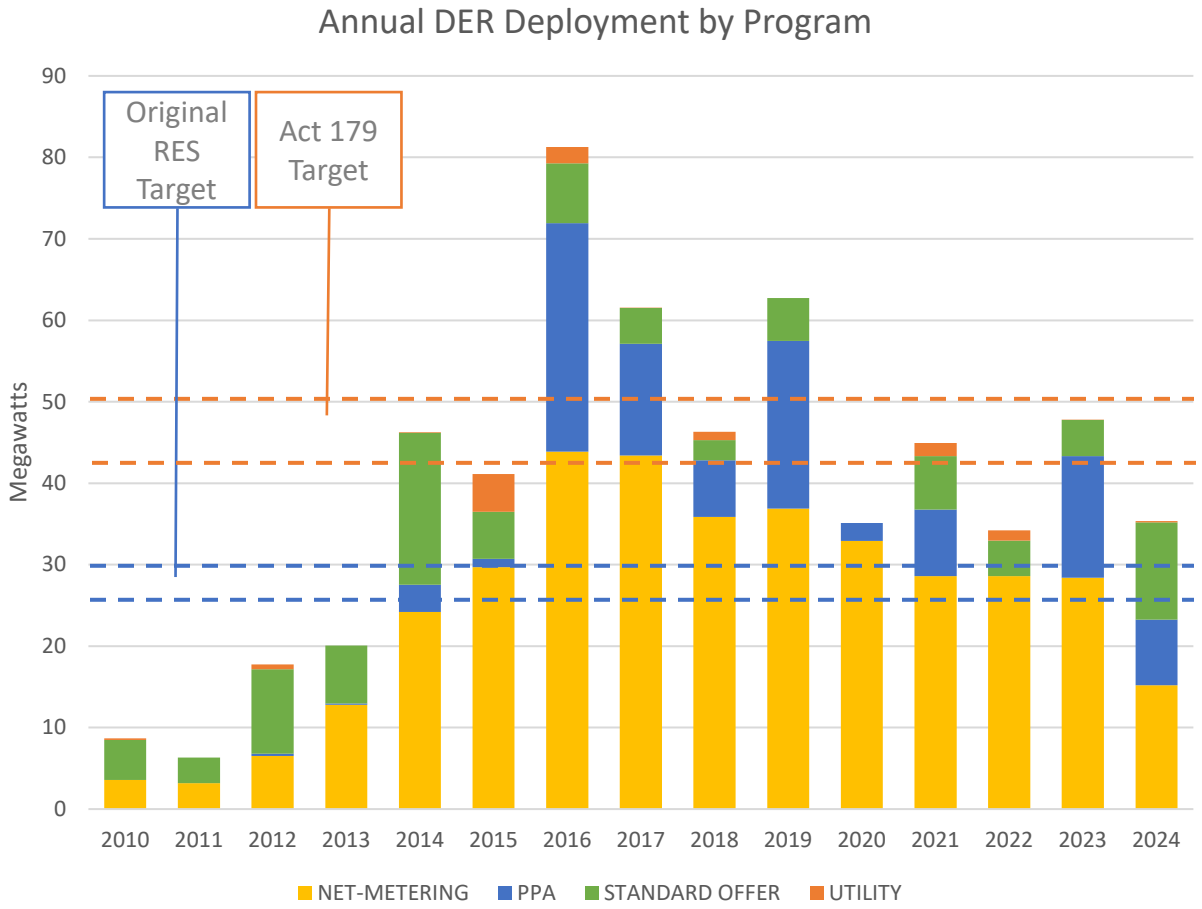
Statewide Distributed Energy Resource(DER) Deployment

Approximately 25-30 MW per year of distributed generation (DG) was needed to meet requirements under Tier II of the previous Renewable Energy Standard (RES).

With the passage of Act 179, RES requirements have increased, requiring approximately **42-50 MW** per year of new DG from 2025-2034, depending on loads.

Tier II resources are likely to come from net-metering, Standard Offer, and resources owned by, or under contract to, utilities.

30.4 MW of new solar DG installed in 2024 as of December; 2024 installations are expected to be lower than recent years. Vermont utilities sold ~125,000 excess Tier II eligible RECs (~95 MW of solar) into other regional compliance markets and banked an additional 20,000 Tier II RECs (~15 MW of solar) given current oversupply. As Tier II requirements increase and these excess supplies are used for Vermont's compliance with Tier II (reducing revenue gained from selling the RECs), new DG development is expected to ramp up to meet that new demand. Many utilities have already submitted contracts for review for new, utility scale projects.



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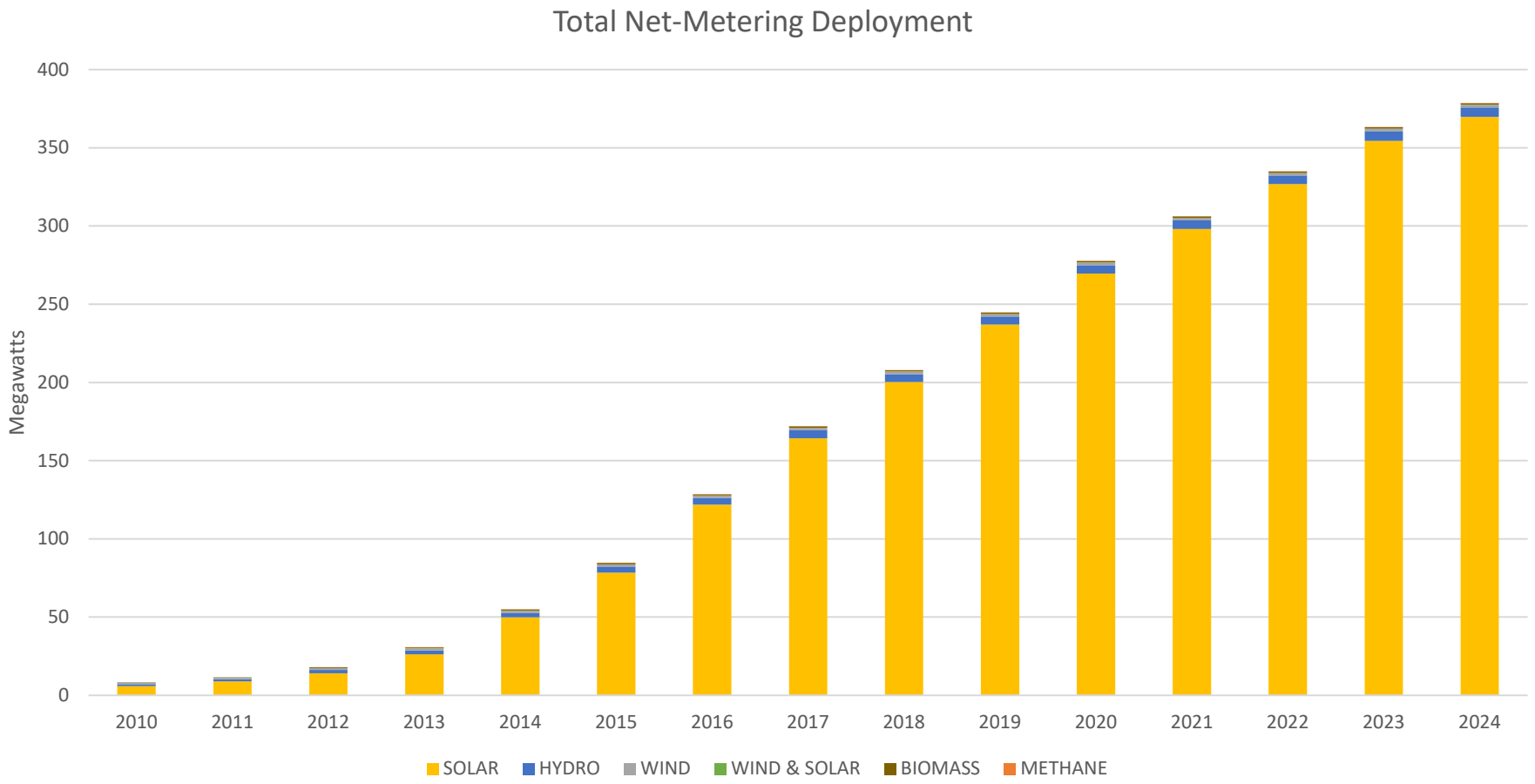
Annual Net-Metering Deployment



**Derived from utility monthly DG resource surveys to ISO-NE and includes data for GMP through Dec. VEC, WEC & BED through Nov. 2024; VPPSA through August 2024; Hyde Park though Aug. 2022; and Stowe through Dec. 2021"*

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2023 Net-Metering Deployment

Utility	Total Installed NM (kW)	2023 Non-Coincident Peak	NM as % of Peak Load	% of NM Capacity	% of Retail Sales
GMP	302,619	704,492	43.0%	83.3%	75.7%
VEC	30,873	88,247	35.0%	8.5%	8.7%
VPPSA	13,289	71,783	18.5%	3.7%	6.5%
BED	6,015	63,372	9.5%	1.7%	6.0%
WEC	8,140	17,382	46.8%	2.2%	1.4%
SED	1,746	19,049	9.2%	0.5%	1.5%
HPE	530	2,899	18.3%	0.1%	0.2%

Statewide 2023 Total Net-Metering: 363 MW

	MW	NM % of Peak
VT 9/7/2023 Coincident Peak	735	49%
VT 2/3/2023 Non-coincident Peak	910	40%

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Net-Metering 2023 Cost

- Based on data collected from each utility, the cost of net-metering in 2023 was more than $55 million higher than the market value of the products provided resulting in an inequitable cost-shift from participating net-metering customers to non-participating customers. This includes the cost associated with all net metering since the program's inception.

- Each biennial review by the Commission has resulted in gradual decreases to the compensation rate for new net-metering systems, which is somewhat offset by increases in utility retail rates. Net-metering remains one of the highest-cost renewable resources.

Utility	Reduced Retail Sales (kWh)	Excess Generation (kWh)	Gross Generation (kWh)	Above-market Cost ($)
BED	1,614,957	4,345,540	5,959,307	$472,138
GMP	80,802,313	285,735,687	366,538,000	$47,295,367
HPE	1,543,371	92,602	-	$36,749
SED	2,245,726	235,583	-	$337,663
VEC	16,782,961	18,348,409	35,131,370	$4,319,498
VPPSA	1,421,533	6,656,716	8,087,822	$778,260
WEC	6,252,059	1,436,720	7,675,669	$1,931,079
TOTAL	**110,662,920**	**316,851,257**	**423,392,168**	**$55,170,754**

Net-Metering Renewable Energy Credit (REC) Transfers

57 MW of net metering RECs were transferred to utilities in 2022-2023, according to utility filings in the 2024 Net-Metering Biennial Review.

Net Metering customers have the option to either retain their RECs, or transfer them to the utility, who is required to retire them for compliance with the Renewable Energy Standard. If a customer retains their RECs, their compensation under the net metering program is lower. Nearly all net-metering RECs available are transferred to the utility.

REC Disposition in Capacity (MW) by Net-Metering Vintage

REC DISPOSITION	NM 1.0	NM 2.0	NM 2.1	NM 2.2	NM 2.3	NM 2.4	NM 2.5	Total
RETAINED	**0.19**					**0.67**	**0.22**	**1.08**
2022	0.19					0.02		**0.20**
2023						0.65	0.22	**0.87**
TRANSFERRED	**0.00**	**2.02**	**0.00**	**8.40**	**8.23**	**24.24**	**13.12**	**56.02**
2022	0.00	0.52	0.00	5.96	5.96	14.99	0.82	**28.25**
2023		1.50	0.00	2.44	2.27	9.25	12.30	**27.76**
Total	**0.19**	**2.02**	**0.00**	**8.40**	**8.23**	**24.91**	**13.35**	**57.09**

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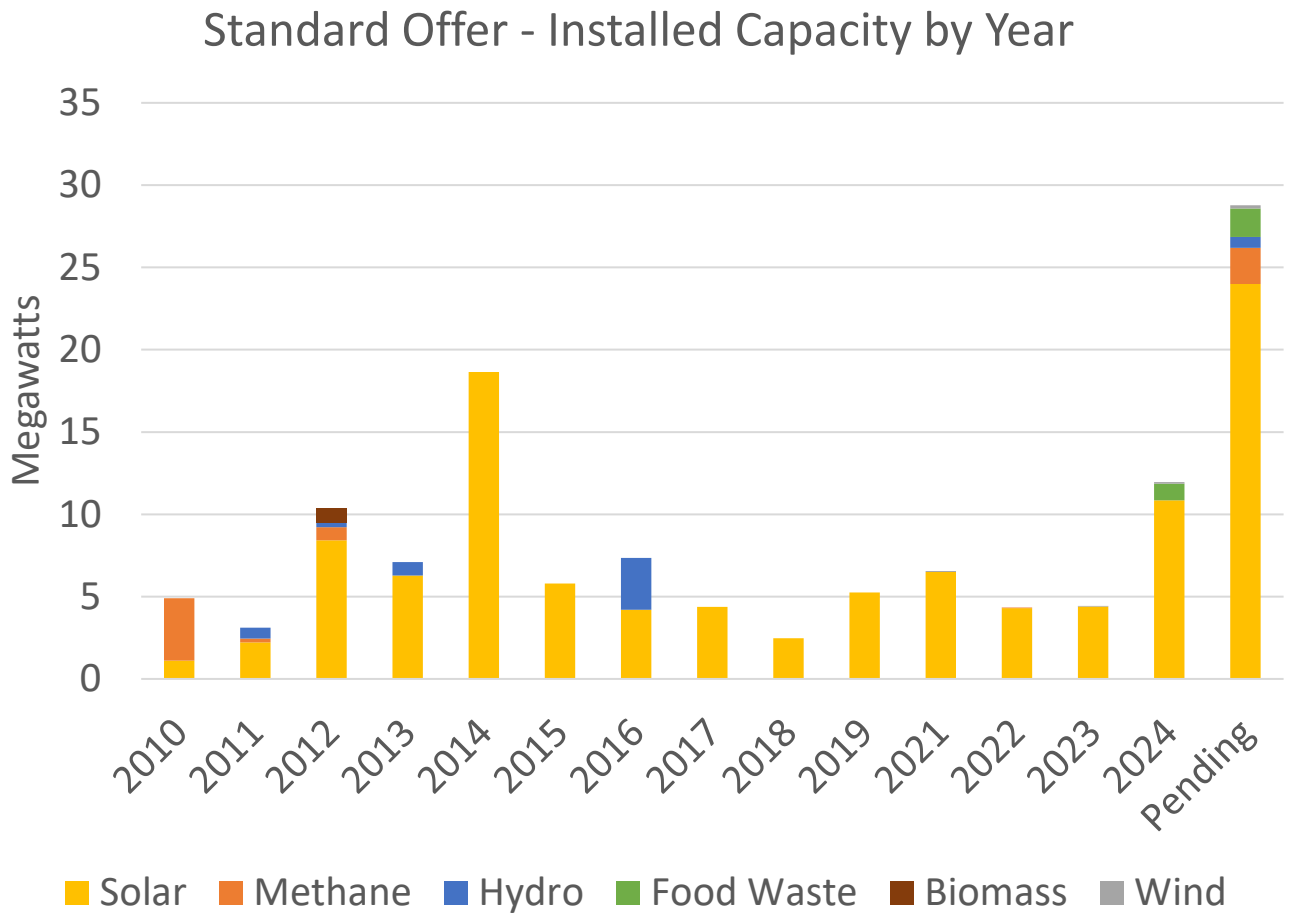
Standard Offer Deployment

The Standard Offer program began in 2009 and has facilitated contracts for its statutory program capacity of 127.5 megawatts ("MW") of renewable energy. This program underwent several changes since its implementation, with the most notable being an expansion of the initial 50 MW cap and a transition to a competitive procurement process.



Current Deployment:

- **76 Plants (97 MW) Online as of 12/31/24**
- **18 Plants (29 MW) Pending**
- **Estimated Annual Output: 173,532 MWH**

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Standard Offer Prices Paid

2022 Award Group

Technology Diversity Developer Block

	Project Name	Technology	Price	MW
1.	Walnut Lane Wind	Small Wind	0.2540	0.022
2.	Alburgh Wind A	Small Wind	0.2540	0.050
3.	Alburgh Wind B	Small Wind	0.2540	0.050
4.	Alburgh Wind C	Small Wind	0.2540	0.050
5.	West Wind A	Small Wind	0.2540	0.075
6.	West Wind B	Small Wind	0.2540	0.075
7.	Stamford Main 4597	Large Wind	0.1150	2.200
8.	Bellows Falls Minimum Flow	New Hydro	0.1300	0.650

Price Competitive Developer Block

	Project Name	Technology	Price	MW
1.	Steinberg Road Solar	Solar	0.0818	2.20
2.	Midway Ave. Solar	Solar	0.0819	2.20

- Pre-2012 Procurement: fixed prices for technology categories – e.g., $0.30/kWh for early projects.
- Market-based mechanism for setting contract prices with technology-specific price caps introduced in 2012, this competitive solicitation substantially lowered prices.
- 2022 Award Group – the most recent solicitation - included prices as low as $0.0818/kWh.
- 22 proposals were submitted in the 2022 solicitation. Of those, 10 projects (left) were awarded contracts and 8 were placed in the Reserve Group.
- **The standard offer program solicitations are complete, no further solicitations are expected unless awarded projects are not built.**

Source: Investigation to review the 2022 implementation of the standard-offer program https://vermontstandardoffer.com/wp-content/uploads/2022/06/Case-No.-21-4085-INV-Investigation-to-review-the-2022-implementation-of-the-standard-offer-program.pdf

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Energy Storage and Other Flexible Resources

Energy storage

- 74 MW operational, distributed batteries
- Another 38 MW permitted or in permitting
- Additional 255 MW transmission-scale batteries in the ISO-NE active interconnection queue

Other flexible load management

- Time-of-use rates
- EV rates
- Programs
  - Heat pump peak hour reduction (GMP/BED)
  - Critical peak water heater interruption (GMP)
  - Voluntary conservation – Defeat the Peak (BED) / Beat the Peak (VEC)

Vermont Storage Deployment in New England Context

State	Goal*	Milestone	2024 summer peak (MW)**	Goal as % of 2024 summer peak	2024 deployed storage (MW)	Current % of peak
CT	1000 MW x 2030	300 MW x 2024	5962	17	18.5	0.3
ME	400 MW x 2030	300 MW x 2025	1919	21	64	3.3
MA	1000 MWh x 2025	N/A	11470	2***	307	2.7
NH	N/A	N/A	2440			
RI	N/A	N/A	1719			
VT	N/A	N/A	855		74	8.7 (13.1 including under construction/in permitting; note these does not include proposals for transmission-level storage)

The above table shows New England State's storage deployment targets. While three states have targets, those same states are currently at far lower levels of storage deployment relative to Vermont, as measured by percent of peak load. Vermont is already on pace to exceed the targets set in other states.

*MA and CT storage goals apply just to Investor-Owned Utilities ("IOUs"). ME's is unclear.

** Preliminary 2024 summer peak contribution values

***Assumes all batteries are 4 hours in duration

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Ryegate Power Plant Contract Extension Update

The 20 MW Ryegate woodchip fueled electricity plant (Plant) is located in Ryegate, Vermont and qualifies for Vermont's Baseload Renewable Energy Standard. Under 30 V.S.A. § 8009, Vermont electric utilities must purchase their pro rata share of the output from the Plant for a price set by the Vermont Public Utility Commission (PUC). The contract was set to expire November 1, 2022; however, Act 155 of 2022 temporarily extended this obligation for two years and creates an opportunity for a further extension out to 2032 provided that the Plant's owners increase the efficiency of the Plant by at least 50%.

Vermont Public Act No. 142 ("Act 142") of 2024 made further changes to 30 V.S.A. § 8009, extending all deadlines for Ryegate by 1 year. This included extending the deadline by until October 1, 2025, for Ryegate to submit a certification that the main components of the facility intended to meet increased efficiency requirements have been manufactured and the construction plans for the facility have been completed. It also extended until November 1, 2027, the requirement for the PUC to determine the contract price, if the efficiency requirement is achieved. The Act also added a section on Biomass Suppliers and Construction, which called for establishing customary commercial terms, including payment timelines, supply volume, and term lengths for fuel suppliers to the plant, and required reporting by the Plant of its payment history.

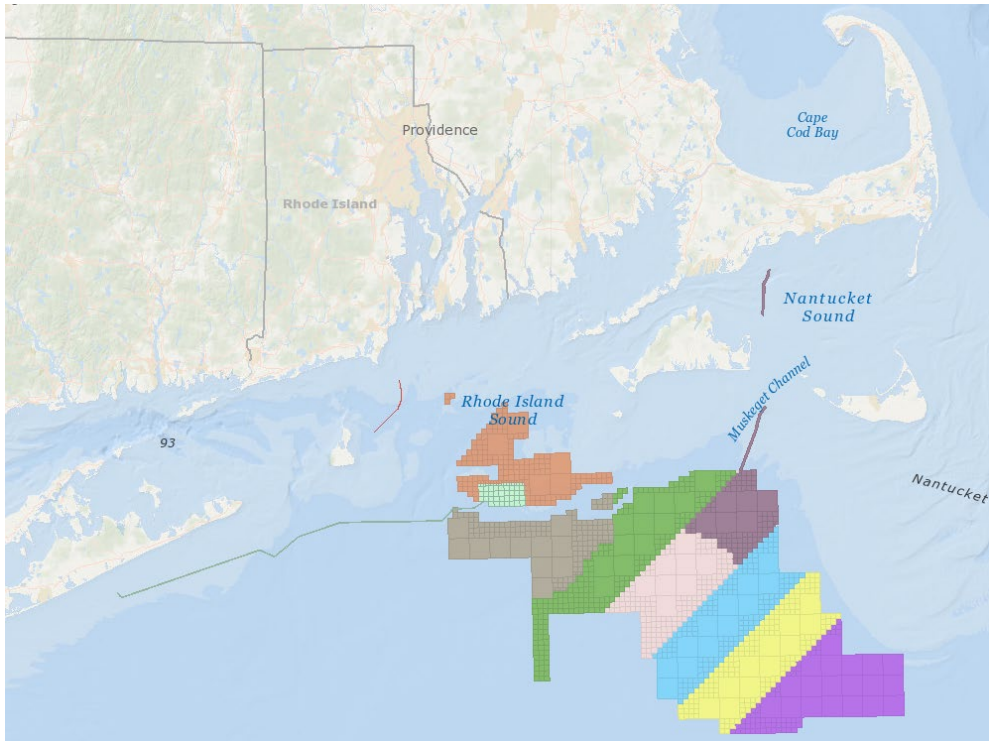
On September 6, 2024, VEPP Inc. filed a petition requesting approval of an amendment to the Contract to address the changes made to by Act 142. (see: 24-2901-PET)

Offshore and Onshore Wind

The development of wind resources off the shores of New England has the potential to help New England states meet their renewable and clean electricity targets, while mitigating energy security issues. With significant new generating capacity being considered, states have engaged with utility and developer partners for onshore transmission projects, for which the states have received considerable federal funding. Under the Grid Resilience Innovation Partnerships program, administered by the Grid Deployment Office of the Department of Energy, these projects will expand substation capacity in southern New England to accommodate and encourage the interconnection of offshore wind projects.

In addition to offshore prospects, the potential of unlocking additional capacity for onshore wind in Maine, existing or new, has resulted in a NESCOE request to ISO-NE for the first request for proposals in the Longer-term Transmission Planning process. This RFP is expected to solicit proposals for projects that provide an increase in transfer capability from Maine to NH, solving an issue identified by ISO-NE in the 2050 Transmission Study.

States have also engaged with a developer to construct a long duration energy storage facility in Maine to alleviate curtailment of existing wind project.



Northeast offshore wind Bureau of Ocean Energy Management lease areas from northeastoceandata.org

NESCOE - New England States Committee on Electricity - represents the collective perspective of the six New England Governors in regional electricity matters and advances the New England states' common interest in the provision of electricity to consumers at the lowest possible prices over the long-term, consistent with maintaining reliable service and environmental quality.

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2. Electricity

e. Renewable Energy Standard Compliance and Consolidated Model

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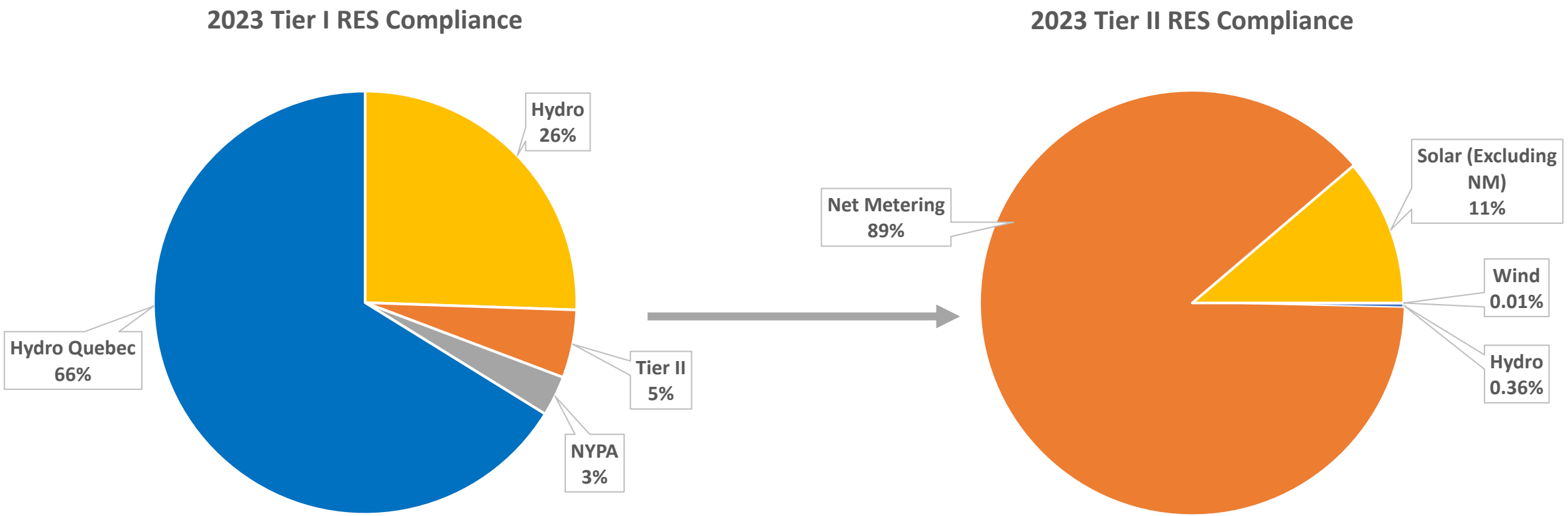
2023 Renewable Energy Standard (RES) Compliance

In 2023 the RES required that Tier I renewable energy sources be at least 63% of the total for all electric distribution utilities' sales. For 2023, Tier I renewable energy credits totaled 80.5% of the State-wide power mix. The types of renewable energy that make up that 80.5% are in the chart below on the left. The chart on the right shows the types of Tier II in-state credits, which were almost all solar.



Source: 2023 Utility RES Compliance fillings with the PUC

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2023 Renewable Energy Standard Compliance (continued)

Each distribution utility has complied with requirements under the RES.

In addition to Tier II, Washington Electric Cooperative and Hyde Park used Tier II Renewable Energy Credits (RECs) for part or all of their Tier III compliance. These RECs are counted towards their Tier III obligation and not their overall renewability as measured in Tier I/II.

Utility	2023 REC Retirements and Tier III Savings as Percent of Sales		
	Tier I	Tier II	Tier III
Barton	63.0%	4.6%	4.7%
Burlington	100.0%	0.0%	6.0%
Enosburg Falls	63.0%	4.6%	4.7%
Green Mountain Power	82.0%	4.6%	6.0%
Hardwick	63.0%	4.6%	4.7%
Hyde Park	63.0%	4.6%	4.7%
Jacksonville	63.0%	4.6%	4.7%
Johnson	63.0%	4.6%	4.7%
Ludlow	63.0%	4.6%	4.7%
Lyndonville	63.0%	4.6%	4.7%
Morrisville	63.0%	4.6%	4.7%
Northfield	63.0%	4.6%	4.7%
Orleans	63.0%	4.6%	4.7%
Stowe	63.0%	4.6%	4.7%
Swanton	100.0%	0.0%	4.0%
Vermont Electric Cooperative	63.5%	4.6%	6.0%
Washington Electric Coop	100.0%	4.6%	6.0%
Vermont Total	**80.5%**	**4.3%**	**5.9%**

Source: 2023 Utility RES Compliance fillings with the PUC under Docket 24-0775-INV

2023 Renewable Energy Standard (RES) Performance

2023 RES Performance			
	REC Retirements		*Compliance Cost*
Tier I	4,299,671	RECs	$4,289,676
Tier II	230,441	RECs	$10,471,192
Tier III	312,194	Mwhe	$17,511,847
Total Cost of Compliance			$32,272,715
Retail Sales	5,338,541	kWh	
Rate Impact of RES Compliance	3.5%		
CO2 Reduction from RES	782,583	tons of CO2	

Note: Maximum RES costs at the Alternative Compliance Cost rates for 2023 would have been approximately $76 million

Sources: 2023 Utility RES Compliance fillings with the PUC under 24-0775-INV

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2025 Consolidated Renewable Energy Standard (RES) Model

30 V.S.A. § 202b (e)(7)(B) calls for the Department of Public Service to complete a "Consolidated Model" that projects the impacts of the RES at least 10 years ahead, and describes several areas to be reported on, including three scenarios of results based on high, mid-range, and low energy price forecasts.

In development of the model, the Department provides an opportunity for public comment and makes the model and associated documents available on the Department's website.

BAU LOAD SCENARIO			
Energy Price Scenario	**Low**	**Mid**	**High**
10 Year Average Electric Rate Impact	6.44%	6.25%	5.86%
Total Energy Reduction (MMBtu)		191,394,306	
Electric Energy Reduction (MWh)		-457,315	
Fossil Fuel Reduction (MMBtu)		192,954,664	
GHG Emissions Reduction (lbsCO2)		26,149,497,715	

VT ROADMAP LOAD SCENARIO			
Energy Price Scenario	**Low**	**Mid**	**High**
10 Year Average Electric Rate Impact	7.72%	7.49%	7.02%
Total Energy Reduction (MMBtu)		206,269,027	
Electric Energy Reduction (MWh)		-491,103	
Fossil Fuel Reduction (MMBtu)		207,944,672	
GHG Emissions Reduction (lbsCO2)		28,041,986,280	

Note – electricity use increases result from Tier III electrification measures load building

Summary of public feedback included in "Updates Log" tab of Final model

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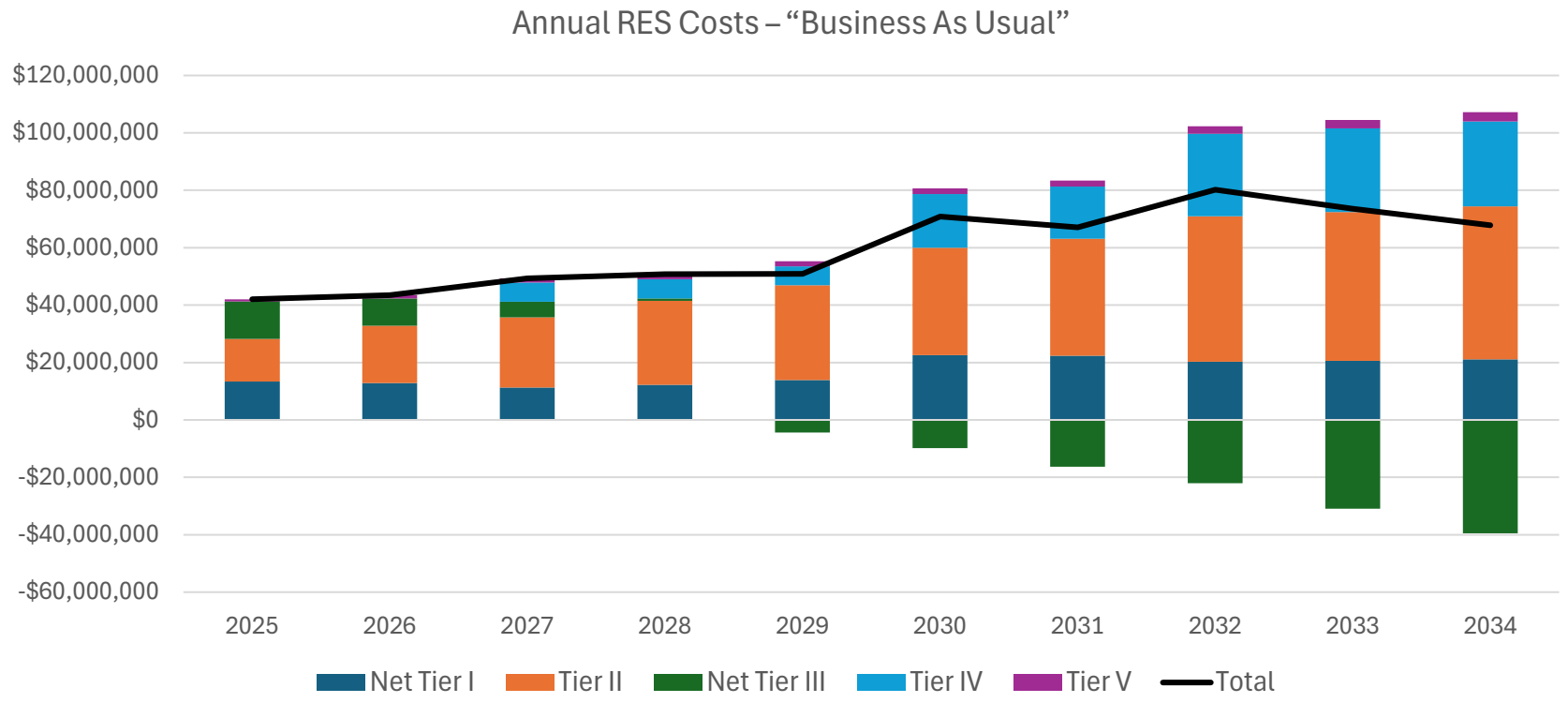
2025 Consolidated RES Model – Business-as-Usual Forecast Cost by Tier



Note – Tier III programs build load and generate additional retail sales revenues leading to a net cost reduction over time

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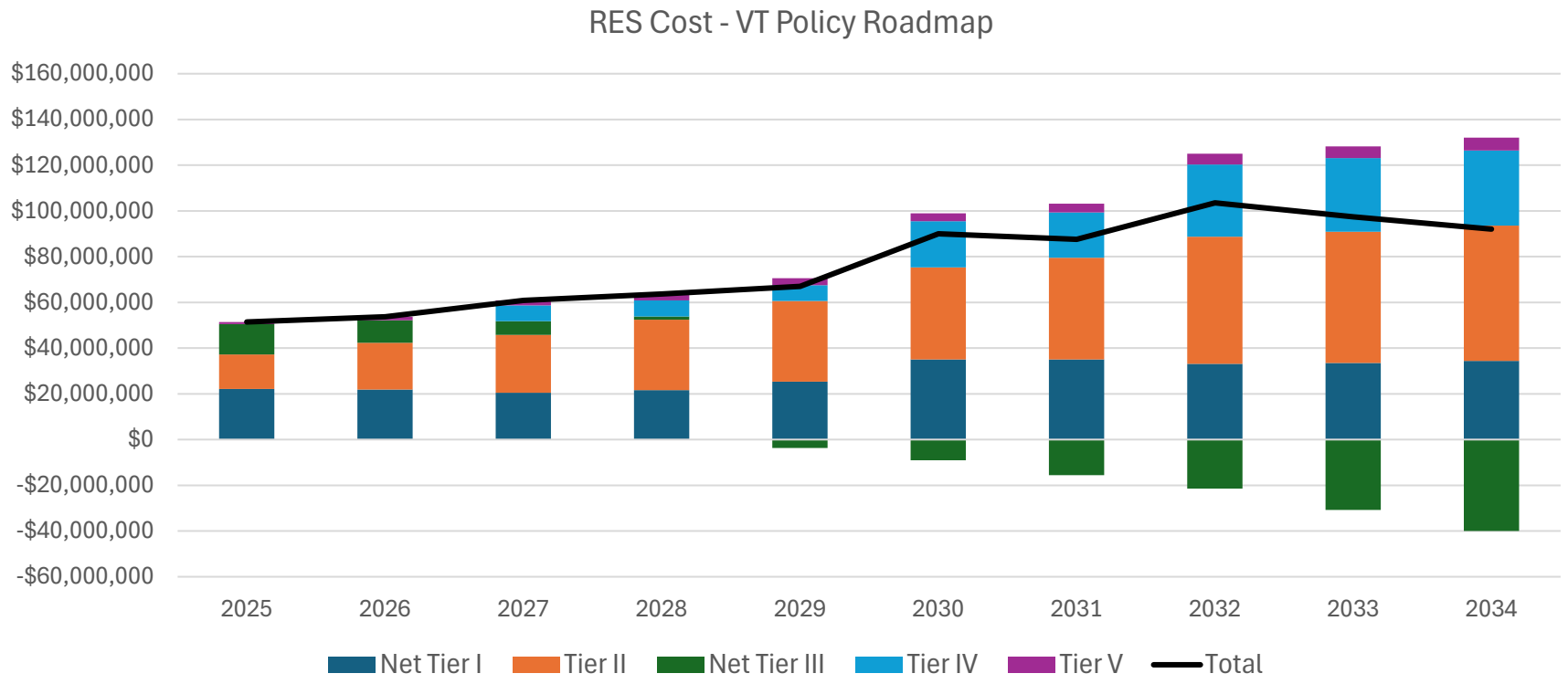
2025 Consolidated RES Model – Climate Action Plan forecast Cost by Tier



Note – Tier III programs build load and generate additional retail sales revenues leading to a net cost reduction over time

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2. Electricity

e. Electricity and Renewable Energy Credit Prices

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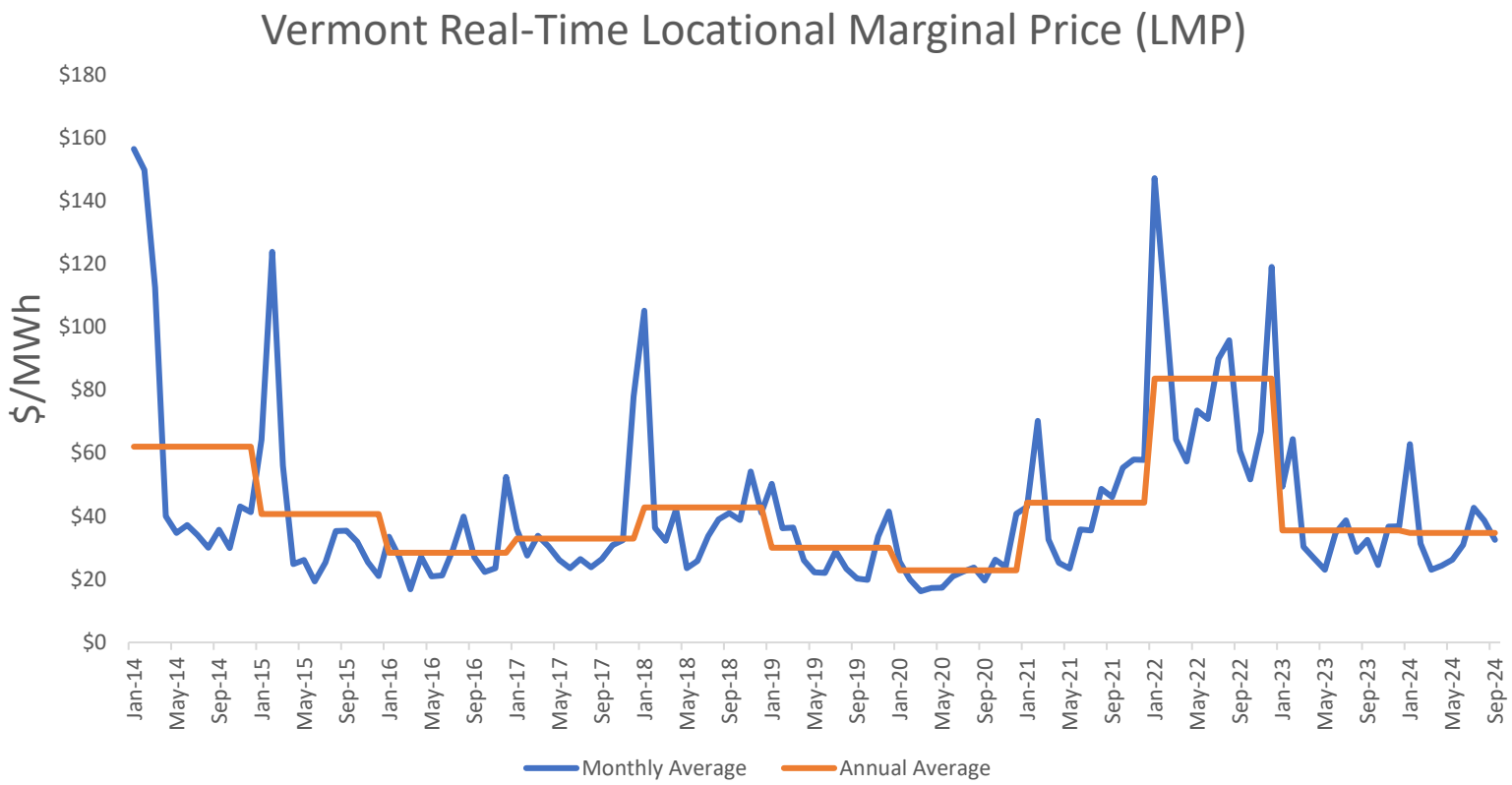
Electricity Prices



Natural gas generating facilities generally set the wholesale price of electricity in the ISO New England (ISO-NE) marketplace which serves Vermont utilities. The figure on this slide shows the wholesale price of electricity for the Vermont zone. Due to New England's reliance on gas generation, the region experienced a significant spike in 2022 due to global geopolitical events.

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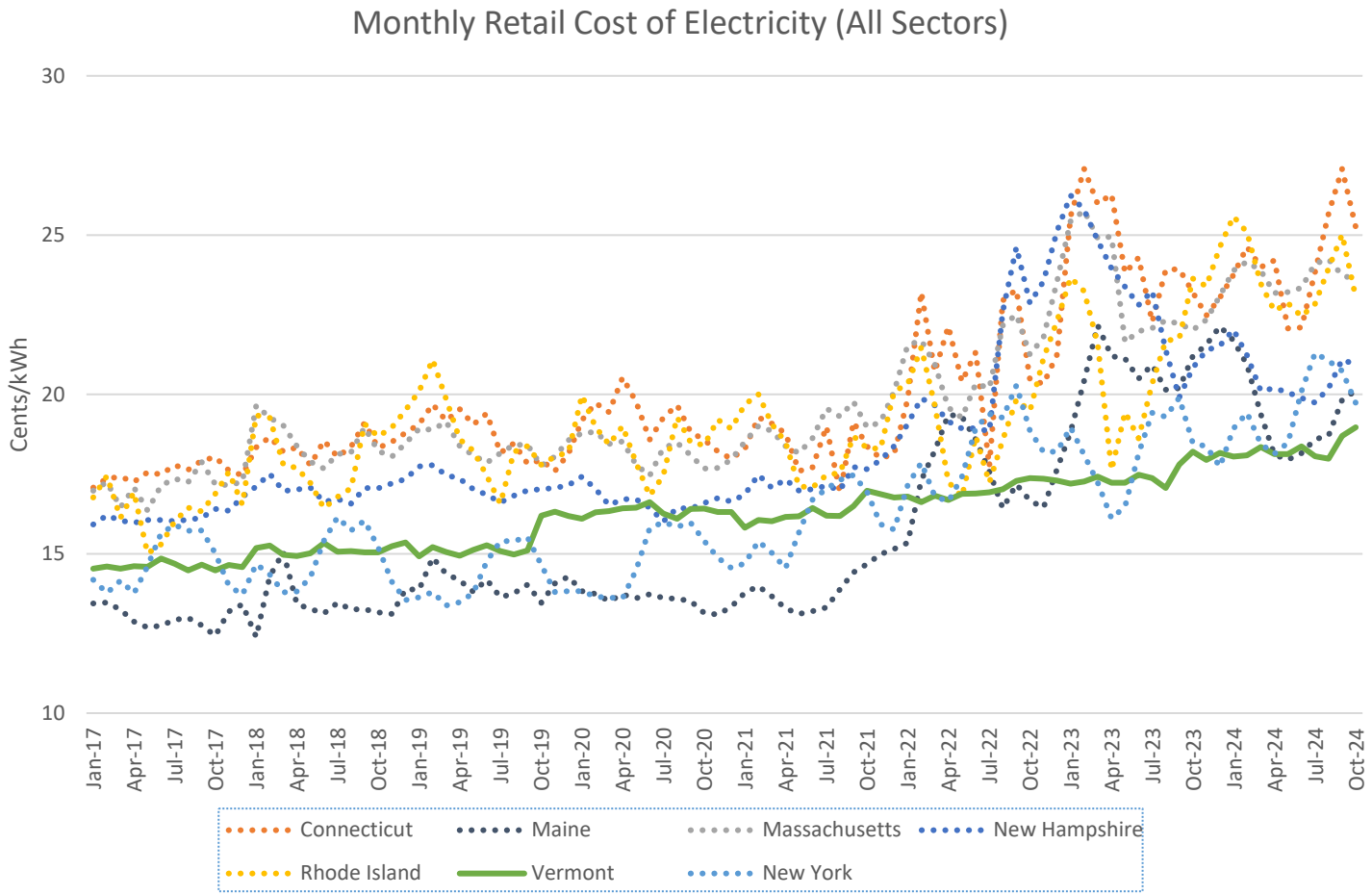
Electricity Prices

Generally, Vermont operates within a regulated electric utility structure, whereby utilities remain “vertically integrated” and are responsible for supply, transmission, and retail services to end-use customers. Unlike some other states, where power generation and supply roles are managed separately from distribution services, Vermont utilities are allowed to meet their supply needs through long-term contracts. As a result, contracts secured before the price spike insulate Vermont customers from some of the short-term market impacts. As shown by, Vermont’s prices have risen over the last two years, albeit much more slowly and steadily than other Northeastern states.



Data source: U.S. Energy Information Administration

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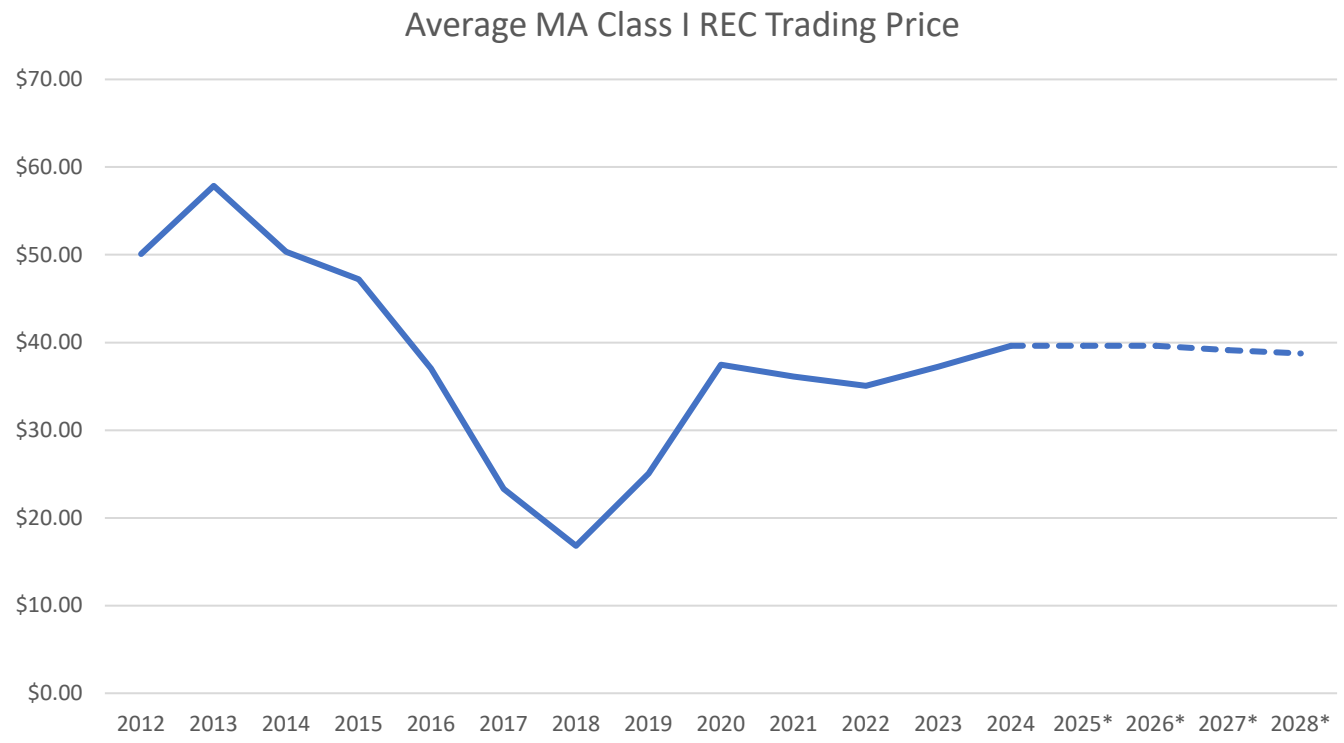
New Renewables ("Class I") REC Price



(*) Prices for 2025-2028 based on broker quotes available as of late 2024.

Massachusetts Class I renewable energy credit (REC) prices are a useful measure of the cost Vermont utilities will incur to fulfill their Tier II Distributed Generation requirements. This is also an indication of price for the Tier IV New Renewables requirement established by H.289 (Act 179), which will go into effect for Green Mountain Power in 2025.

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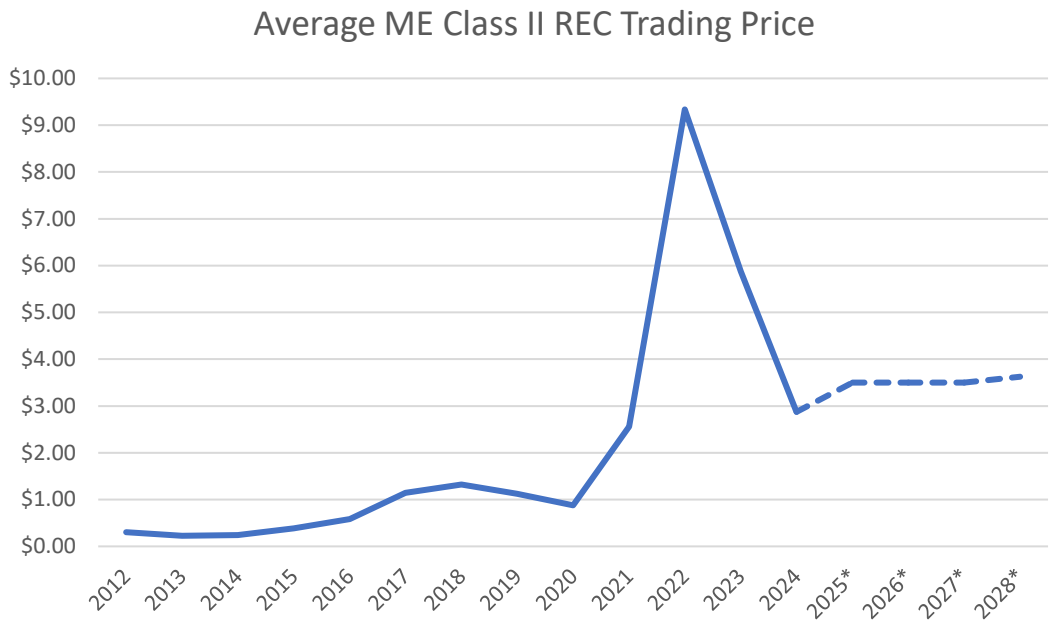
Maine Class II REC Prices



(*) Prices for 2025-2028 based on broker quotes available as of late 2024.

Maine Class II REC prices are a useful measure of the value of Tier I RECs from existing renewable generation. Prices saw a significant spike in 2022 due to a reorganization of categories within in Maine's Renewable Portfolio Standard but have since stabilized at a new, higher level.

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3. Transportation

a. Major Trends & Initiatives

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Clean Cars & Trucks Rules Set to Advance Low- and Zero-Emissions Vehicle Adoption

Vermont's Advanced Clean Cars II and Advanced Clean Trucks regulations, adopted in December 2022, require vehicle manufacturers to deliver an increasing percentage of zero-emission vehicles from model years (MY) 2026 to 2035.

After 2035, sales of all new light-duty vehicles delivered will be zero-emissions, while 40-75% of medium- and heavy-duty vehicles (depending on class) will be zero-emissions.

Vehicle Class	MY 2026 **Requirement** for New Vehicle Sales or Deliveries	MY 2035 **Requirement** for New Vehicle Sales or Deliveries
Cars & Light Duty Trucks 	**35%**	**100%**
Class 2b-3 Large Pickups & Vans 	**10%**	**55%**
Class 4-8 Straight Trucks & Buses 	**13%**	**75%**
Class 7-8 Tractors 	**10%**	**40%**

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Transportation Carbon Reduction Strategy

Completed in November 2023 for the Agency of Transportation, the Carbon Reduction Strategy provides direction for spending certain federal funds to reduce transportation sector emissions.

While federal funding is insufficient to implement all elements, the Strategy will be used to shape the Capital Program for Vermont's transportation infrastructure and inform other policies.

Carbon Reduction Program Funding Priorities for State-Directed Funds

Project Type		Examples	Implementation to Date
	Bicycle & Pedestrian Projects	Shared-use paths, bike lanes, and sidewalks	$4.0 million
	Mobility & Transportation Innovation	Microtransit, shuttles, carshare	$3.0 million
	Fleet Conversion	Public transit and fleet electrification	$5.4 million
	Agency of Transportation	Light-and heavy-duty equipment electrification and charging infrastructure	$1.1 million

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3. Transportation

b. Transportation Fuel Demand

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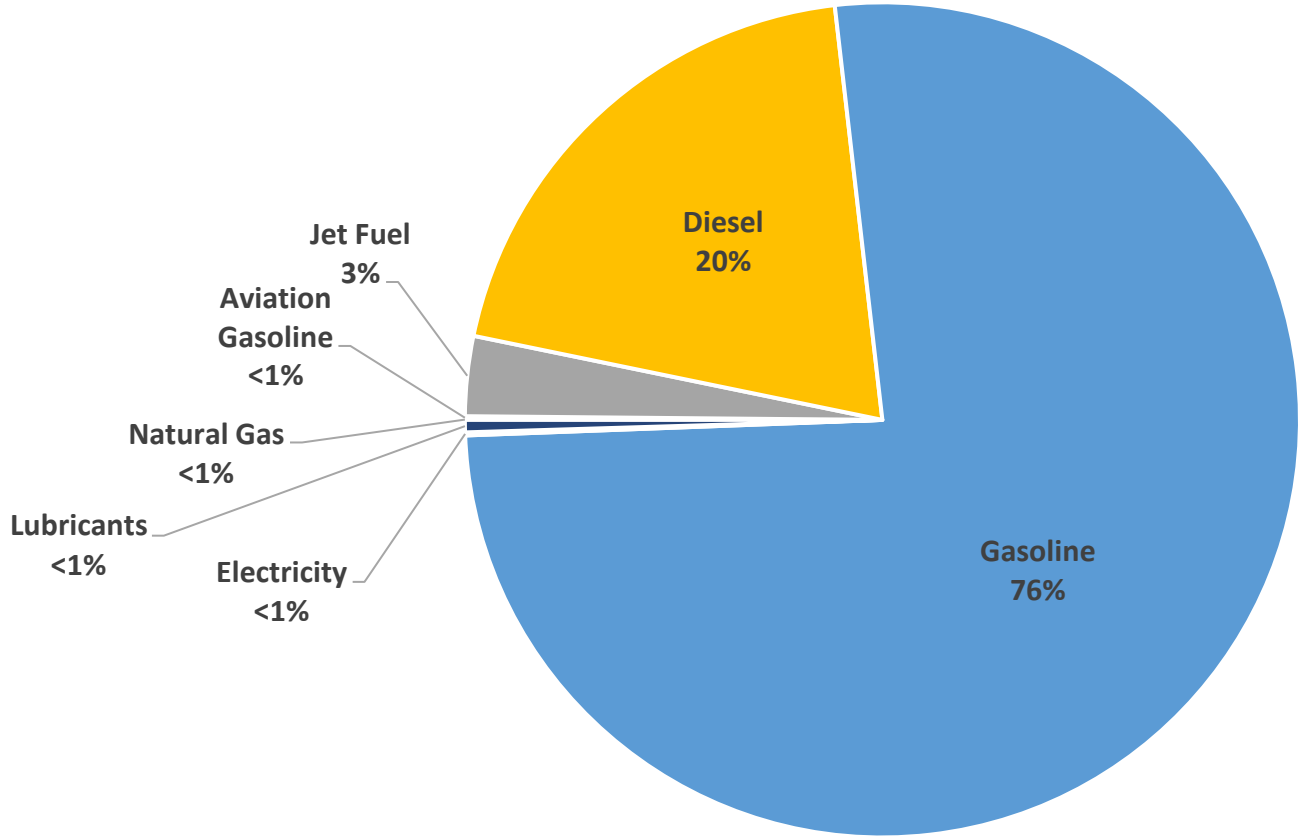
Transportation Energy Consumption by Fuel Type

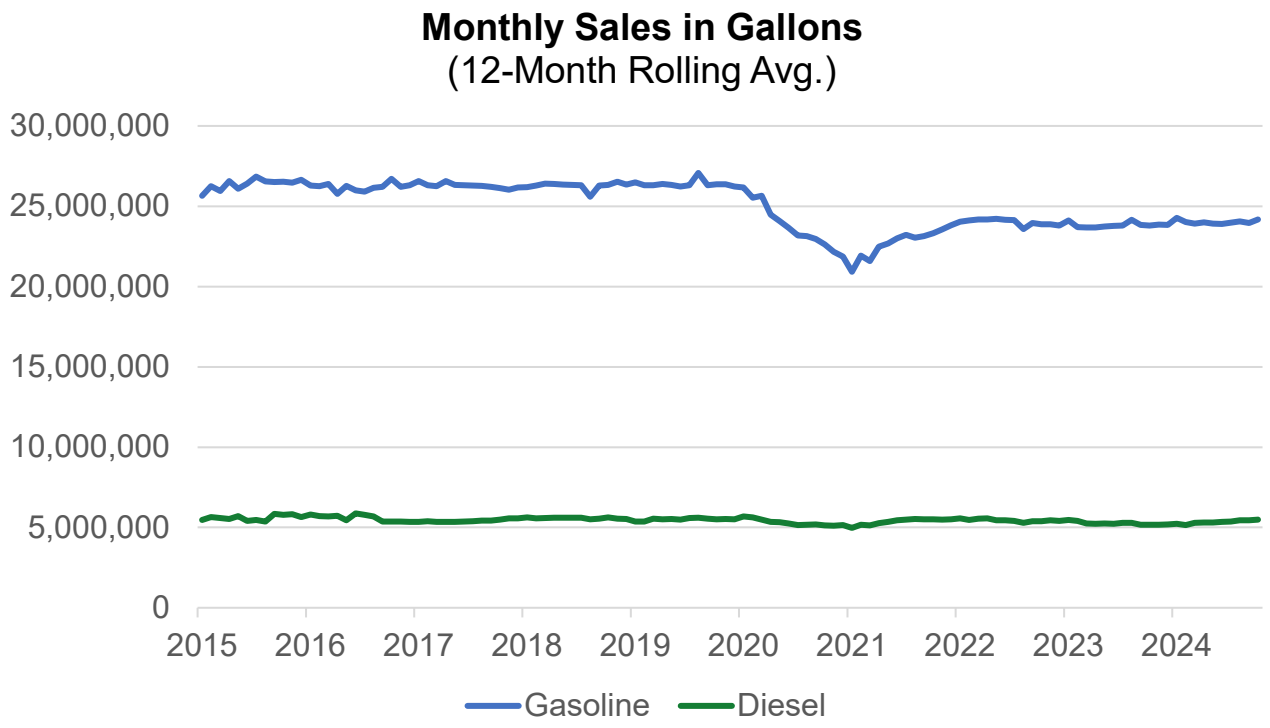
Gasoline and diesel account for the vast majority of transportation energy fuel. Gas consumption peaked in 2005 and has declined since, largely as a result of more efficient vehicles. Diesel consumption has remained level.

While electric vehicle adoption is growing, their relatively small number and overall efficiency mean that EVs still consume less than 1% of transportation energy.



Source: US Energy Information Administration, SEDS Table C8 and Table N6 for 2022. Residual fuel oil and hydrocarbon gas liquids are not shown.

Gasoline and Diesel Sales, 2015-2024



Gasoline and diesel taxes and assessments account for 28% of Transportation Fund revenues.

While diesel consumption and by extension tax revenue remain stable, Vermont gasoline consumption has not returned to pre-pandemic levels.

Source: Joint Fiscal Office, July (FY25 revenue forecast) and December 2024 (sales data).

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3. Transportation

c. Transportation Fuel Prices

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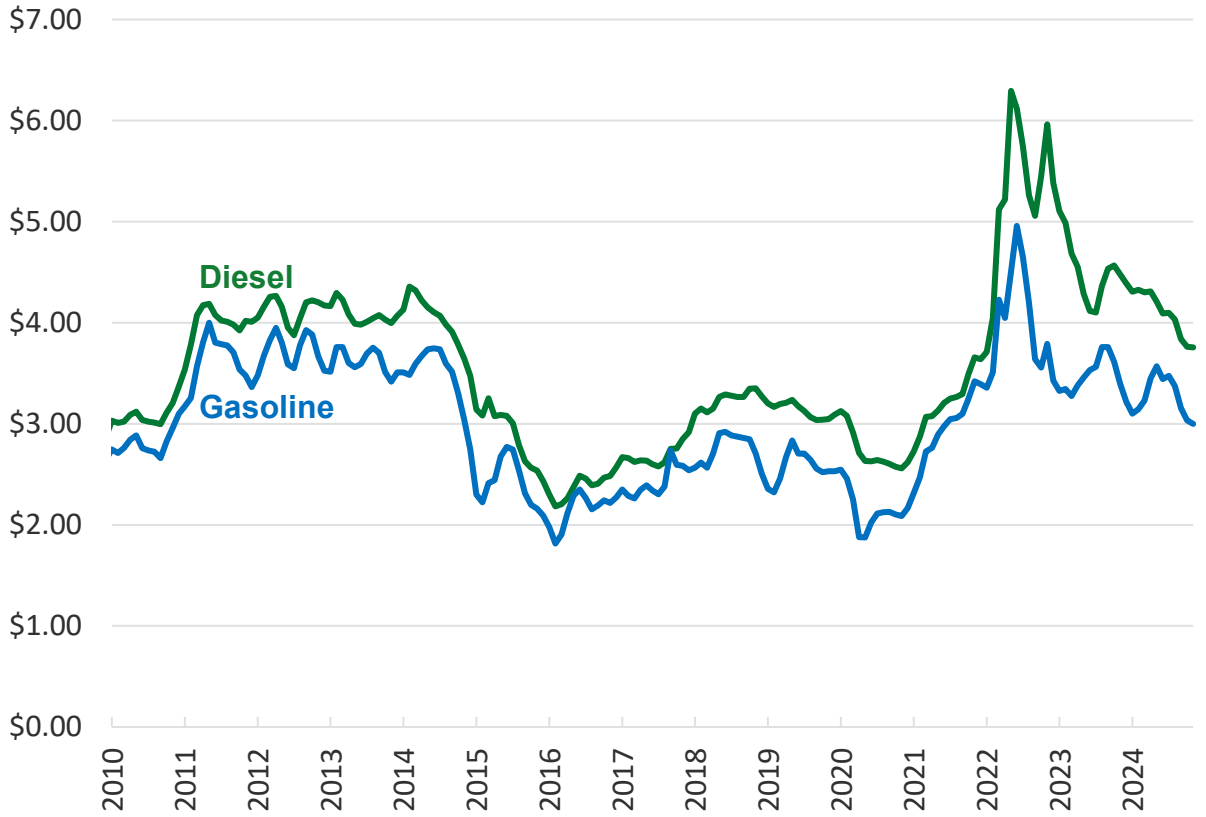
Gasoline and Diesel Retail Prices, 2010-2024

Although gasoline and diesel prices are both based on the global market for crude oil, other factors influence the price that consumers pay at the pump. These include refining capacity, inventories at regional ports, and local retail competition.

By the end of 2024, gasoline and diesel prices had fallen from the high prices of 2022 but remain slightly higher than the ten-year average.



Source: US Energy Information Administration for PADD 1A (New England). Monthly regular gasoline (all formulations) and ultra-low sulfur diesel prices are shown.

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3. Transportation

d. Electric Vehicle Adoption & Charging Infrastructure

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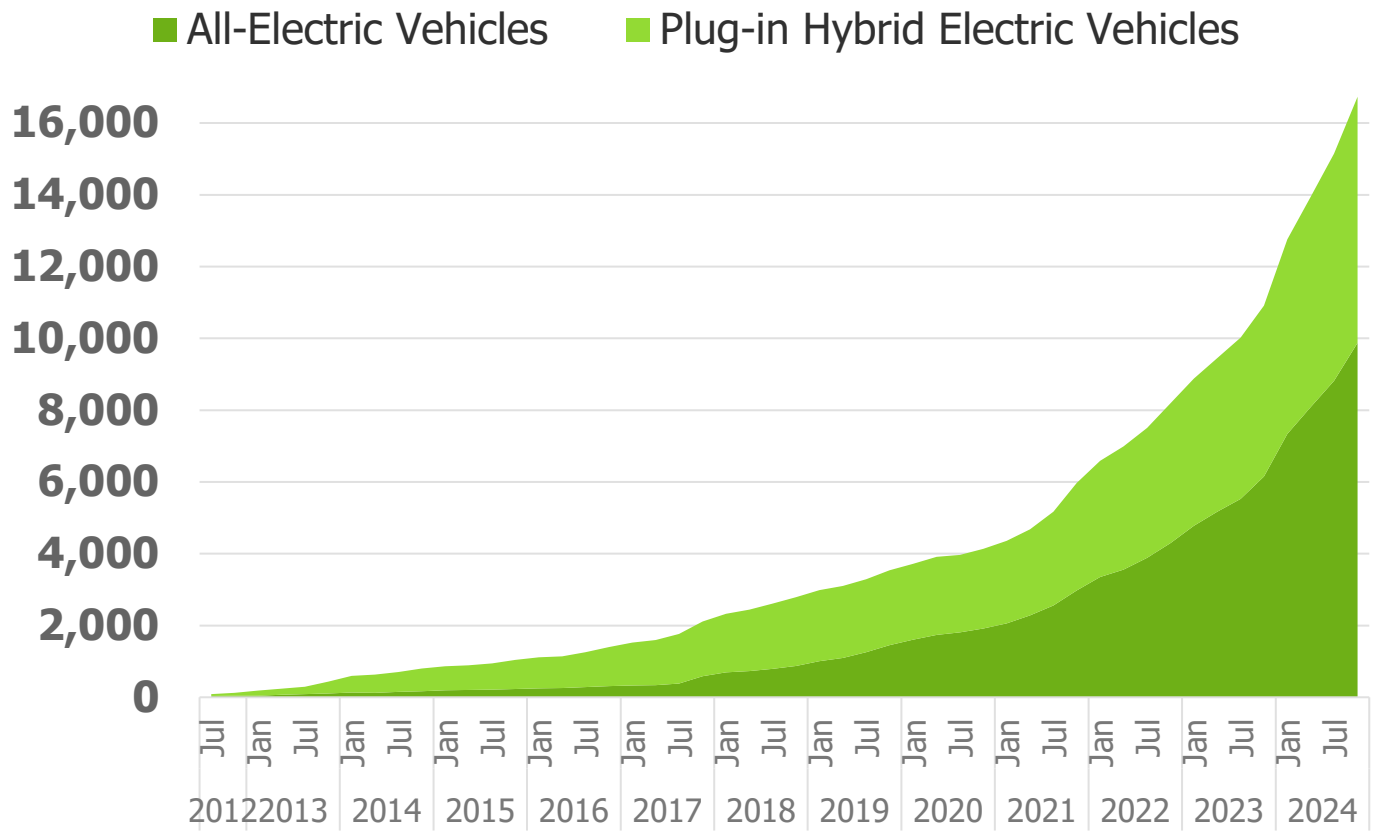
Electric Vehicle Adoption and Availability

There were 16,731 registered electric vehicles in October 2024, an increase of 53% over the prior year (equal to 5,815 net added EVs). EVs comprise 2.7% of all registered vehicles in Vermont.

59% of registered EVs were all-electric models and 41% were plug-in hybrids. Drive Electric Vermont reported 42 all-electric and 24 plug-in hybrid models available for sale, with 16 models priced at under $40,000 for a base trim level.



Sources: Drive Electric Vermont / October 2024 Vermont DMV data / FHWA Table MV-1.

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Electric Vehicle Incentives

Vermonters interested in the purchase or lease of an electric vehicle typically qualify for incentives. Recent federal legislation and state programs have added incentives for use vehicle purchasers as well as corporate, non-profit, and municipal fleets. See program details for eligibility.

Distribution Utility Incentives	Federal Tax Incentives	State of Vermont Incentives		Efficiency Vermont Incentive for Dealers
$250 - $3,000 for new and used purchases (varies by vehicle and utility)	Up to $7,500 depending on manufacturing location, material sourcing, battery size, income, purchase price, and tax liability	Electrify Your Fleet: $500,000 available in total for commercial, municipal, and nonprofit fleet owners	*Funding Exhausted in October 2024* New / Used Vehicles Up to $5,000	$400 split between dealership and sales staff for each EV sold or leased
Four utilities offer additional free charging equipment or rebates up to $900	Additional 30% tax credit for charger installations			

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Electric Vehicle Rates

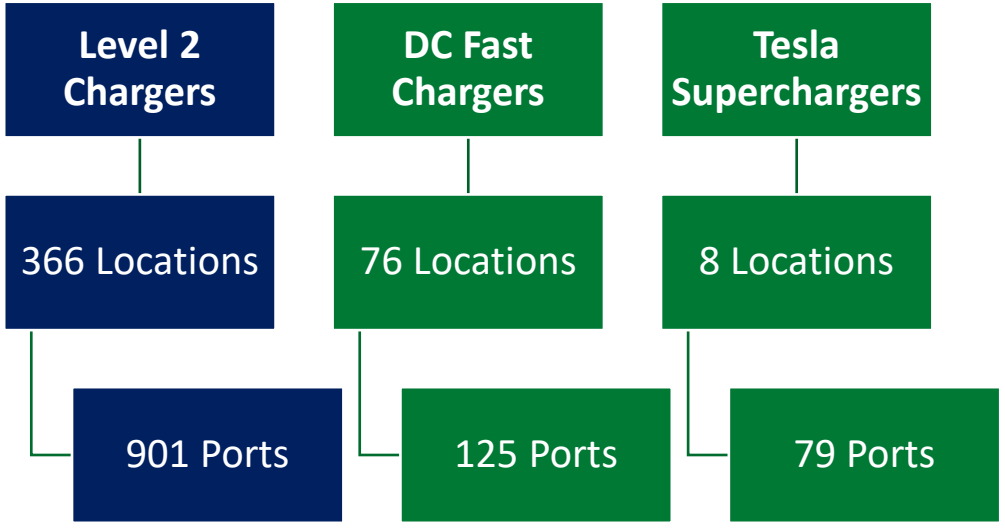
Act 55 of 2021, the Transportation Bill, required each distribution utility to offer electric vehicle rates by June 30, 2024. The rates must encourage EV adoption without adversely impacting other ratepayers.

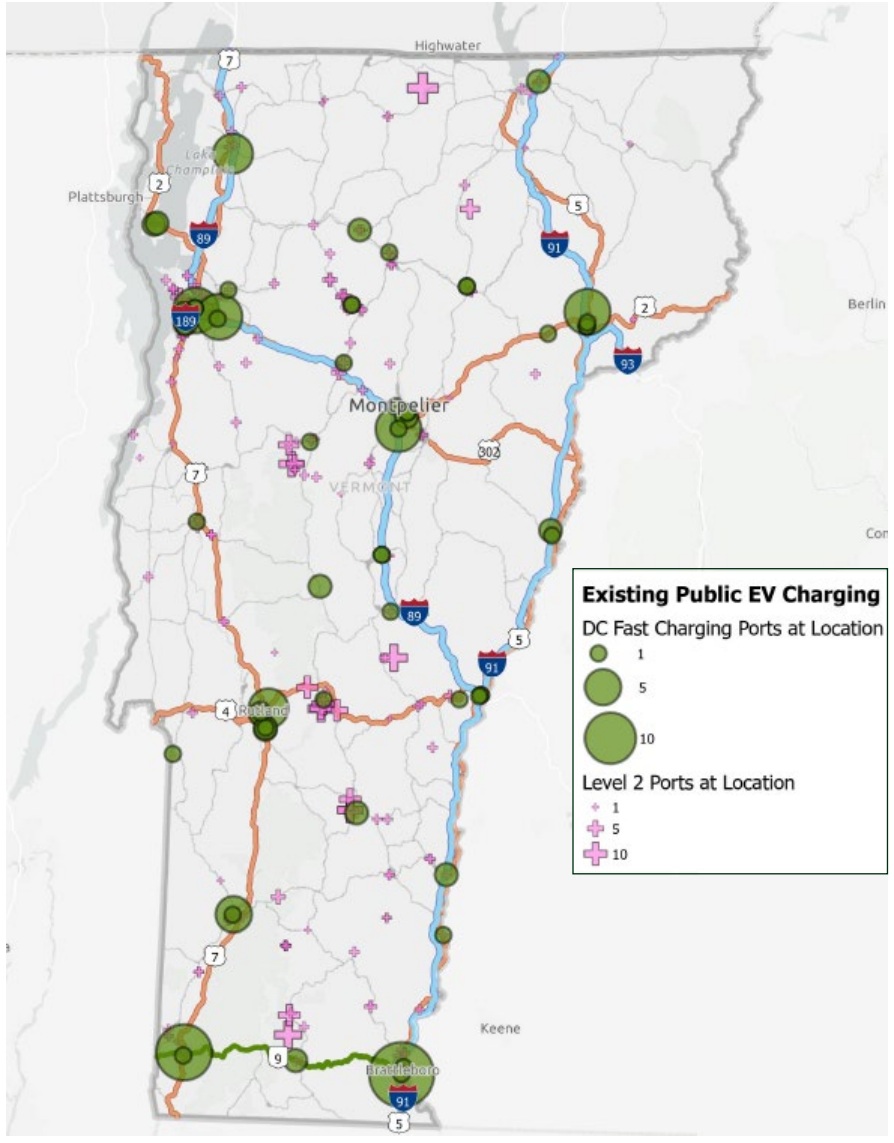
Access to EV rates typically requires a special Level 2 charger that communicates with the utility via third-party software provider.

Utility	EV Rate Now Available?	Summary
Green Mountain Power	Yes	Offers time-based and peak event-based rates, and a demand charge exemption for high-speed public chargers
Burlington Electric Dept.	Yes	Offers time-based and peak event-based rate options
VPPSA Representing 11 Municipal Utilities	Under Development	Developing varying price program based on electricity market conditions
Vermont Electric Coop.	Yes	Offers $8 bill credit each month that charging occurs entirely outside peak demand events; also offers time-based rates for residential and commercial customers
Stowe Electric Dept.	No	PUC granted extension to 2025 for technical reasons
Village of Hyde Park	No	PUC granted extension to 2026 for technical reasons
Washington Elec. Coop.	No	PUC granted extension to 2027 pending AMI deployment
GF Power	No	PUC granted general exemption as a non-retail utility

Electric Vehicle Public Charging

Vermont leads all other states in the count of total public charging ports per capita and ranks in the top five for fast chargers per capita. Fast chargers are operated by both private and utility actors. Publicly-funded fast chargers are being installed to serve vital travel corridors, including in priority locations such as St. Albans, Derby, St. Johnsbury, and White River Junction.





Count: US Department of Energy Alternative Fuels Data Center, December 2024.
Map: Existing chargers, Agency of Transportation, April 2024

Electric Vehicle Charging Incentives

Nearly 80% of EV charging occurs at home. However, a number of state, federal, and utility incentives support the installation of electric vehicle supply equipment (EVSE) along travel corridors, at workplaces and attractions, and to serve residents of multiunit dwellings.

Distribution Utility Incentives	Federal Tax Incentives	National Vehicle Infrastructure Program (NEVI)	Vermont Community Electric Vehicle Chargers Incentive		
$250-$2,500 for residential and workplace chargers (varies by utility)	30% tax credit for cost of equipment and installation, for up to $1,000 for residents and $30,000 for businesses	$21.2 million for FY2022-2026, mainly for highway corridor fast charging	*Funds Remain in 9 Counties* Multiunit Dwellings: $500 - $56,000 per applicant	*Awaiting Renewed Funding* Public Attractions & Fast Chargers: $3,000 – $160,000 per applicant	*Awaiting Renewed Funding* Workplaces: $500 - $56,000 per applicant

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4. Thermal

a. Major Trends and Initiatives

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Clean Heat Standard

The General Assembly passed the "Affordable Heat Act" (Act 18) in 2023, which directs the Public Utility Commission (PUC) to design a potential "Clean Heat Standard" (CHS) for authorization by the Legislature in 2025. A CHS would create an obligation on fuel providers that import heating fuels into Vermont to reduce carbon equivalent emissions over time. Obligated entities would comply with the CHS by purchasing credits from a "Default Delivery Agent", or by actively investing in either supply- or demand-side activities (for increasing the supply of renewable fuels, or causing the installation of weatherization, cold climate heat pumps). The General Assembly must specifically authorize the Commission to implement a Rule for the obligations to come into effect.

The PUC has two ongoing proceedings to fulfill its requirements, including developing the rules and procedures that would govern the CHS (PUC Case No. 23-2220-RULE), and the details and parameters of the potential "Default Delivery Agent" (PUC Case No. 23-2221-INV). Information is available on the PUC's website.

The PUC established an Equity Advisory Group (EAG) to assist in developing and implementing an equitable program and a Technical Advisory Group (TAG) to assist in the ongoing management of the CHS and to advise on the technical aspects of the program. These groups held regular bi-weekly meetings throughout 2024 and regularly provided advice and guidance to the PUC on program design and implementation.

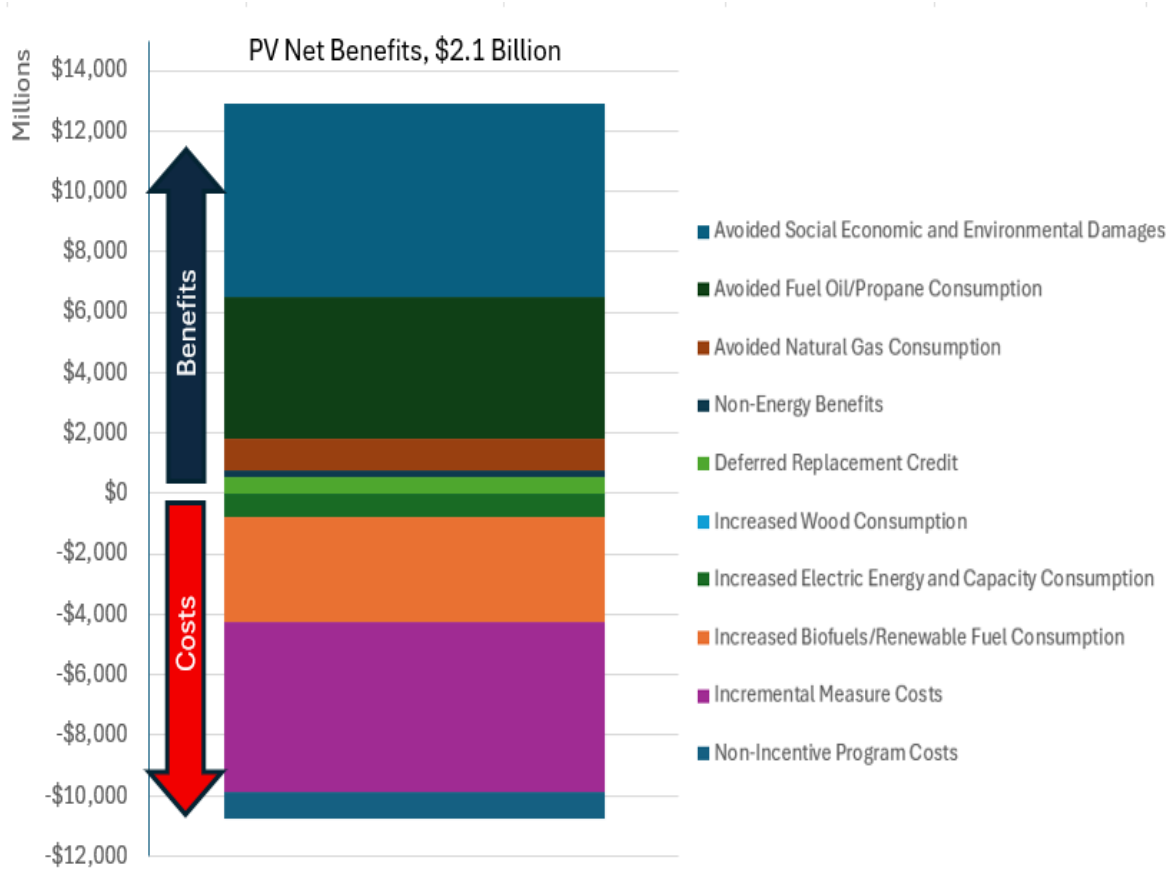

Figure 12: PV Cumulative Societal Costs and Benefits by Category, 2049, including monetization of benefits that accrue both inside Vermont and outside of Vermont. While societally, net benefits in the Potential Study's optimized scenario were over $2 billion, the same study (and chart above) show net costs to of over $4 billion would accrue to Vermonters.

Source: NV5, *Clean Heat Standard Assessment of Thermal Sector Carbon Reduction Potential in Vermont.* Prepared for the Vermont Department of Public Service. September 1, 2024

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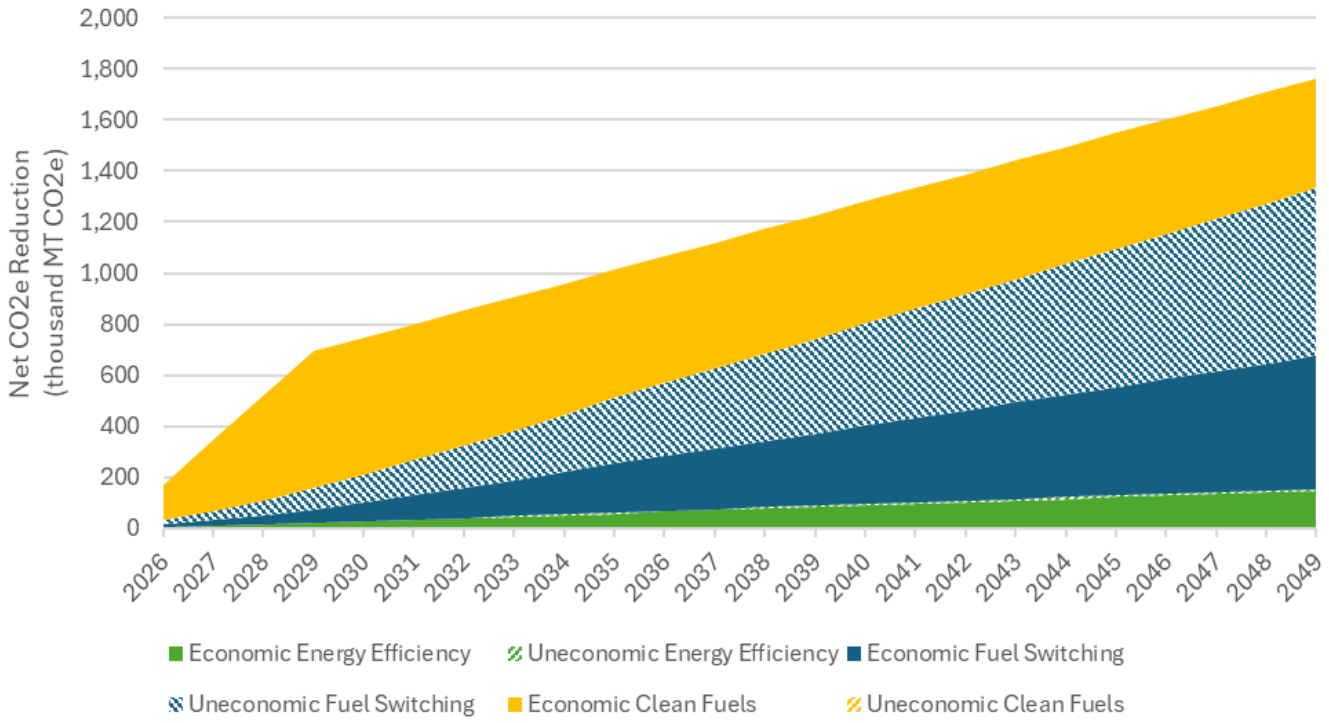
Clean Heat Standard – Potential Study

The Department of Public Service was tasked with completing a “potential study”. The Potential Study was completed by contractor NV5, who estimates that sufficient thermal emissions reduction resources are available to satisfy the thermal sector emissions reduction requirement. However, the Potential Study had four important findings:

- While overall the Clean Heat Standard could be cost-effective on a societal basis, to meet requirements some portion of the measures necessary will not be societally cost-effective. (see chart on right)
- Meeting the 2030 Requirement (calendar year 2029) relies heavily on “clean fuels” as a solution (e.g. biofuels, renewable natural gas) (see chart on right)
- Workforce limitations may prevent Vermont from meeting GWSA requirements, particularly as it relates to installed measures such as weatherization.
- It will not be possible to consistently reach low- and moderate-income requirements while also reaching the CHS requirements.

"Assessment of Thermal Sector Carbon Reduction Potential in Vermont"



Act 18 Optimized cumulative annual GWSA emissions reduction by measure type and cost-effectiveness according to the Vermont Societal Cost Test (“VT SCT”). A significant portion of the Fuel Switching potential—56% in 2049—is not cost effective.

Clean Heat Standard Potential Study – Workforce

The Potential Study indicated that largest need for additional workforce is for single and multifamily weatherization measures. The CHS would likely require a significant increase in weatherization workforce above existing workforce capacity.

According to the study, there are approximately 164 current Weatherization workers in Vermont – under an optimized 2030 scenario the State would need about 468, about 3 times as many.

Measure	Number of Current Workers (2023)	BAU Workers in 2030	Optimized Workers in 2030	BAU Workers in 2035	Optimized Workers in 2035	BAU Workers in 2040	Optimized Workers in 2040	BAU Workers in 2049	Optimized Workers in 2049
Residential Heat Pumps (Ductless)	70	82	24	91	26	102	28	125	30
Commercial Heat Pumps (Ductless)	10	11	11	12	12	13	12	16	13
Residential Heat Pumps (Ducted)	15	17	27	19	29	22	31	27	34
Commercial Heat Pumps (Ducted)	3	4	12	4	13	4	14	5	15
Heat Pumps (Ground Source)	1	1	4	1	4	1	4	1	4
Weatherization Single-family	140	113	435	100	435	85	435	65	435
Weatherization Multifamily	4	3	14	3	14	2	14	2	14
Weatherization Mfg. Home	20	16	19	11	19	10	19	7	19
Residential Heat Pump Water Heater	3	3	18	3	21	3	21	4	21
Residential Induction Stovetop	0.4	1	3	1	7	1	7	1	7
Advanced Wood Heating (Pellet Stoves)	0.3	0.3	8	0	8	0	8	0	8
VRF	0.1	0.1	3	0	3	0	3	0	3

Current State, Business-As-Usual and Act 18 Optimized Workforce Results

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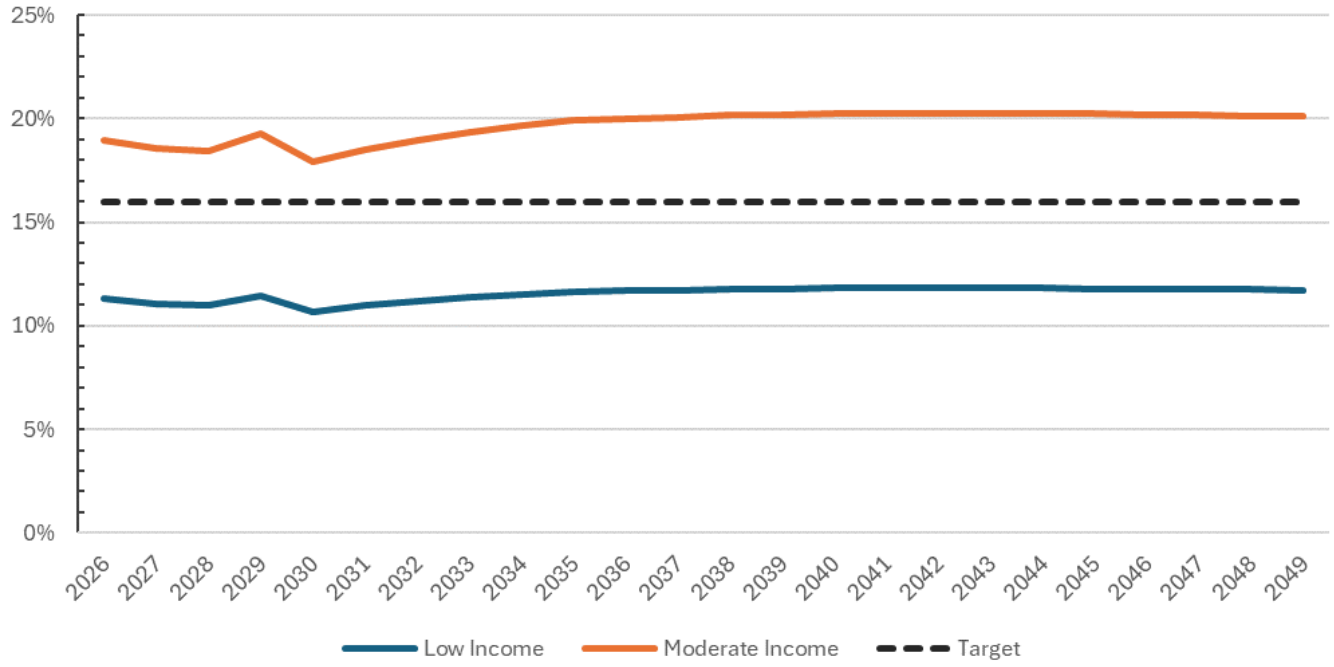
Clean Heat Standard Potential Study – Low Income



Act 18 Optimized Percent Total Cumulative Annual Lifecycle Emissions Reduction by Income Level

Act 18 requires "[o]f their annual [clean heat credit] requirement, each obligated party shall retire at least 16 percent from customers with low income and an additional 16 percent from customers with low or moderate income." The Potential Study's optimized scenario exceeds the requirement for Moderate Income but falls short for Low Income - achieving a maximum contribution of just under 12% in 2040 and beyond. This result highlights that total thermal lifecycle emissions from the low-income demographic in Vermont may not be high enough for obligated parties to achieve an annual lifecycle emissions reduction of 16%.

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Building Energy Codes Study Committee - Charge

The Building Energy Codes Study Committee (BECSC) was established in Act 47 of 2023 to address issues related to compliance rates with Vermont's mandatory energy codes, known as Residential Building Energy Standards (RBES) and Commercial Building Energy Standards (CBES). The group was continued for another two years in Act 151 of 2024.

The 2023 Committee developed a list of recommended strategies to increase awareness and compliance with the energy codes, which include the following:

- Structural, statutory, policy, and programmatic changes to Vermont's energy code environment.
- Improve the process for filing and tracking energy code certificates.
- Improve workforce training and support.
- Increase awareness of building energy codes and requirements.
- Establish a plan for funding base-code and above-base code compliance.
- Coordinate code compliance grant efforts in Vermont.

The 2024 Working Group provided additional recommendations in a report submitted to the VT House and Senate Energy Committees on November 15, 2024.

Additional information, including the groups reports, is available at: https://publicservice.vermont.gov/efficiency/building-energy-standards/building-energy-code-working-group

VT Energy Workforce Development Funding and Initiatives

Office of Economic Opportunity's (OEO) Weatherization Program – Weatherization Training Center (WxTC)
Funding: $1.7M from U.S. Department of Energy (DOE)
Purpose: To support weatherization and other construction trades in recruiting, training, and placing workers in careers. The WxTC will serve as a hub to coordinate existing training programs and develop new training programs for Vermont. A specific goal of the WxTC is to diversify the workforce and bring underrepresented individuals into the weatherization field. A contractor has been selected and contract negotiations are underway with expected opening of the center in the summer of 2025.

State Energy Program (SEP) Bipartisan Infrastructure Law (BIL) - Workforce Development Training
Funding: $875,000 from U.S. DOE, BIL
Purpose: The PSD has budgeted a portion of the SEP BIL award to provide weatherization workforce development.

Vermont Energy Code Administration Project
Funding: $693,000 from U.S. DOE, BIL to Energy Futures Group
Purpose: A portion of the $1,000,000 grant from DOE has been budgeted for "Energy Professionals (HERS Raters) Workforce Development and Support" and "Education, Training and Support". Most of this activity will be carried out by a full-time energy code circuit rider who will provide outreach, field support and training on energy codes to the design, building, supply, finance and affordable housing communities.

Efficiency Vermont ARPA Workforce Development Training Grant
Funding: $1M from American Rescue Plan Act (ARPA)
Purpose: To provide funding for entities and programs that increase the number of people working in or supporting the weatherization field in Vermont. Programs must directly serve an eligible population, which includes low and moderate income (up to 120% AMI) or individuals who, as a result of the COVID-19 pandemic, are unemployed or are employed part time but want and are available for full-time work. Vermont Adult Learning (VAL) and ReSource are the selected entities to provide programs.

VT Energy Workforce Development Funding and Initiatives

Efficiency Vermont ongoing Building Energy Code Support
Funding: $105,500 for 2024-2026 DRP – DSS budget
Purpose: This funding is to provide technical support and training regarding the development and implementation of state energy codes and standards. The anticipated support includes, but is not limited to:

- Direct technical assistance, including a telephone assistance hotline;
- Development, production, and delivery of educational materials;
- Development and delivery of workshops and professional training; and
- Technical support for the development or amendments of energy codes and standards.

Efficiency Vermont – Weatherization Training & Building Science Certifications
Funding: ~$70,000 from TEPF funds
Purpose: This funding is allocated to subsidize coursework, field training, and exam fees for Building Performance Institute certifications. Some or all of it could be redirected to the VT Weatherization Training Center once it is up and running.

Efficiency Vermont - Workforce Development FTE position
A full-time position was filled in 2024 to assist with Talent Pipeline Management in the energy efficiency trade workforce. This position will work collaboratively with Vermont partner organizations on helping to build and implement long term strategies to recruit and retain more skilled workers in the weatherization and heating electrification fields.

EAN Climate Workforce Coalition
Purpose: Create and implement a plan to reduce the gaps in the climate workforce to support implementation of the Climate Action Plan. The Climate Workforce Coalition is planning a Climate Jobs Campaign for 2025.

State-Based Home Energy Efficiency Contractor Training Grant Program
Funding: $1,048,680 from U.S. DOE, Inflation Reduction Act (IRA)
Purpose: Formula grants to states to develop and implement a state workforce energy program that prepares workers to deliver energy efficiency, electrification, and clean energy improvements. PSD applied for this funding January 31, 2024 and still await receiving the funds from DOE.

School Heating Assistance with Renewables and Efficiency (SHARE)

- Clean Energy Development Fund (CEDF) Board allocated ARPA Funding - $3.75 Million – Rounds 1&2
- Eligible Measures: Advanced Wood Heat (AWH), Heat Pumps (HPs), Controls and Efficiency Projects
- Round 3 - $2 Million funding for FY24 of General Fund $$ - **AWH associated projects only**
- Title I Schools Eligible for grants $25K-250K
- 95 initial applications seeking $15.25 million in funding requests for projects totaling $52 million
- 20 ARPA-funded projects
- 9 projects awarded in round 3 for ~$1.3 Million; remaining SOV funds to go out to solicitation in 2025
- Annual expected savings per school - ~$23K; 8,600 gallons of oil
- Warmer, more comfortable learning and working environments

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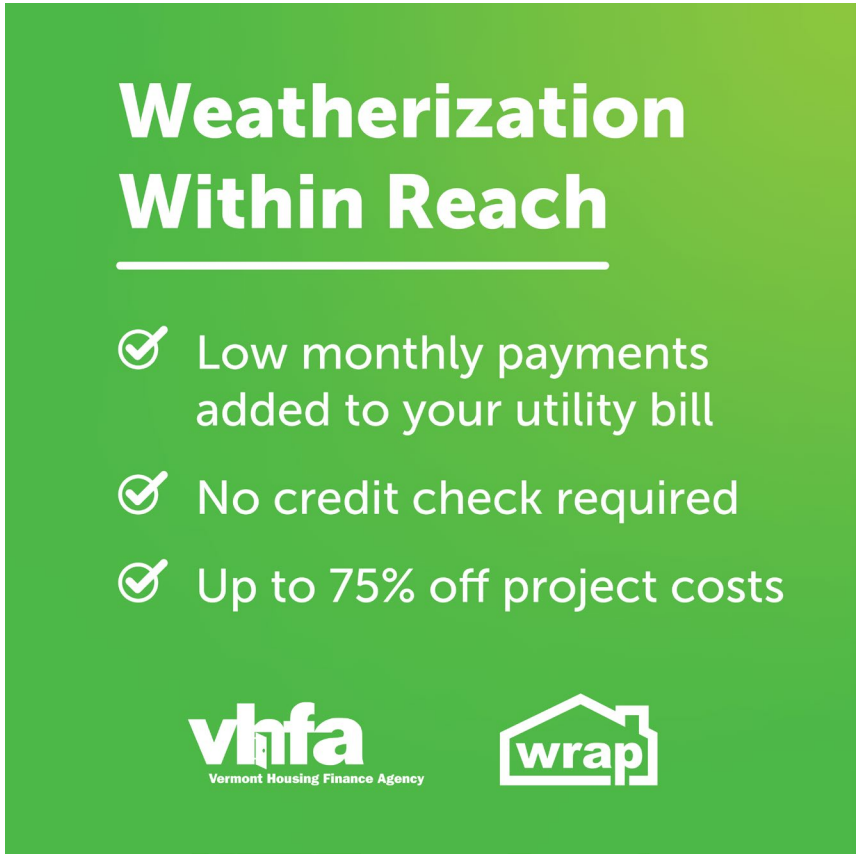
The Weatherization Repayment Assistance Program (WRAP)

The *Weatherization Repayment Assistance Program* is an innovative new program run by Vermont Housing Finance Agency to help Vermonters participate in comprehensive home efficiency projects. WRAP allows Vermont households to pay for qualifying weatherization projects as well as heat pumps, advanced wood heating systems, and health and safety measures through a monthly charge on their electric or gas bill. The charge is tied to the *meter* rather than to the individual customer – overcoming the barriers of access to credit, high upfront costs, and long payback periods. Both homeowners and renters (with landlord permission) can participate in the program. Although the program is open to Vermonters of all incomes, the majority of program funding is targeted to households earning 80% to 120% of the area median income.

The WRAP pilot was initially proposed by Governor Scott in 2021 and funded with $9 million in State appropriations in that year. Green Mountain Power, Ludlow Electric, Vermont Electric Cooperative, Vermont Gas Systems, and Burlington Electric Department have put tariffs in place to offer the program to their customers starting in late 2023. VHFA is in discussions with additional utilities to encourage them to participate and is considering adjusting certain requirements to allow for additional customer participation opportunities.



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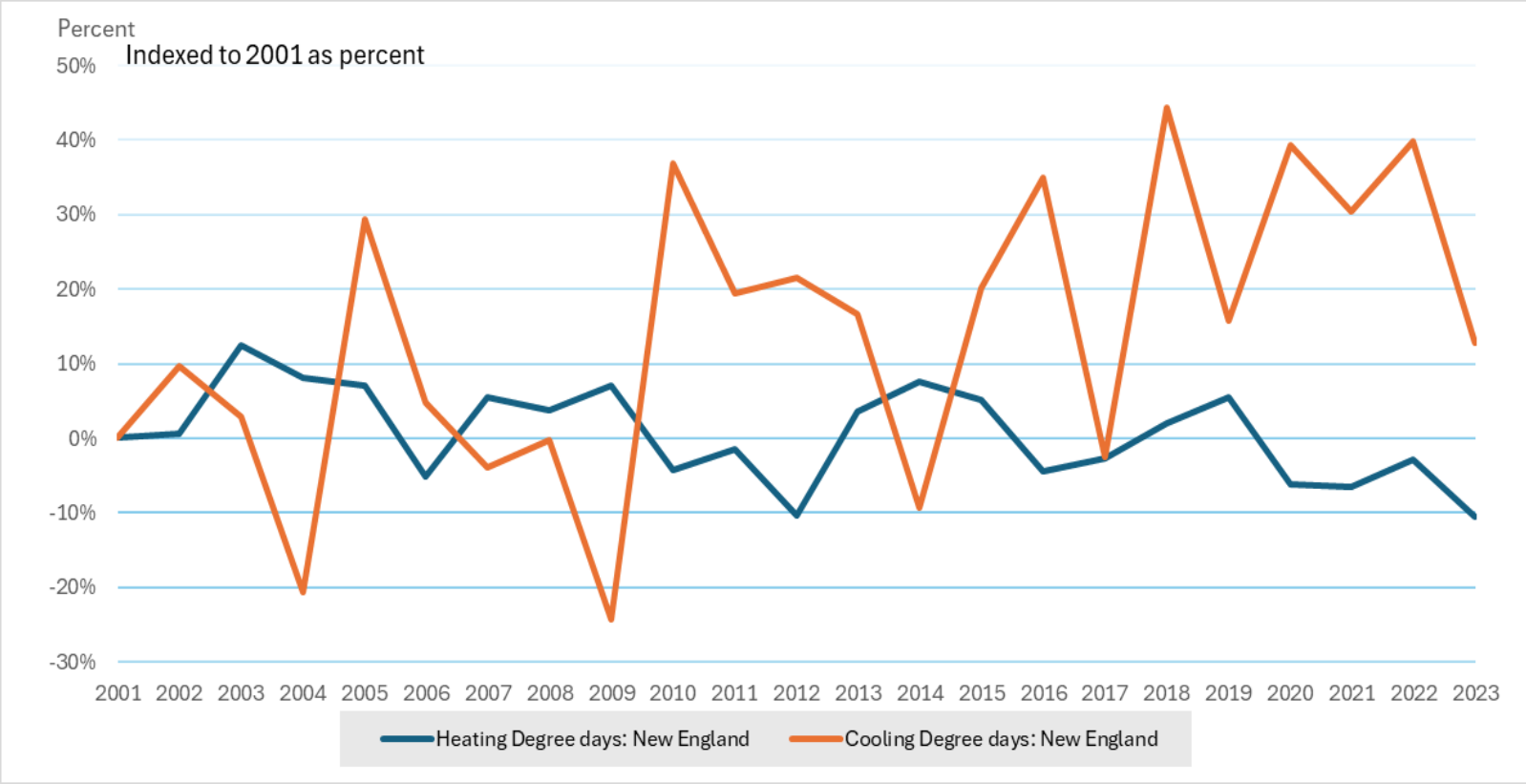
4. Thermal

b. Thermal Fuels Demand

Thermal Demand Impacted by Weather



Vermont's thermal energy needs depend on the weather. Over the last twenty-two years, the amount of Cooling Degree Days in New England increased by 12.7% while the amount of Heating Degree Days has decreased by 12%. Historically, demand for heating fuel has moved in line with heating degree days. The warming climate is decreasing the demand for heating fuels in the winter.

Source: U.S. Energy Information Administration (Dec 2024)

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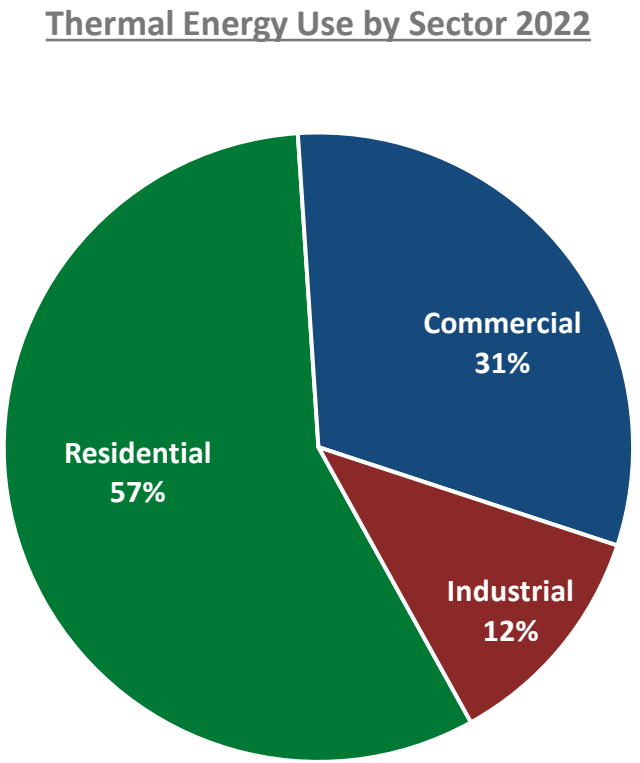
Vermont 2022 Thermal Energy Demand by Sector

Thermal uses of energy by sector/building type has remained steady in Vermont, The residential sector uses the most thermal energy to keep our homes warm. Businesses use about 31% to heat their buildings and the industrial sector uses about 12% for space heating and for manufacturing/material processing.



Source: 2022 EIA State Energy Data System (SEDS).

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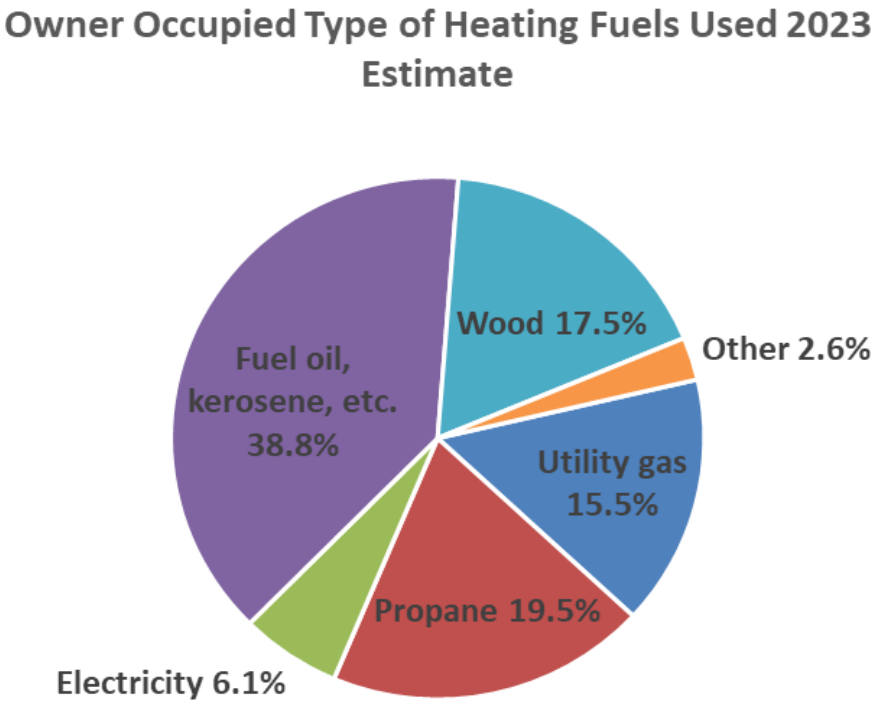
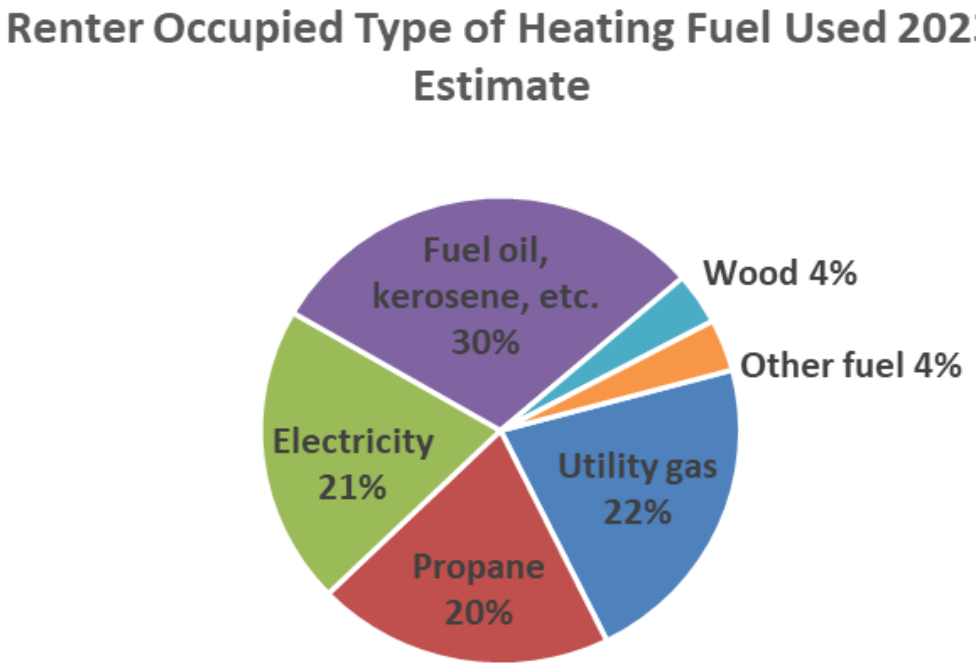
Heating Fuel Source by Housing Type

Vermont is seeing an increase in the use of electricity in heating, especially in renter occupied households. For renter occupied homes the estimated number of households where electricity was the primary fuel increased 5% in 2023 over the 5-year average from 2017 to 2021. Fuel oil use continues to decrease, and propane held steady as a primary fuel. Despite 21% of the renter occupied homes and 6% of the owner-occupied homes using electricity as their primary fuel the percentage of electricity that is meeting the total heating load is just nearly 4%. This could be because of the increase in the use of heat pumps, which are about twice as efficient as electric resistant heat and thus use less energy to heat the same space.





Source: US Census – American Community Survey Data, 2023.

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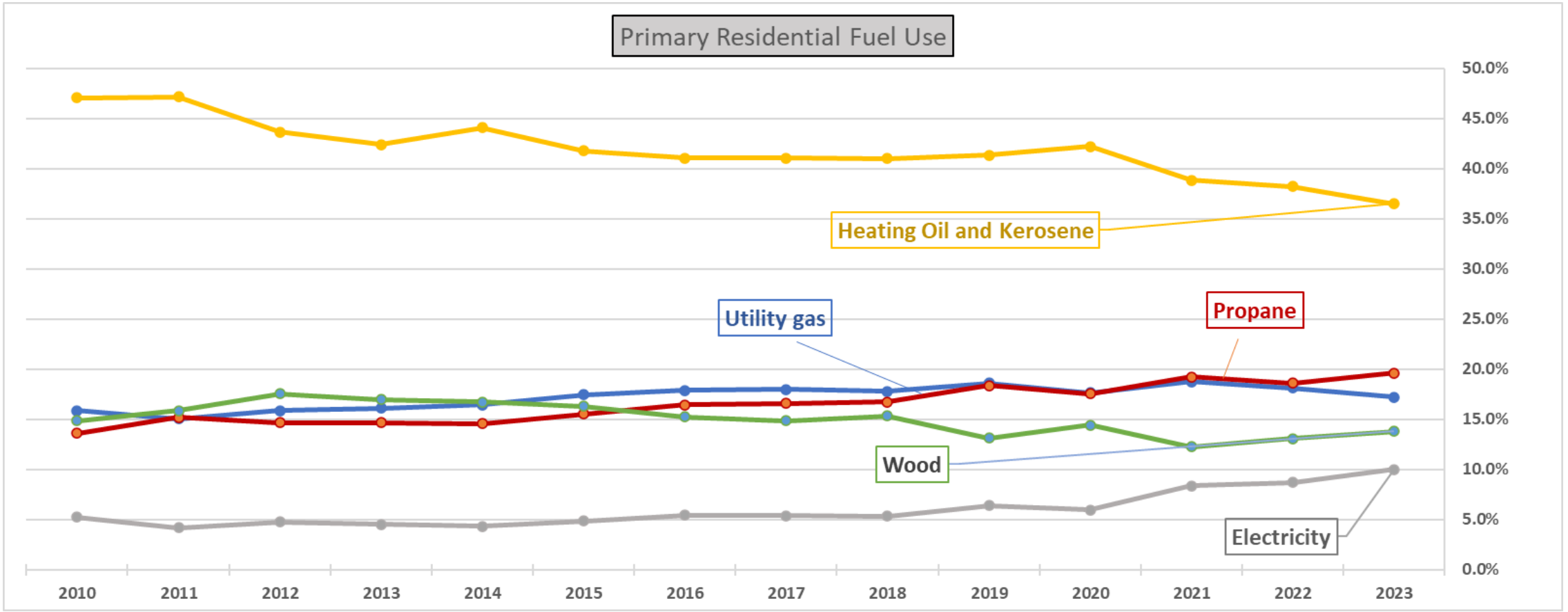
Primary Residential Fuel Use 2010-2023

Residential use of heating oil and kerosene is dropping while electricity is on the rise due to continued weatherization efforts as well as the adoption of heat pumps as a primary heating source. Dada from the US Census Bureau's American Communities Survey is matched with heating and propane sales data in Vermont to confirm this data.



Source: US Census Bureau's American Community Survey. Totals don't equal 100% as there are small amounts of other fuels respondents reported as their primary heating fuel (e.g., Coal, Solar, and "other").

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Weatherization

Weatherization programs focus on improvements to building insulation and air sealing to reduce the energy required to heat and cool indoor spaces, homeowner costs, and the carbon emissions from the burning of fossil fuels for space heat.

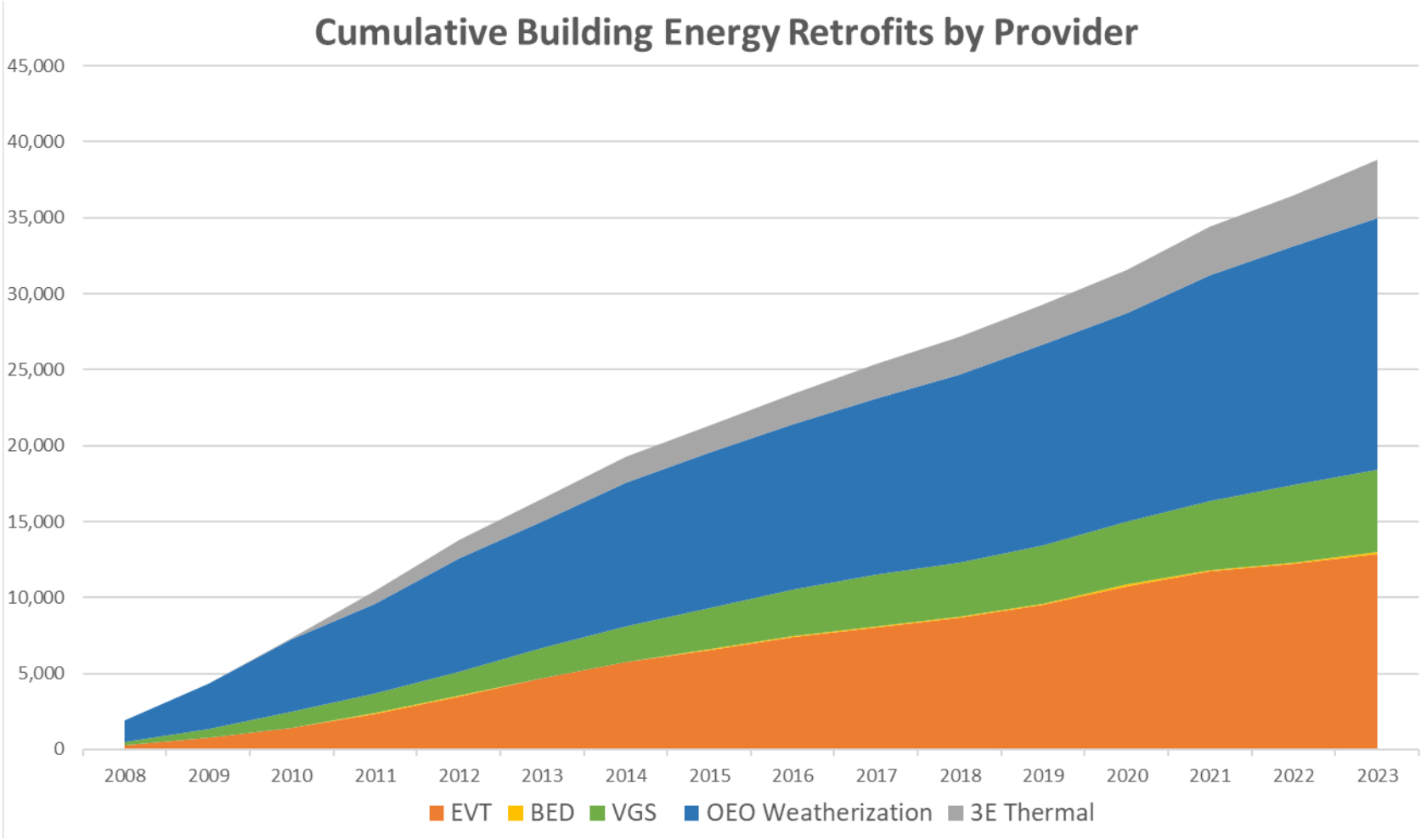
The 2022 Comprehensive Energy Plan set a target of comprehensively weatherizing a total of 120,000 homes by 2030. While significant federal funding has been dedicated to support Weatherization (as described elsewhere in this report), available workforce and organizational capacity remain insufficient to meet that aspirational target.

There are five major weatherization programs in Vermont that are contributing to meeting the building energy goals of the state: Efficiency Vermont's Home Performance with ENERGY STAR program, Vermont Gas Systems' Home Retrofit program, the Burlington Electric Department, the Weatherization Assistance Program agencies coordinated by the Office of Economic Opportunity (OEO), and 3E Thermal, which focuses on multifamily buildings. As shown below, 2,752 comprehensive retrofit projects were completed in 2023, with an average fuel usage reduction of 30.5%.

2023 Building Energy Goals Tracking		
Total Projects (# units served)	**2,752**	Total number of housing units weatherized, including all comprehensive projects completed through the five participating program implementers: EVT, VGS,BED, OEO and 3E Thermal
Average % fuel usage reduction	**30.5%**	Average fuel usage reduction for projects completed in 2023 using fuel usage data when available and modeled estimates when fuel usage is unavailable
Carbon emissions reductions (pounds)	**6,276,906**	Carbon emissions reductions use a calculation based on Federal standards for fossil fuels and PSD derived values for emissions avoided through reduced electricity generation
Incentive costs	**$23,630,260**	Direct financial incentives to the homeowner or building owner. (For OEO projects, all project costs are funded by OEO's Weatherization Assistance Program)
Participant costs	**$6,424,128**	Program Participant contributions to the cost of the building improvements
Total project costs	**$30,054,388**	

Weatherization

Vermont has supported the weatherization of over 38,000 units between 2008 and 2023.



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4. Thermal

c. Thermal Fuel Supply

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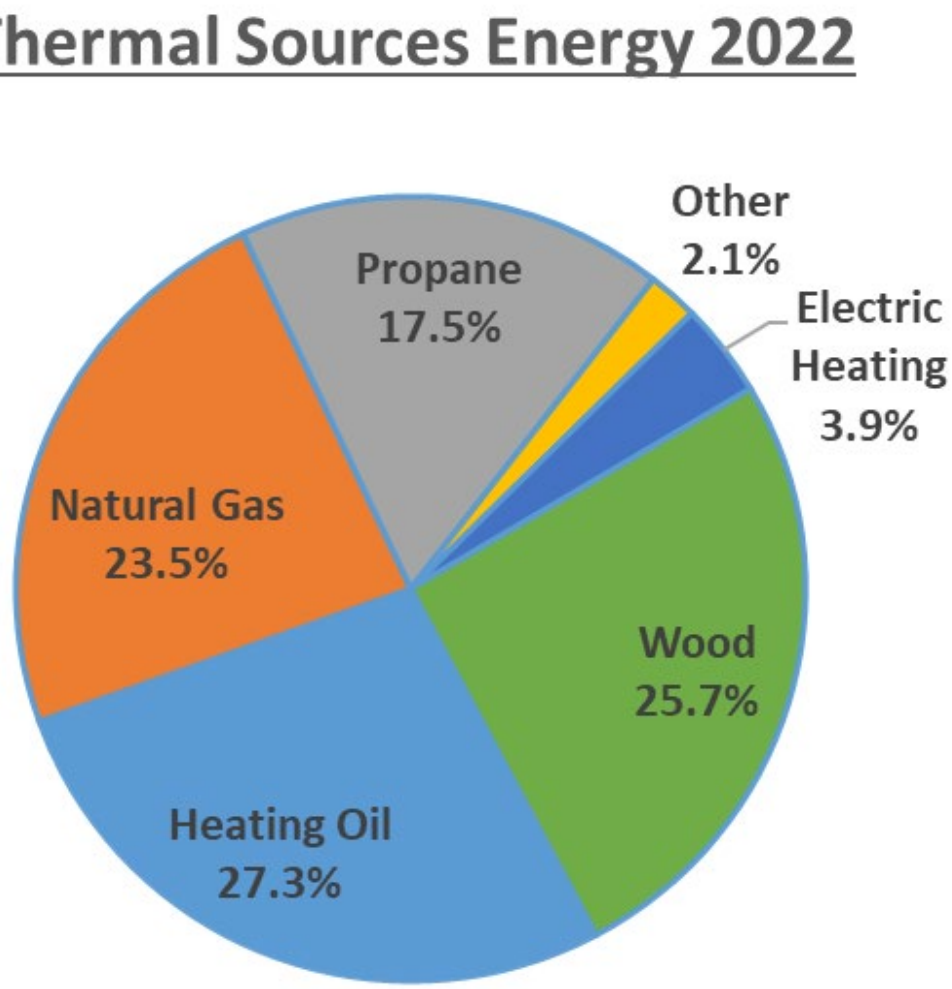
Vermont 2022 Thermal Energy Supply

In 2022 Vermont continued to use a variety of fuels to meet heating needs. No one heating fuel dominates supply in Vermont; fossil fuels together continue to provide over 70% of heating needs. Renewable Fuels make up over 29% of Vermont's thermal energy needs. Thermal energy data shown here is primarily from the U.S. Energy Information Agency (EIA). EIA data was not available for 2023 and thus 2022 data is used.



Source: 2022 EIA State Energy Data System (SEDS). Vermont State Tax Department

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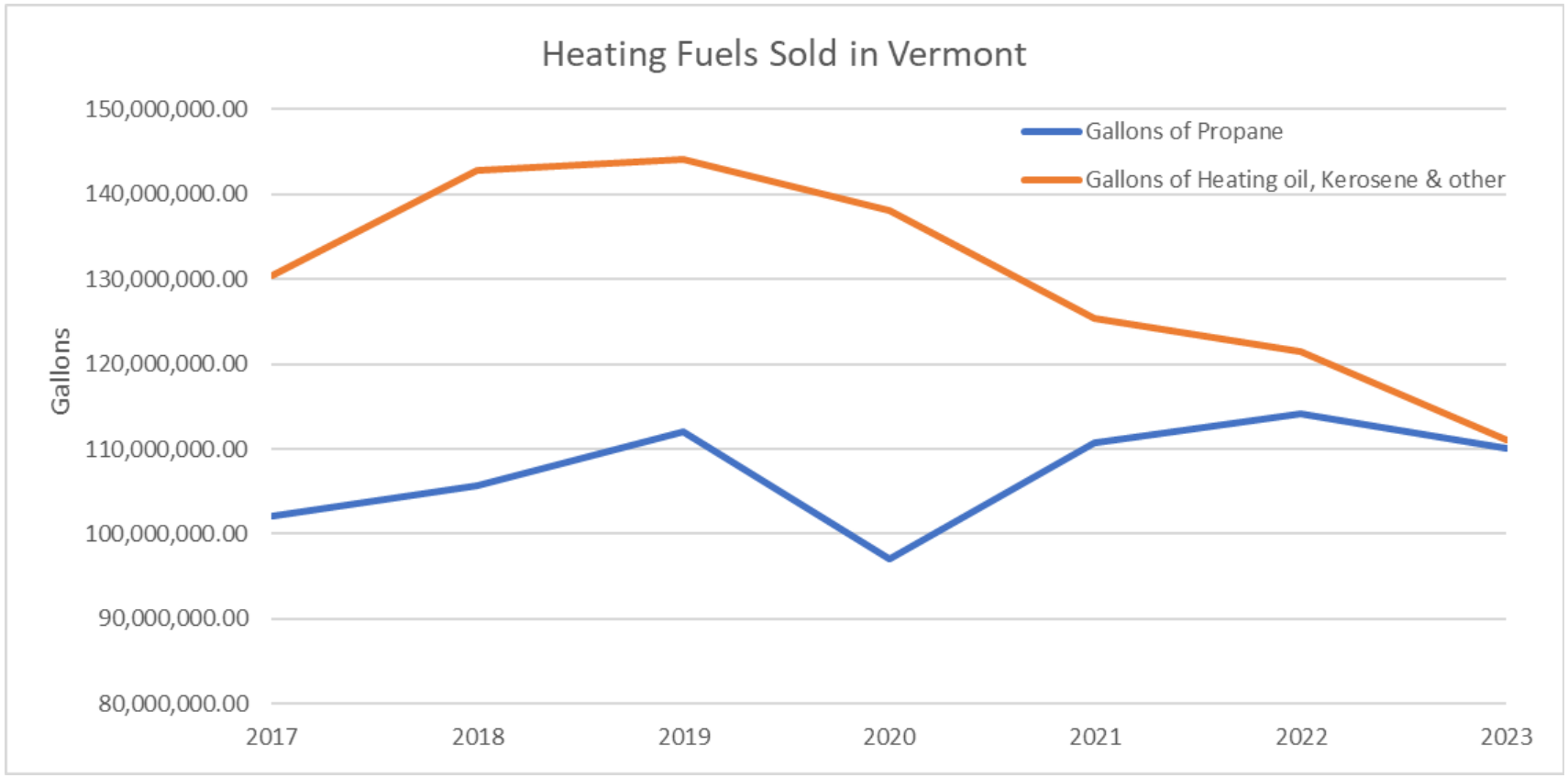
Total Delivered Fossil Heating Fuels Sold in Vermont



Sales of fossil heating fuels are down 13.7% from the 2019 high. This is likely a result of a decrease in heating degree days since 2019. The year 2023 was the warmest year ever recorded, and it was also the warmest 10-year period on record.

Source: Vermont State Tax Department

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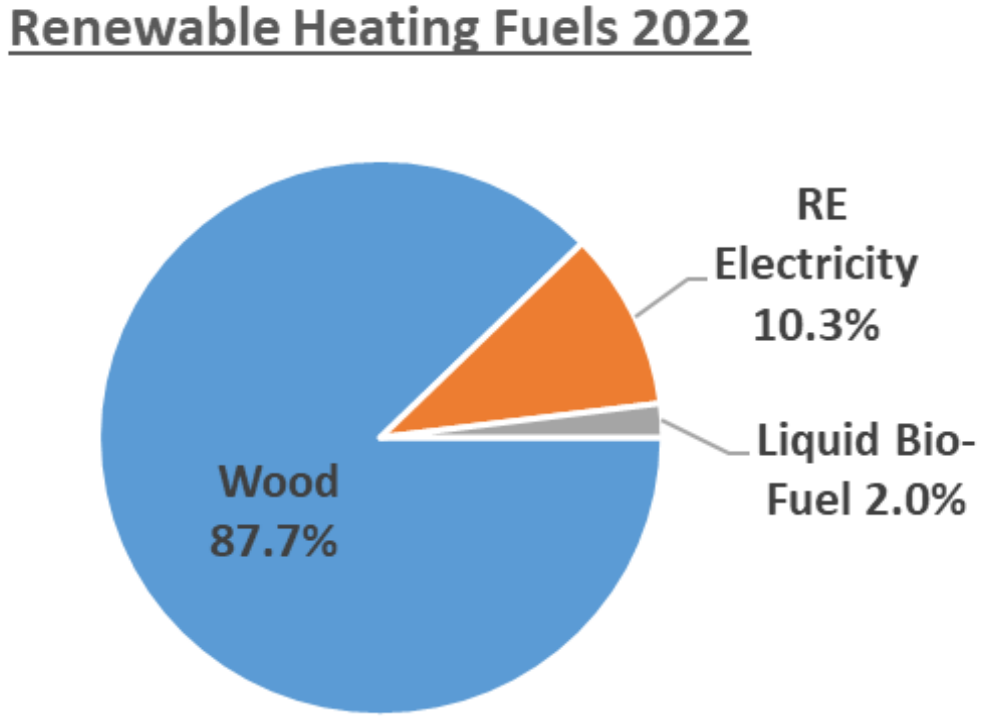
Vermont 2022 Thermal Energy Supply - Renewable

Of the twenty-nine percent of total heating fuel usage in Vermont that is renewable, the vast majority of that is wood fuel of various types (cord wood, wood chips, and wood pellets). As electricity use for heating increases with more efficient cold-climate heat pumps being installed and the amount of electricity generated from renewable sources grows the PSD expects the percentage from renewable electricity to increase.EIA data was not available for 2023 and thus 2022 data is used.



Source: 2022 EIA State Energy Data System (SEDS) and PSD data

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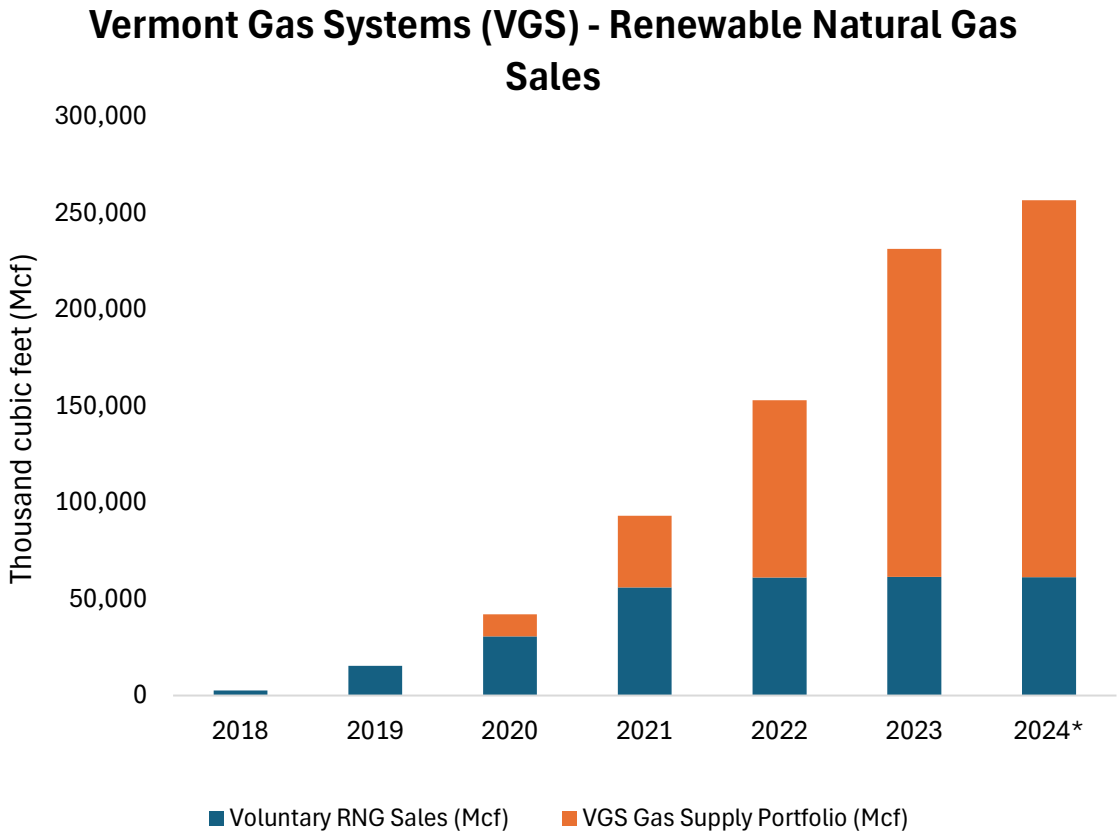
Vermont Gas Alternative Supplies

Vermont Gas Systems (VGS) continues to invest in alternative supplies such as renewable natural gas (RNG) and pilots for emerging technologies such as green hydrogen. These resources have varying emissions intensities based on the method of production and use-case. VGS has seen increasing sales under their voluntary RNG tariff since it's inception in 2018. Under their current Alternative Regulation Plan – VGS may also invest in alternative supplies up to 6% of total gas sales passed through VGS' supply portfolio to all customers. These supplies must be cost-effective relative to the societal cost of carbon established by the VT Climate Council, and with due regard to the overall rate impact on VGS customers.



(*) 2024 projected

See: Docket 22-5085-PET for VGS Alternative Regulation Plan
Docket 24A-2028 for 2024 Annual Gas Supply and RNG Report

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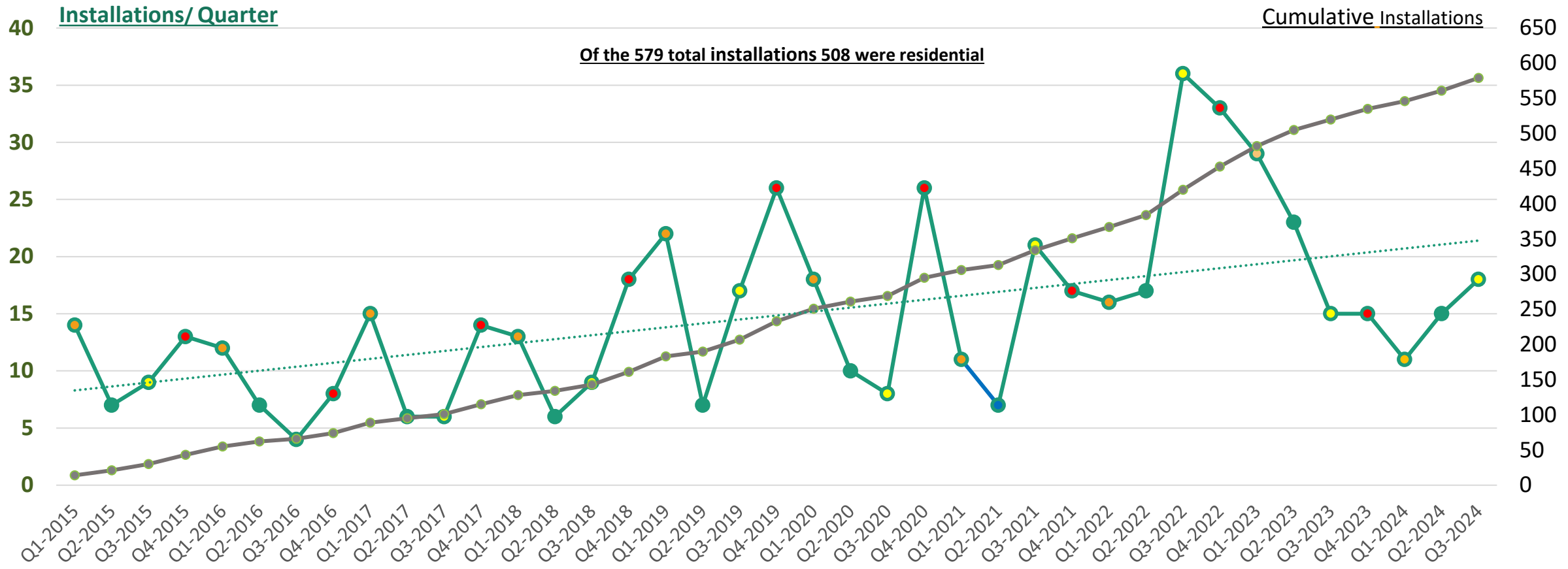
Number of Residential & Small Commercial Pellet Boiler Installations in Vermont



Pellet boiler/furnace installations hit a high in the summer of 2022 but declined for six quarters, with only the last two quarters seeing some increase. The high number in the second half of ’22 and first half of ’23 was driven by COVID recovery funds that increased incentives for low-income residential installations. In addition, a federally funded incentive to change-out old coal systems helped boost projects in ’22 and ’23. The penetration of pellet stoves appears to be directly related to the public incentives available.

Source: Public Service Department, 2024

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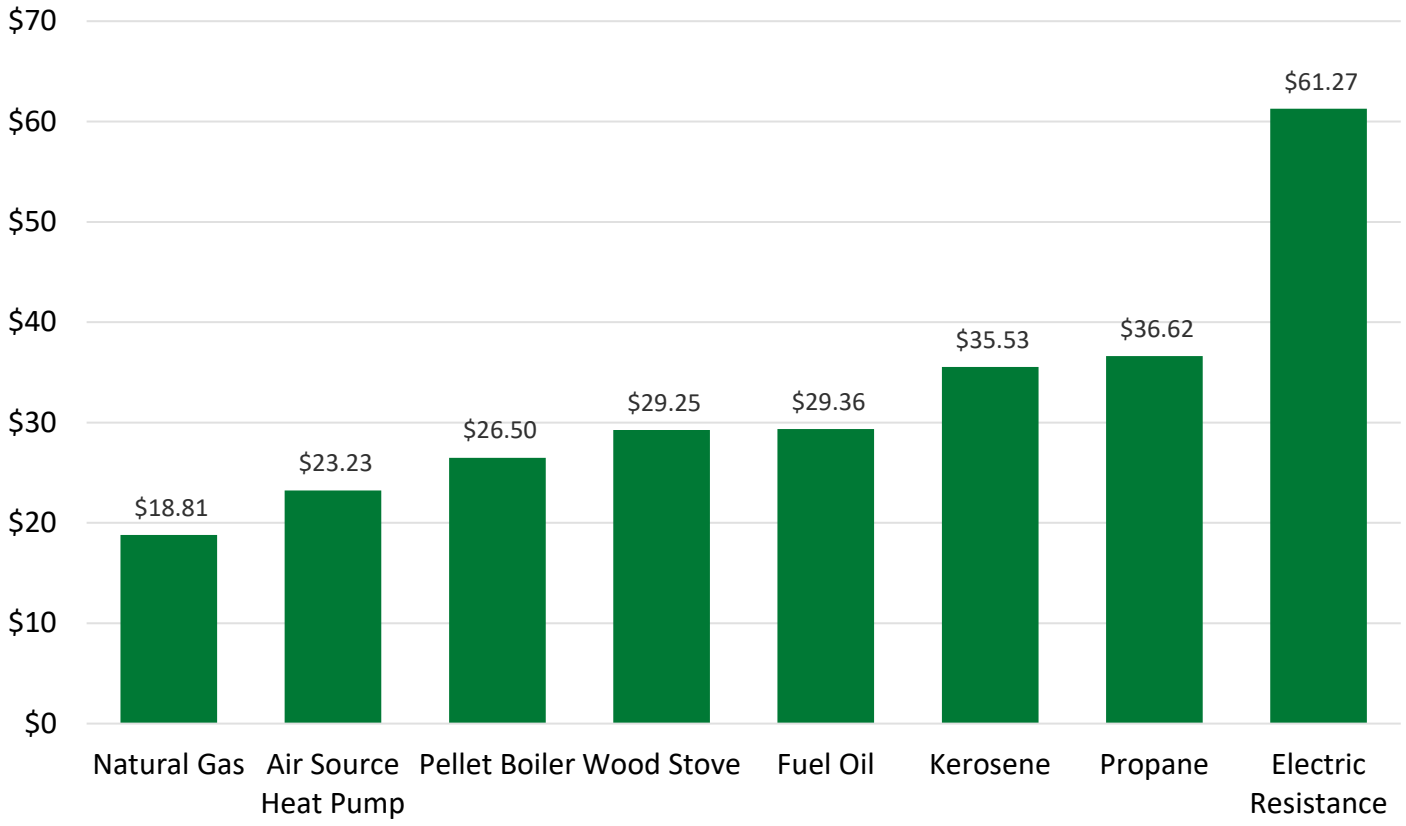
4. Thermal

d. Thermal Fuel Prices

Residential Effective Cost per MMBTU of Fuel in VT



Delivered fuel prices generally fell or remained unchanged during 2024 relative the prior year. Natural gas has recently remained the cheapest option to meet thermal operational needs on a $/MMBTU basis.

Costs reflect retail prices between September and November 2024.

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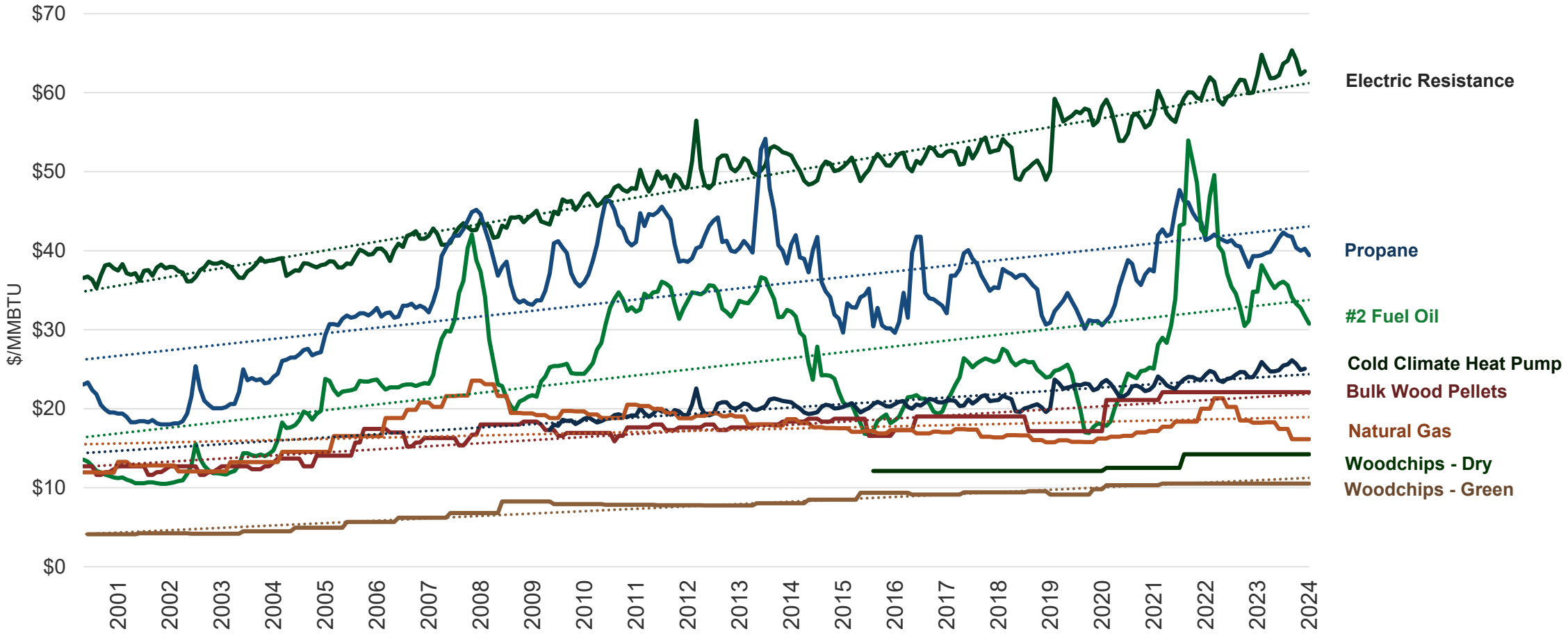
Vermont Heating Fuel Price Trends ($/MMBTU)



Fossil heating fuel prices are more volatile than electricity and wood fuels. Utility gas prices are regulated in Vermont helping to smooth out the gas commodity market price. The above graph shows prices from 2001 through 2024. Heating oil and propane prices haven fallen since 2022.

Source: Department of Public Service compilation with data contributions Energy Action Network.

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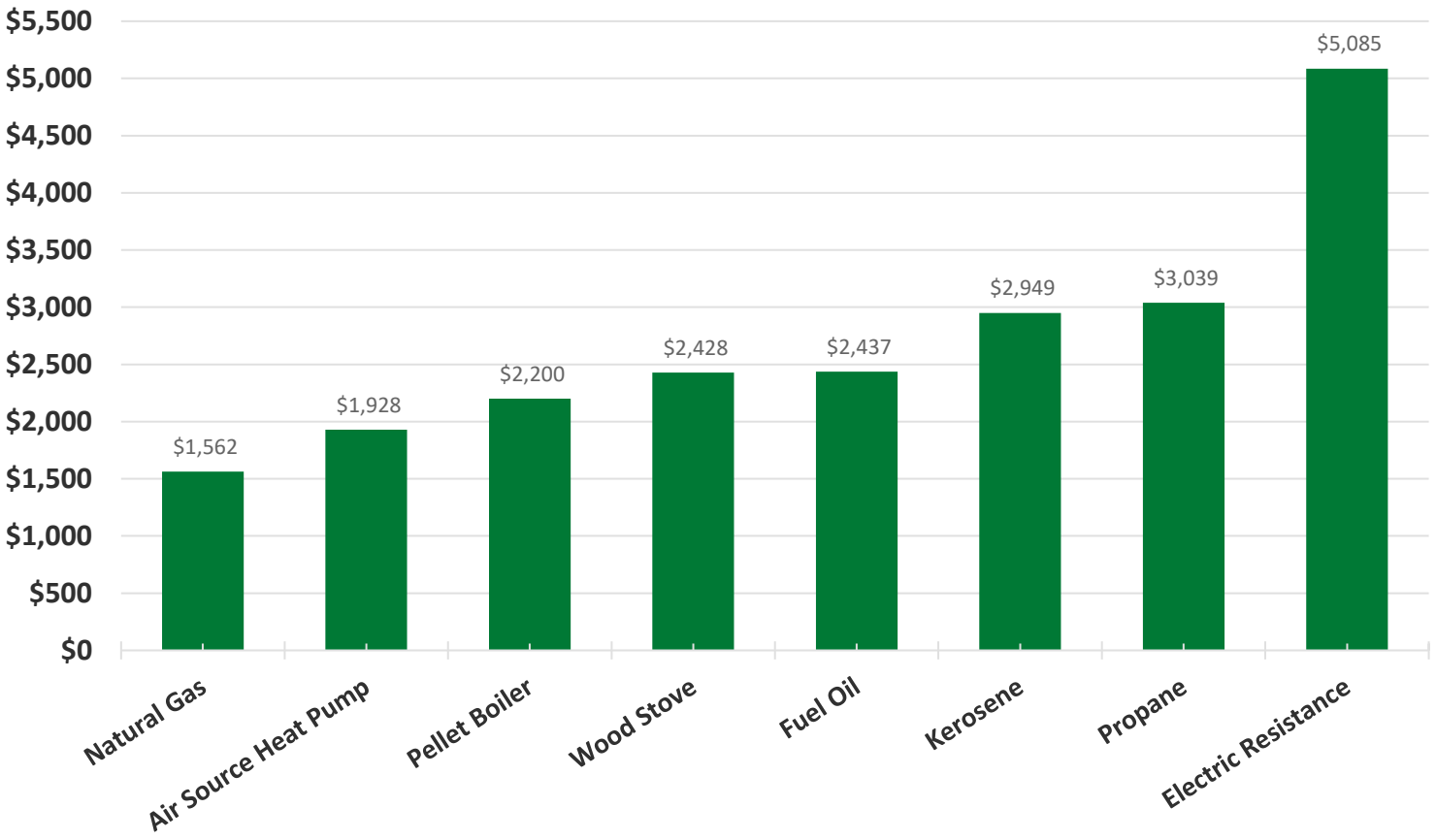
Annual Average Household Heating Costs



Costs reflect retail prices between September and November 2024.

There is a wide range of potential annual heating costs that an average Vermonter might pay if using a singular fuel to meet 100% of thermal demand (assumed to be 83 MMBTU/year).

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Appendices

a. Progress Toward 2022 Comprehensive Energy Plan Recommendations
b. State Agency Energy Plan Update

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