2024 Annual Energy Report Electric Sector & Electrification Summary

Abridged Report Presented to the Vermont Climate Council Cross-Sector Mitigation Committee

TJ Poor, Director of Regulated Utility Planning

January 18, 2024

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Historical ISO-NE and Vermont System Peak Demand

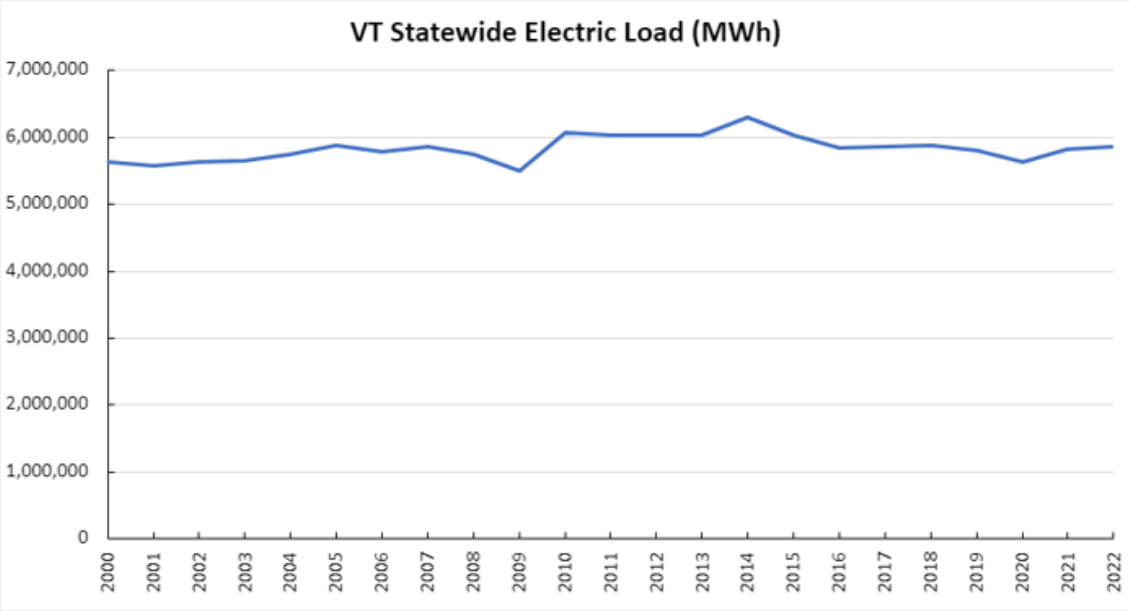
The regional grid continues to reach system-wide peaks during hotter summer weather. In the past decade, peaks have shifted later into the evening over time due to the penetration of behind-the-meter solar production which reduces metered demand the most during peak daylight hours (noon and the few hours around noon). Vermont, on the other hand, has reached its peak demand during colder winter months in 5 of the last 8 years. Most monthly peaks (not shown), which form the basis of regional transmission cost allocation, occur late in the evening near or after dark.

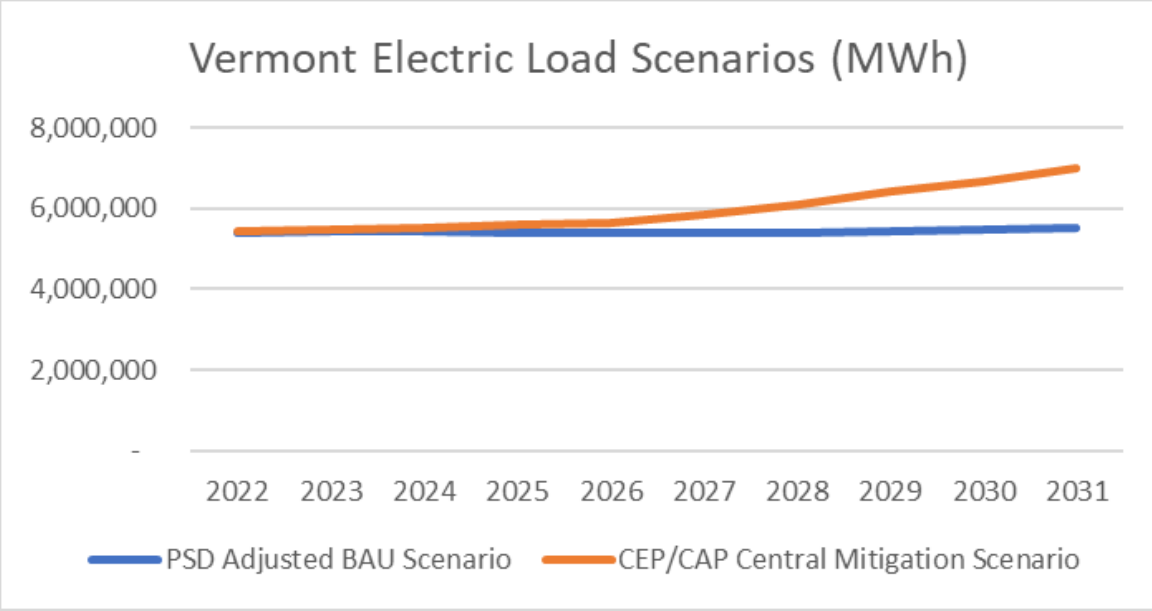
ISO New England System					Vermont		
Year	Peak Date	Hour Ending	System Peak Load (MW)	Vermont Coincident Peak (MW)	Peak Date	Hour Ending	System Peak Load (MW)
2016	8/12/2016	15:00	25,111	868	1/4/2016	18:00	931
2017	6/13/2017	17:00	23,508	849	12/29/2017	18:00	942
2018	8/29/2018	17:00	25,559	726	7/2/2018	20:00	935
2019	7/30/2019	18:00	23,929	837	1/21/2019	18:00	892
2020	7/27/2020	18:00	24,727	792	7/27/2020	20:00	890
2021	6/29/2021	16:00	25,280	825	8/26/2021	20:00	962
2022	8/4/2022	18:00	24,445	765	1/29/2022	19:00	904
*2023**	*9/7/23*	*18:00*	*23,614*	*735*	*2/3/2023*	*18:00*	*874*

**2023 data is preliminary*

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Historic and Projected Annual Demand

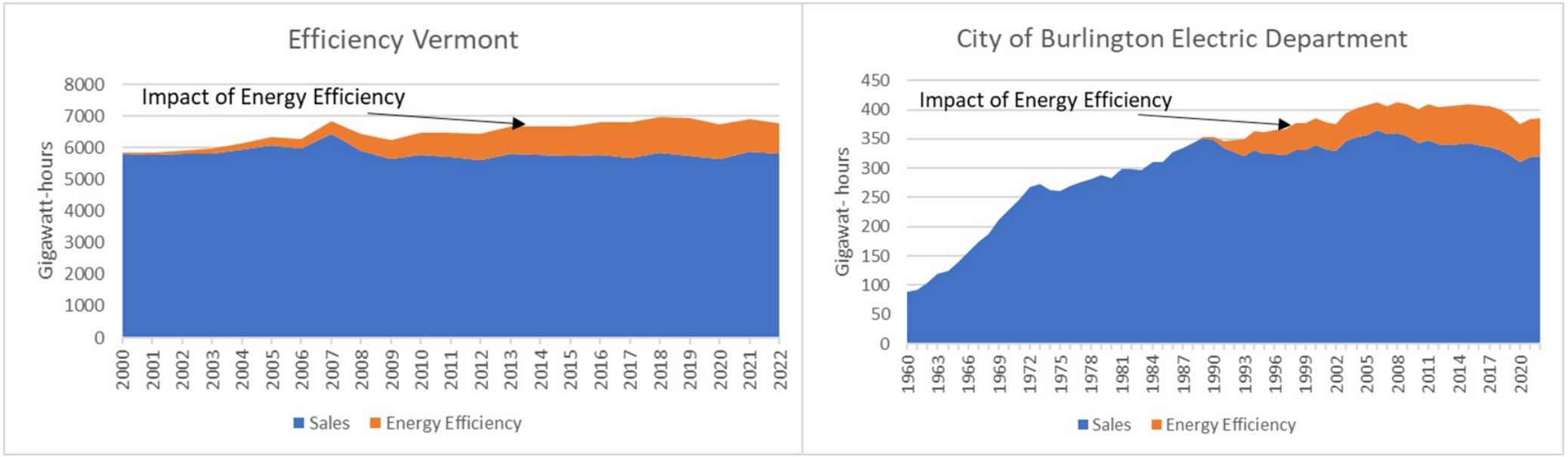




As shown in the first chart, Vermont Statewide electric load has rebounded since reductions seen from the pandemic. Overall demand has remained lower than that seen in the early 2010's, despite increases in the use of electricity for thermal and transportation uses (via heat pumps and electric vehicles, respectively). The chart on the right shows forecast annual demand scenarios developed for purposes of the Comprehensive Energy Plan and Climate Action Plan modeling, detailing a possible "Business-As-Usual" scenario and a "Mitigation" scenario assuming greenhouse gas reduction requirements are achieved.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Energy Efficiency Impacts

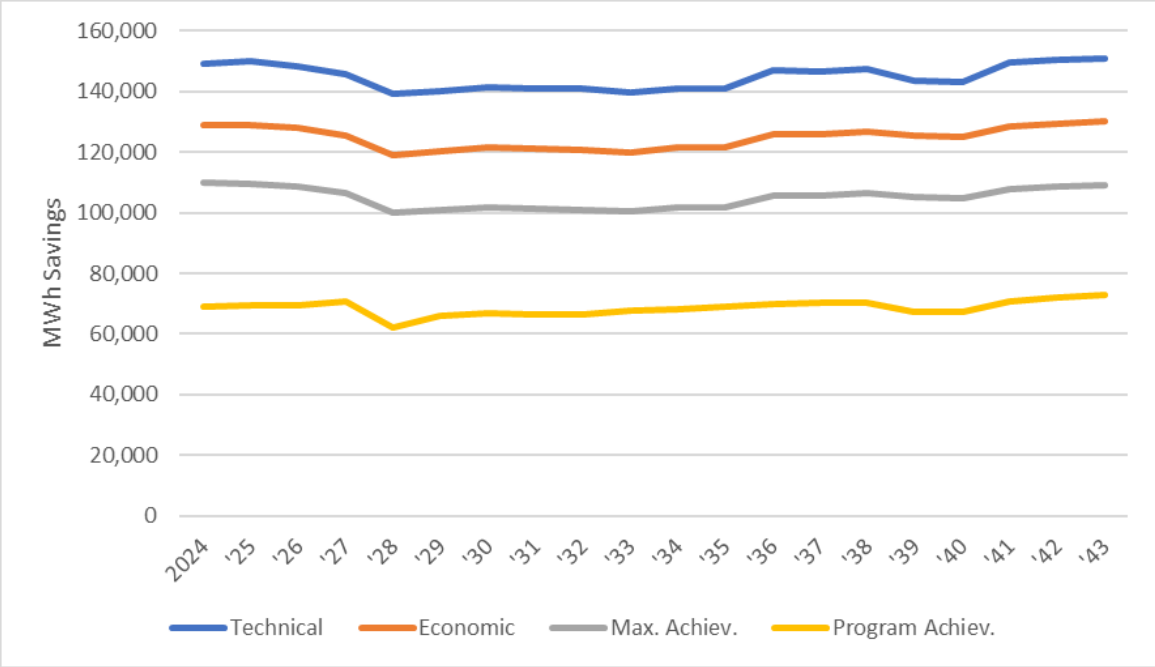


The Public Utility Commission sets EEU budgets to acquire “all reasonably available cost effective” electric efficiency, pursuant to 30 V.S.A. § 209(d) and least-cost planning principles of 30 V.S.A. § 218c. Since 2000, Vermont’s energy efficiency utilities (EEUs) have acquired electric efficiency resources 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.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Electric Energy Efficiency Budgets

	2024	2025	2026	Total
EVT Electric Efficiency	$46,462,409	$47,655,281	$48,411,102	$142,528,792
BED Electric Efficiency	$2,669,000	$2,712,700	$2,776,120	$8,157,820
Total	**$49,131,409**	**$50,367,981**	**$51,187,222**	**$150,686,612**



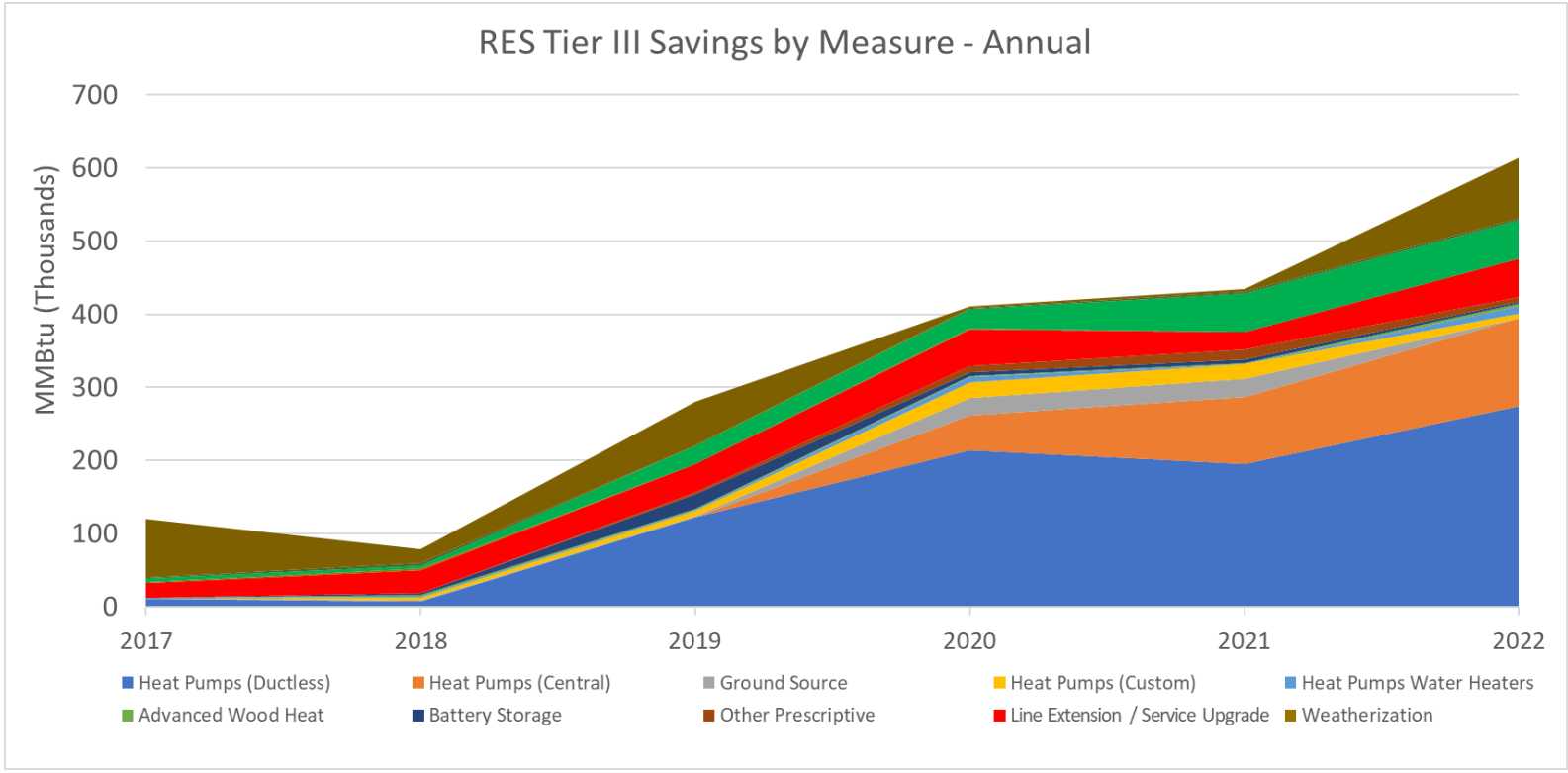
EVT Potential Incremental Annual MWh Savings

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 were approved for Efficiency Vermont and the City of Burlington Electric Department.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

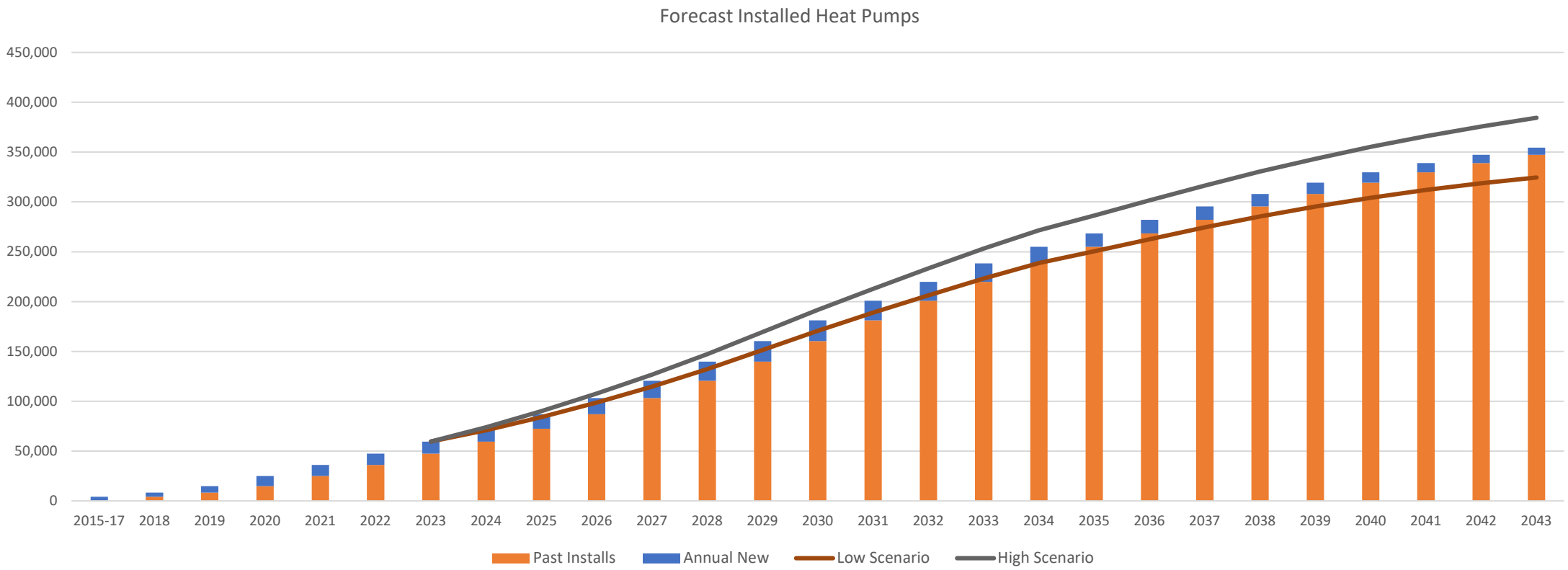
Renewable Energy Standard Tier III

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.



VERMONT
DEPARTMENT OF PUBLIC SERVICE

Electrification – Heat Pump Forecast



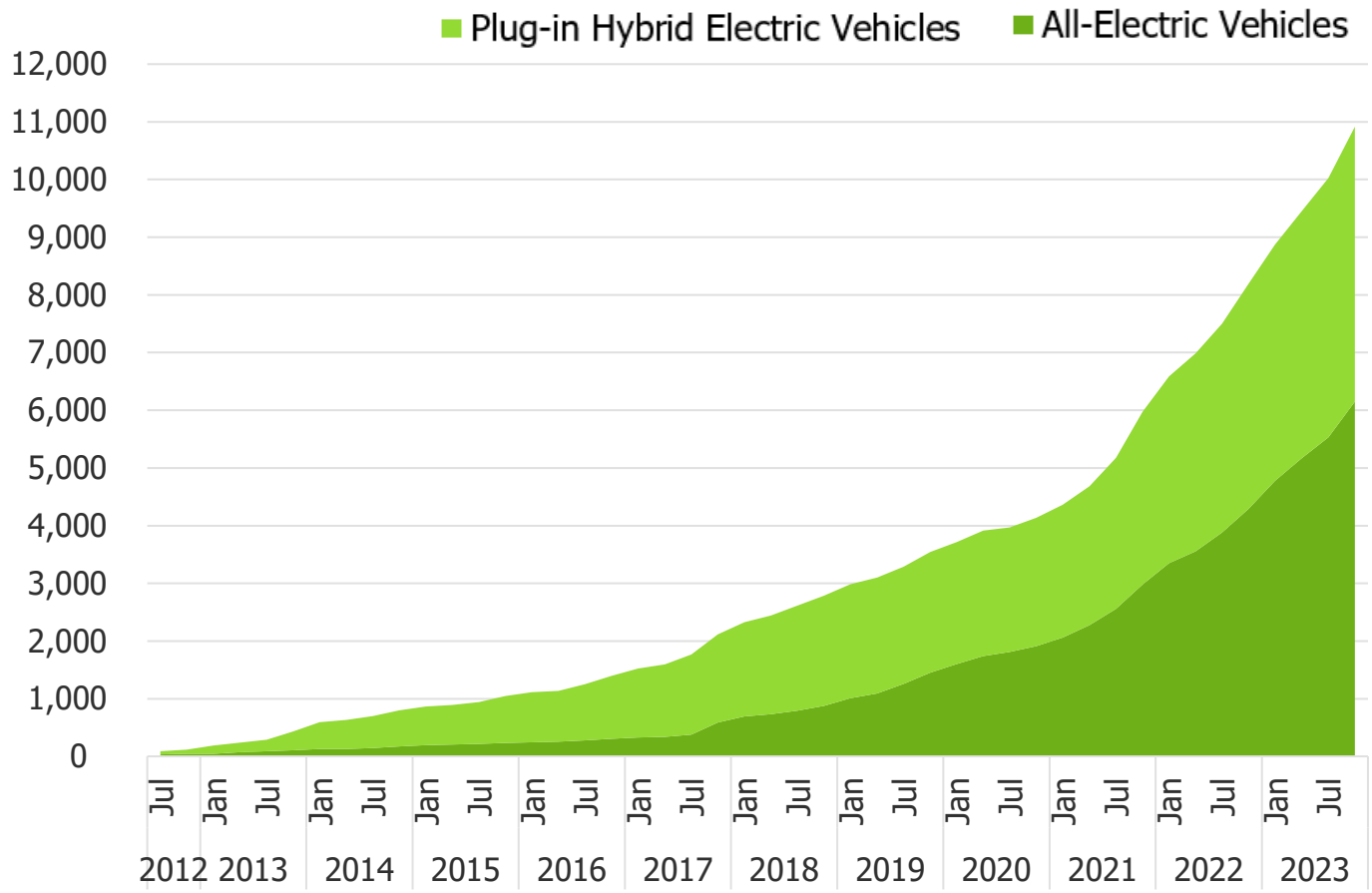
The above chart shows historical and forecasted cumulative and annual cold climate heat pump (CCHP) installations for the state. The forecast represents high efficiency CCHP units supported by EVT and BED efficiency programs (including units supported by DUs through Tier III programs). Starting in 2024, on an annual basis, the number of new CCHP installations reaches approximately 13,000, 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 170,000 CCHP to be installed by 2030.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Electric Vehicle Adoption and Availability

There were 10,916 registered electric vehicles in October 2023, an increase of 33% over the prior year (equal to 2,726 net added EVs).

56% of registered EVs were all-electric models and 44% were plug-in hybrids. Drive Electric Vermont reported 35 all-electric and 25 plug-in hybrid models available for sale, with 14 models priced at under $40,000 for a base trim level.

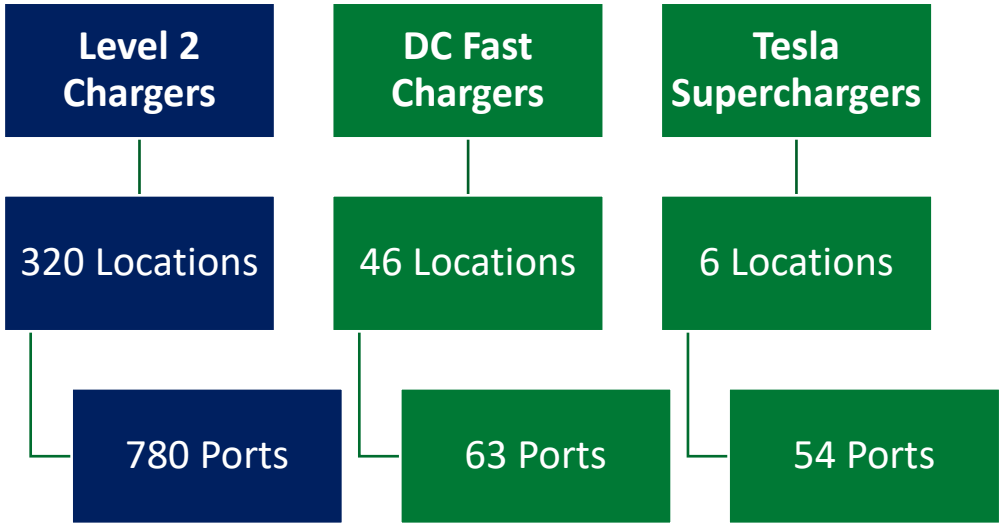


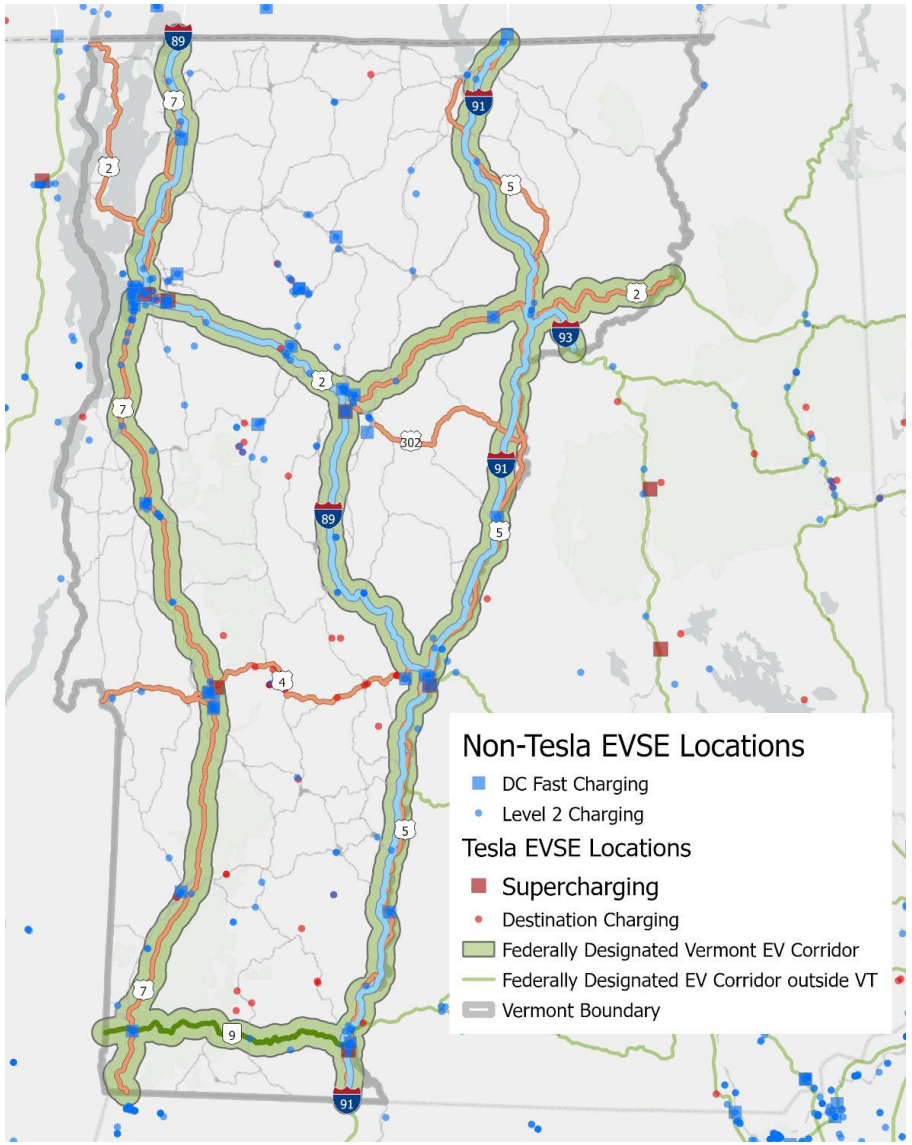
Source: October 2023 DMV data. Analysis by ANR. Chart prepared by Drive Electric Vermont.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Electric Vehicle Public Charging

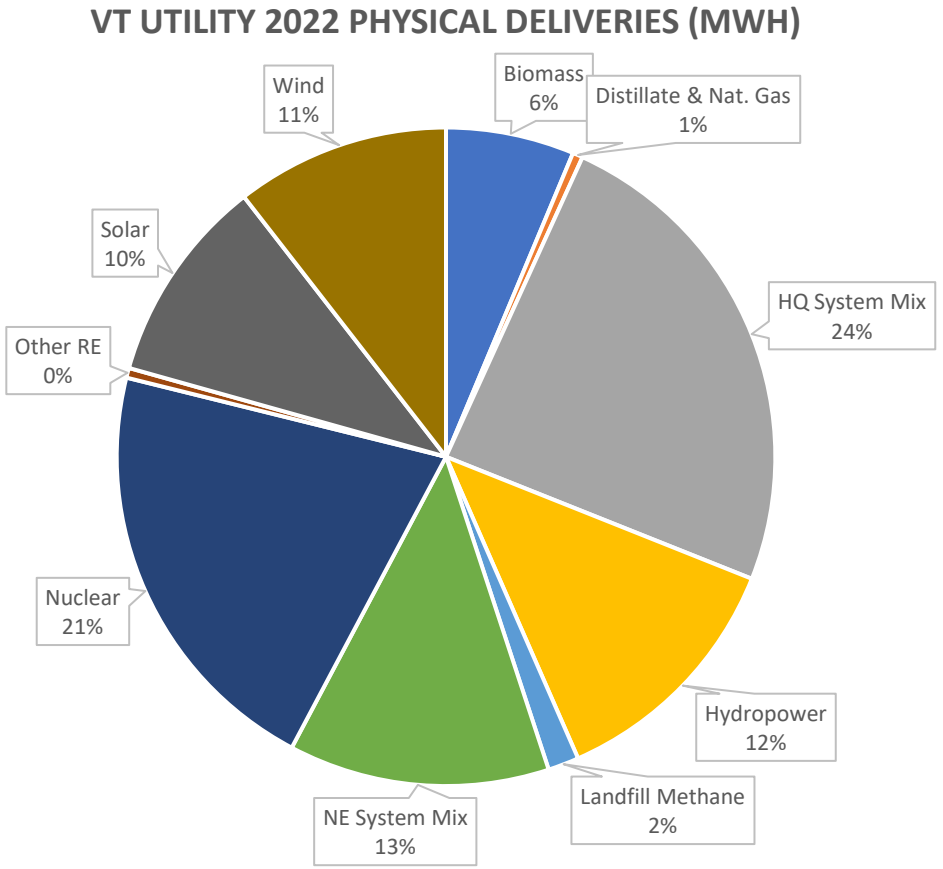
Vermont leads all other states in the count of public charging ports per capita. However, the need for additional chargers is growing as both residents and visitors make more journeys with electric vehicles. Fast chargers are operated by both private and utility actors. Publicly-funded fast chargers are being installed to improve access in vital travel corridors, including in the Northeast Kingdom.





Count: US Department of Energy Alternative Fuels Data Center, December 2023.
Map: Existing chargers, Agency of Transportation 2023 NEVI Plan.

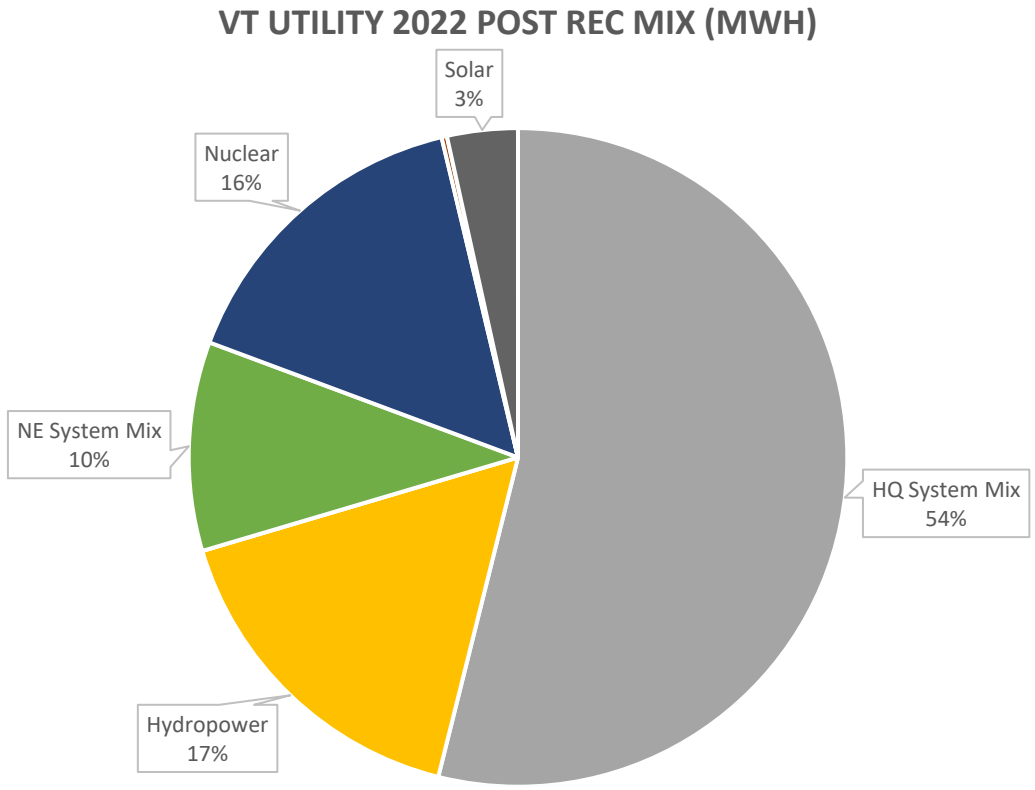
Vermont's 2022 Electric Power Mix Based on Physical Deliveries



In 2022, Vermont distribution utilities purchased 5.8 Million megawatt-hours of electricity to meet the demand of their customers. Of this: 65% came from renewable resources and an additional 21% came from carbon-free resources (nuclear)

VERMONT
DEPARTMENT OF PUBLIC SERVICE

Vermont's 2022 Electric Power Mix After Renewable Energy Credit Retirements



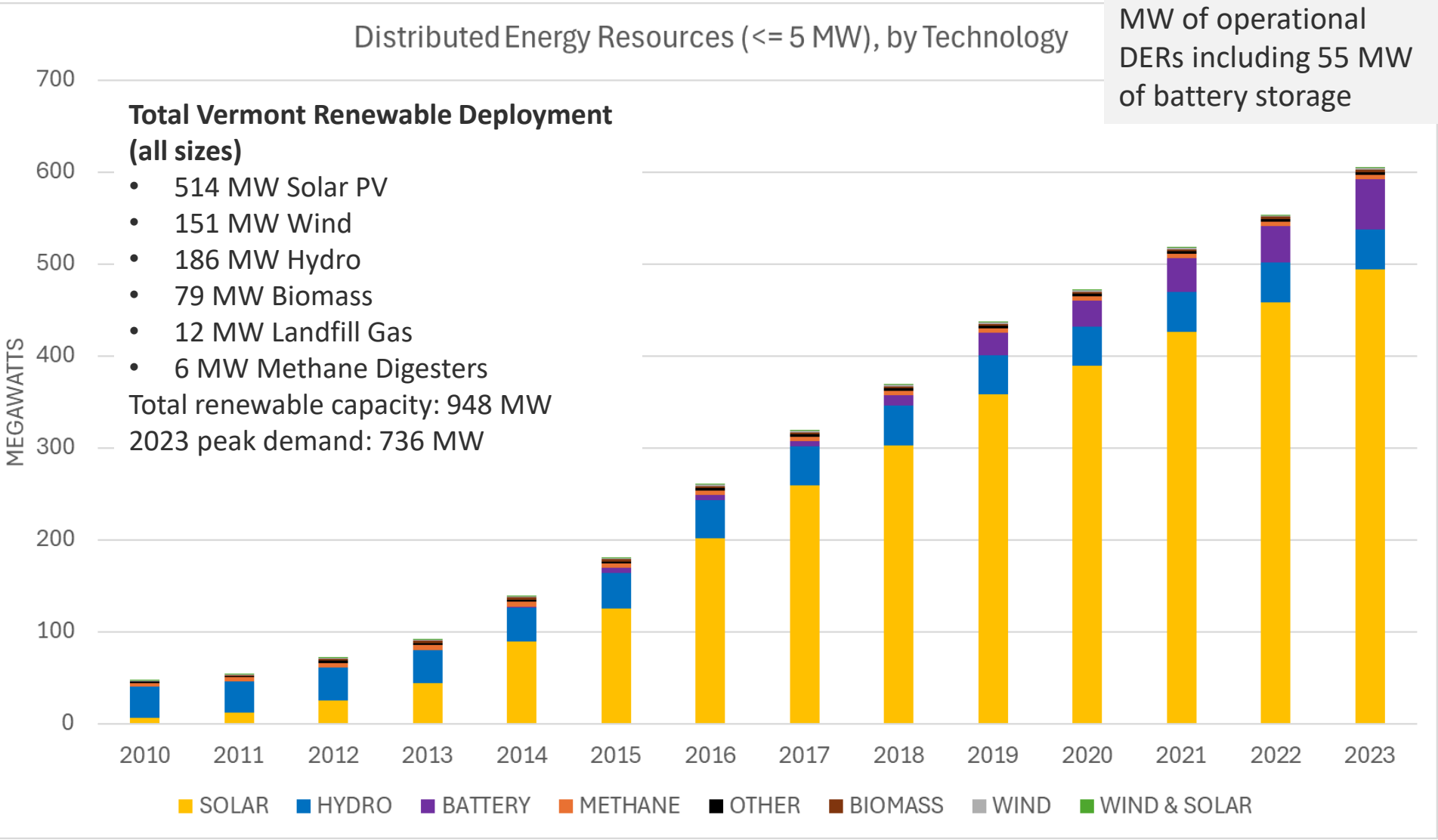
In 2022, Vermont distribution utilities retired 4.3 million renewable energy certificates (i.e. equivalent to 4.3 million megawatt-hours of electricity) to meet their obligations under Vermont's Renewable Energy Standard. These RECs accounted for 74% of Vermont's electricity in 2022.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

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

See Section 2.d for Storage Deployment and Drivers

VT now has over 604 MW of operational DERs including 55 MW of battery storage



VERMONT
DEPARTMENT OF PUBLIC SERVICE

Storage Deployment & Dockets:

54 MW of storage is operational, with another 20 under development in specific dockets (with additional residential storage added every month).

	MW	MWh*	Proceeding	Type
GMP Powerwall & BYOD pilots/tariffs	27	73	19-3167-TF, 19-3537-TF, 21-5254-TF, 22-0955-TF, 23-1355-TF	GMP tariffs approved June 2020; 3030 installations thru 12/31/23; various pilots ongoing
VEC BYOD pilot	0.45	1.201	VEC Tier III program offering	Installations in BYOD program thru 9/28
GMP Stafford Hill Solar + Storage, Rutland	2	3.4	Docket 8098	First utility storage project in VT (GMP, permitted 2014). Actually 4 MW but inverter-limited to 2 MW.
Panton Storage	1	4	Case No. 17-2813-PET	GMP battery co-located with solar; amended to enable islanding
Essex Solar + Storage	2.1	8	Case No. 18-2902-PET	GMP JV Solar + Storage
Milton Solar + Storage	2	8	Case No. 17-5003-PET	GMP JV Solar + Storage
Ferrisburgh Solar + Storage	2.1	8	Case No. 17-5236-PET	GMP JV Solar + Storage
Dynapower	1.5	6	N/A	Backup power only
E. Barre Co Barre	4.999	20	Case No. 18-1658-PET	ESA with GMP
Viridity Hinesburg	1.9	5.3	18-3088-PET	ESA with VEC
Georgia Storage	4.99	10	21-1042-PET	ESA with GMP
Springfield Storage	4.99	10	21-1254-PET	ESA with GMP
Operational	**55**	**157***		
Bristol Solar & Storage	*2.958*	*11.832*	21-0974/5-PET	Co-located (but not integrated) with 2.2 MW Standard Offer solar project
Pittsford Solar & Storage	*0.498*	*2*	21-0100-NMP	Net metered project with integrated storage behind the inverter
Royalton Storage	*4.9*	*19.6*	21-2114-PET	ESA with GMP
S. Hero Storage	*4.99*	*14.94*	21-5049-PET	ESA with VEC. On hold as of 9/28 due to increases in battery prices
E.R. South St. Storage	*2*	*8*	21-3022-PET	ESA with GMP
N. Troy Storage	*3*	*12*	22-4009-PET	GMP & VEC Joint owners. Under construction as of 9/28
Rochester Brandon Mountain Solar	*2*	*8*	23-1639-PET	3rd party project selected by GMP for "Rochester Resiliency Zone," paired with 1 MW solar; CPG issued 12/5/23
Operational + under development	***75***	***233***		*Assumes all systems are 4 hours

Vermont Storage Deployment in New England Context

State	Goal*	Milestone	2023 summer peak (MW)**	Goal as % of 2023 summer peak	2023 deployed storage (MW)	Current % of peak
CT	1000 MW x 2030	300 MW x 2024	5950	17	12	0.2
ME	400 MW x 2030	300 MW x 2025	1817	22	49	2.7
MA	1000 MW**h** x 2025	N/A	11178	2***	307	2.7
NH	N/A	N/A	2251			
RI	N/A	N/A	1688			
VT	N/A	N/A	736		55	7.5 (10.2 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.

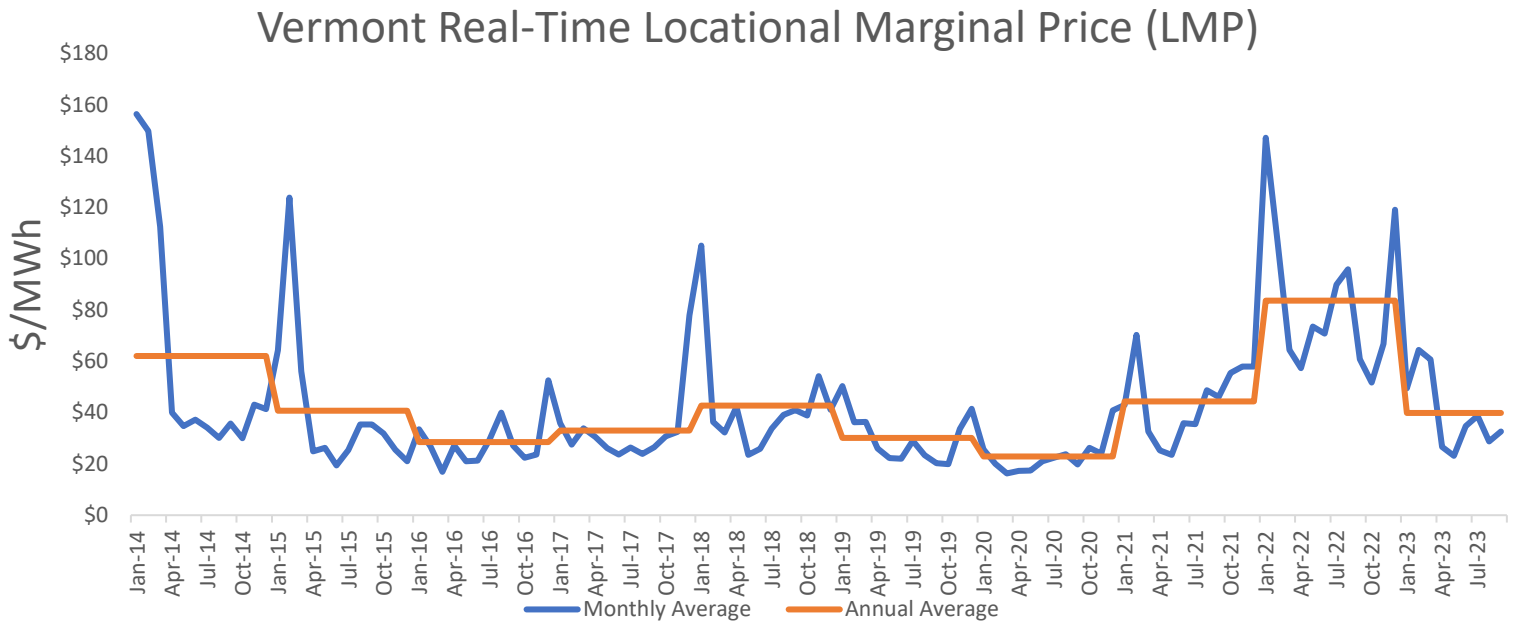
*MA and CT storage goals apply just to Investor-Owned Utilities ("IOUs"). ME's is unclear.

** Preliminary 2023 summer peak contribution values

***Assumes all batteries are 4 hours in duration

VERMONT
DEPARTMENT OF PUBLIC SERVICE

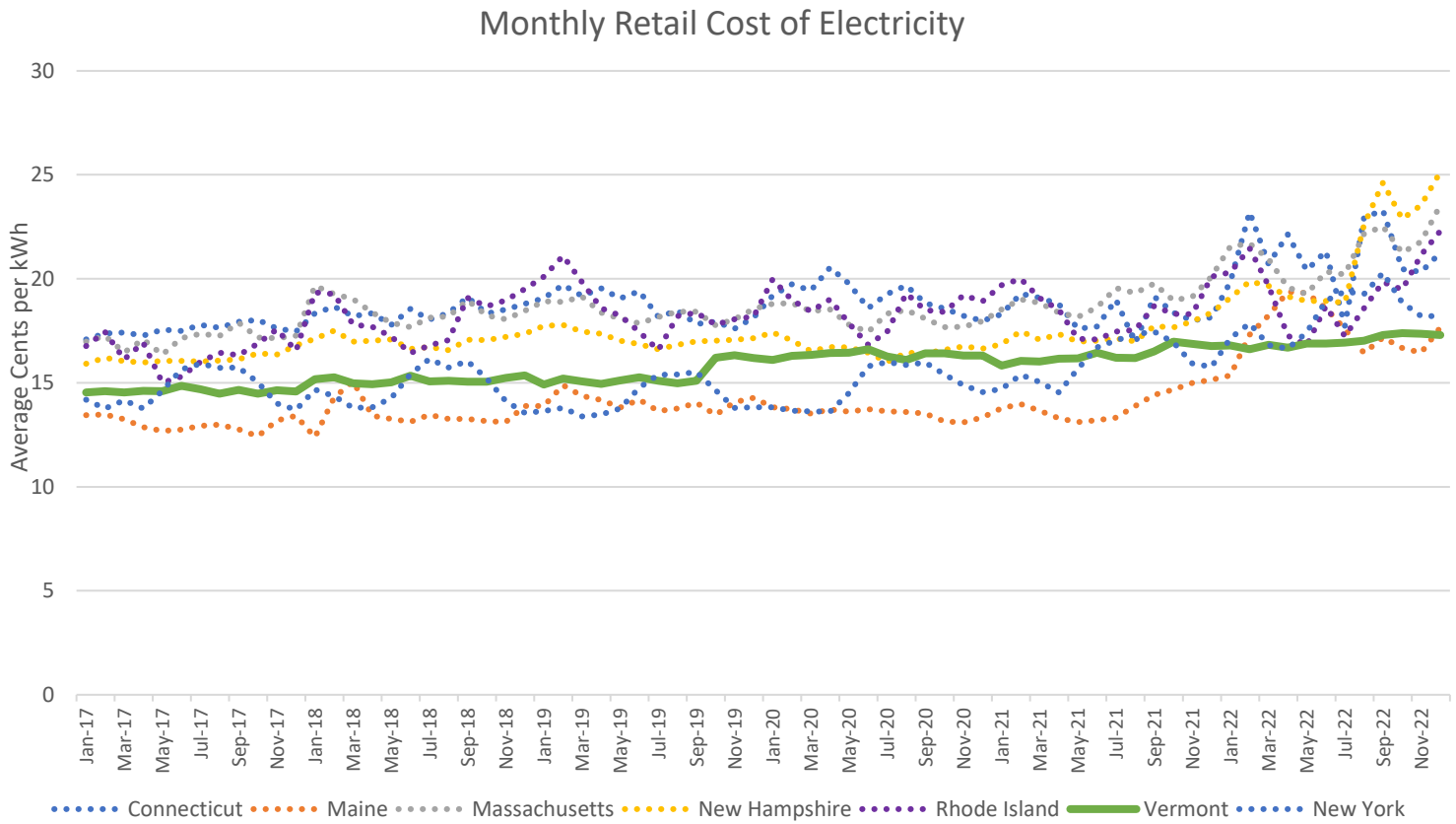
Electricity Prices



World events have caused significant spikes in the price of many fuels, including natural gas. 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, declining from 2022 highs but still higher than pre-pandemic prices.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

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.

VERMONT
DEPARTMENT OF PUBLIC SERVICE

2024 Annual Energy Report can be found at:

https://publicservice.vermont.gov/sites/dps/files/documents/2024%20AER%20FINAL.pdf

ALSO WITH APPENDICES!!

a. Progress Toward 2022 Comprehensive Energy Plan Recommendations
b. Report on Renewable Energy Programs
c. State Agency Energy Plan Update
d. Small Hydropower Assistance Program, Vermont Village Green Program, and Fuel Efficiency Fund Activity

VERMONT
DEPARTMENT OF PUBLIC SERVICE