

# Demand Flexibility

Vermont Public Utility Commission

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Joan White

Senior Analyst, Hearing Officer

[Joan.white@vermont.gov](mailto:Joan.white@vermont.gov)

# Topics

1. Diversity equity and inclusion gap
2. Energy efficiency programs
3. Renewable Energy Standard Tier III
4. Customer-sited storage tariffs
5. Electric vehicle loads
  - Enabling statutory/regulatory framework
  - Rate design
  - Accounting treatment
  - Technology options

# Diversity, Equity, and Inclusion

1. White people are 7 times more likely to benefit from clean energy programs than people of color.
2. Even with added incentives, low-income folks are MUCH less likely benefit from clean energy programs.
3. The clean energy revolution is leaving behind disadvantaged people and reinforcing historical patterns of wealth, power, and racial disparity.
4. The VT Legislature recently enacted an environmental justice law, [Act 154](#) of 2022, that requires state agencies to consider their programs in this light.
5. The VT Commission is undertaking a major DEI initiative to look at all our programs to improve equity.
6. We all have a LOT to do in this area.

# Energy Efficiency Programs

Vermont has stand alone energy efficiency utilities

Rate design: all costs are recouped through an energy efficiency charge on customer bills. The charge is volumetric and the same for all customers served by that efficiency utility. The charge resets annually.

Performance metrics that target peak shaving

- generally, the efficiency utilities use passive measures to meet these metrics.

- these metrics are tied to around  $\frac{1}{2}$  of total compensation.

# Energy Efficiency Programs

VT Legislature authorized spending for electrification (transportation and buildings) [Act 151 of 2020](#).

VT PUC implemented electrification and load-management in Case No. 19-3272-PET

- Planning for electrification was considered side-by-side with traditional passive efficiency in a 3-year plan.
- The plan included \$3.44 million over 3 years for flexible load management.
- Efficiency utilities are working closely with the DUs. Efficiency utility is the technical resource and provides incentives for specific measures. The DU is the entity that calls peaks and controls resources.

# Renewable Energy Standard

- Tier III requires utilities to implement “energy transformation” measures.
- Most of our utilities are engaged in beneficial electrification programs
  - e.g. EVs, cold-climate heat pumps, electrification of maple sugaring operations
- Utilities grant up-front incentives and rebates for customers
- Many utilities roll in active load management and time-of-use rates with their Tier III programs
- There are several low-income adders, but we don’t see much uptake among low-income folks.
- Authorized in [30 V.S.A. §8005\(a\)\(3\)](#). VT [Commission rule 4.400](#)

# Distribution Utility Programs

- Vermont's largest utility, Green Mountain Power, has a fleet of 60 MW of flexible loads consisting of water heaters, battery storage, and electric vehicles.
  - This fleet is supplemented by industrial and commercial time-of-use rates and active demand response programs.
  - New very small pilots in vehicle to grid, electric busses, and thermostats.
- Some coop and municipal utilities are also involved in innovative programs for active control of flexible loads. Most common for electric vehicle load shedding.
- We have not seen much activity from third-party aggregators, but we expect more as FERC 2222 rolls out. The regulatory and DU community is working through how to set the stage for third-party aggregation.
  - Interconnection rulemaking
  - Storage rulemaking
  - Net-metering rulemaking

For specific tariffs, see: <https://greenmountainpower.com/rates/>

Also [Green Mountain Power's Integrated Resource Plan](#)

# Customer-sited storage tariffs

System is available for back-up power to customer and for peak-shaving for utility  
Authorized by the Commission through a tariff proceeding that considered cost/benefit  
Rate design takes into account power supply benefit over time

## “Energy Storage System” Tariff

- Utility purchased residential and small commercial scale storage systems.
- Customer leases the system for around \$50/mo
- Assets are rate-based
- Assets are expected to pay themselves off through power-supply savings and lease payments after about 15 years
- See [Green Mountain Power ESS Tariff Rider sheets](#)
- Tesla batteries and management software platform



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## “Bring Your Own Device” Tariff

- Customer purchased residential and small commercial scale storage systems.
- Customer pays up front for the system and receives an up-front per kW incentive from the utility.
- Up-front incentives are expensed in the year they occur
- Customers who only charge from solar receive a reduced incentive because the systems are generally less available during peaking events. This implicates the ITC federal tax incentives.
- See [Green Mountain Power’s BYOD rider tariff sheets](#)
- A variety of manufacturers and one VPP management software platform

# Electric Vehicle Programs

Many utilities were already engaging in both time-of-use rates and active load-shedding for EVs, and now all utilities are required to offer EV rates.

Act 55 of 2021

Section 33, (a)-(b):

- (a) Encourage integration of plug-in electric vehicles (EVs) with the electrical system.
- (b) Electric utilities shall offer EV rates not later than June 30, 2024. Rates should encourage EVs to integrate with the electrical system and promote EV adoption.

Rate design here has varied. Some are “bottom-up” meaning that only marginal power supply costs are included. Others are “top-down” meaning that the direct power supply savings are subtracted from the retail rate.

Some are direct load control using chargepoint level II chargers, others are passive time-of-use rates.  
See:

[GMP “off-peak” EV rate \(direct load control\)](#)

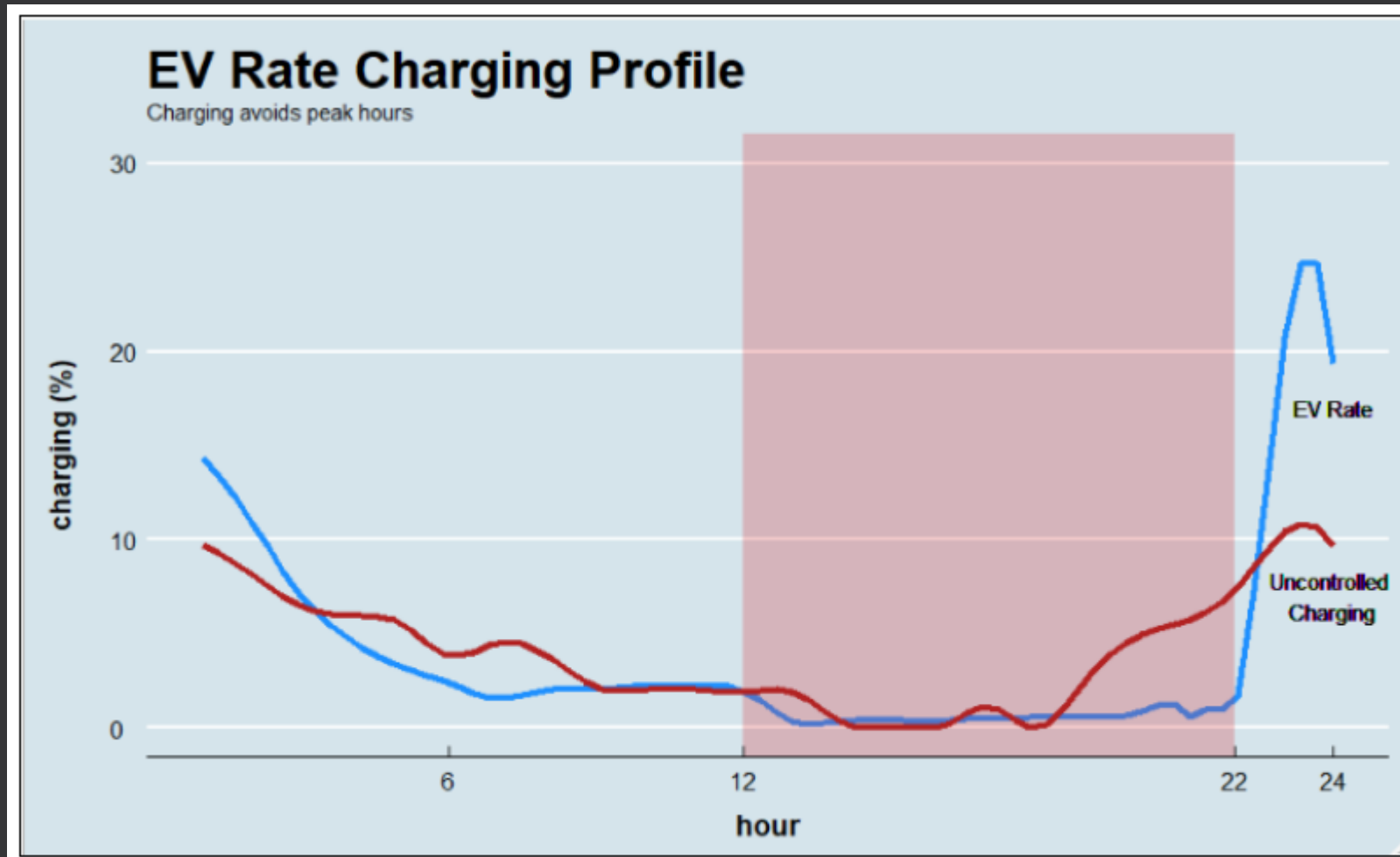
[GMP time-of-use EV rate \(passive\)](#)

[Burlington Electric EV rate](#)

[Commission report to the Legislature on EV rates](#)

# Effectiveness

When customers enroll, rates are **highly effective** at directing loads away from costly peak times.



## GMP:

In 2021, approximately 2% of Rate 72 customers opted out of managed charging during a Peak Event.

For customers using GMP's time-of-use Rate 74, 95% of EV charging has occurred during off-peak hours.

Burlington Electric charging profiles for enrolled and non-enrolled customers

# Enrollment

Of customers who received a purchase incentive for an EV, how many enroll in an EV rate or program?

Burlington Electric Department: 28%

Green Mountain Power: 36%

Vermont Electric Cooperative: 42%

# Barriers and Challenges to EV rates

## Metering

Customers need equipment to measure electricity used to charge their EV separately. For some, this is a barrier. Several utilities offer incentives.

## Changing Technology

As the field develops, there is rapid change in what technologies are available and affordable. Utilities are hesitant to invest in hardware and software that may soon be obsolete.

## Cost to the Utility

Implementing EV rates may cause costs to utilities. For example, costs to obtain data from chargers or other metering equipment, integrate that data with utility billing systems, and implement dynamic load control.

## Broadband Access

Most EV rates will require that data about vehicle charging be transmitted over the Internet. In areas with low connectivity, this is a barrier to customer adoption.

# What's new and next?

## Greater focus on vulnerable communities and BIPOC folks

VT PUC is assessing clean energy programs now. We aren't sure how to improve access.

## Coordinating renewable generation with flexible loads

Several pilots running using Packetized Energy Management devices and software for EV and water-heating loads. Entirely automated and requires no utility action.

## Resiliency and reliability for vulnerable communities

Target utility investment in storage and distribution grid infrastructure to specific vulnerable communities.

## Setting state-wide standards for communications protocols

Allowing DUs, aggregators, and customers to coordinate flexible loads, regional markets, distribution-level programs and incentives, and customer needs. ISO-NE may be helpful here.