

2019 Tier III Plan – Vermont Electric Cooperative November 1, 2018

The Energy Transformation (Tier III) provision of Act 56, passed by the Vermont Legislature in 2015, set targets for utility-led or utility-partnership projects that will reduce fossil fuel usage. The legislated target starts at 2 percent of sales (BTU equivalency) in 2017, rising by two-thirds of a percent each year until it reaches 12 percent in 2032.

A utility can satisfy this requirement through additional distributed renewable generation (Tier II), by implementing “energy transformation projects,” or by paying an Alternative Compliance Payment (ACP). In order to be eligible, an energy transformation project must have commenced on or after January 1, 2015, must provide delivery of energy goods or services other than electric generation, and must result in a net reduction in fossil fuel consumption by a utility’s customers.

The statute does not mandate any particular product or service and allows for flexibility in how each distribution utility will meet its targets. The statute includes the following project criteria, which will influence our implementation strategy. Projects must:

- Meet the lowest present value life cycle cost, including environmental and economic costs;
- Be evaluated against alternatives that do not increase electricity consumption;
- Cost less per megawatt-hour (MWh) than the ACP;
- Be implemented in a partnership with others unless exclusive delivery can be shown to be more cost-effective or because no others have the expertise;
- Ensure “an equitable opportunity to participate in, and benefit from, energy transformation projects regardless of rate class, income level, or provider service territory.”

Annual Planning and Evaluation

In 2016, the Public Utility Commission ruled that Tier III annual plans must include a description of the estimated Tier III compliance obligation for the following year and a description of the overall implementation strategy.

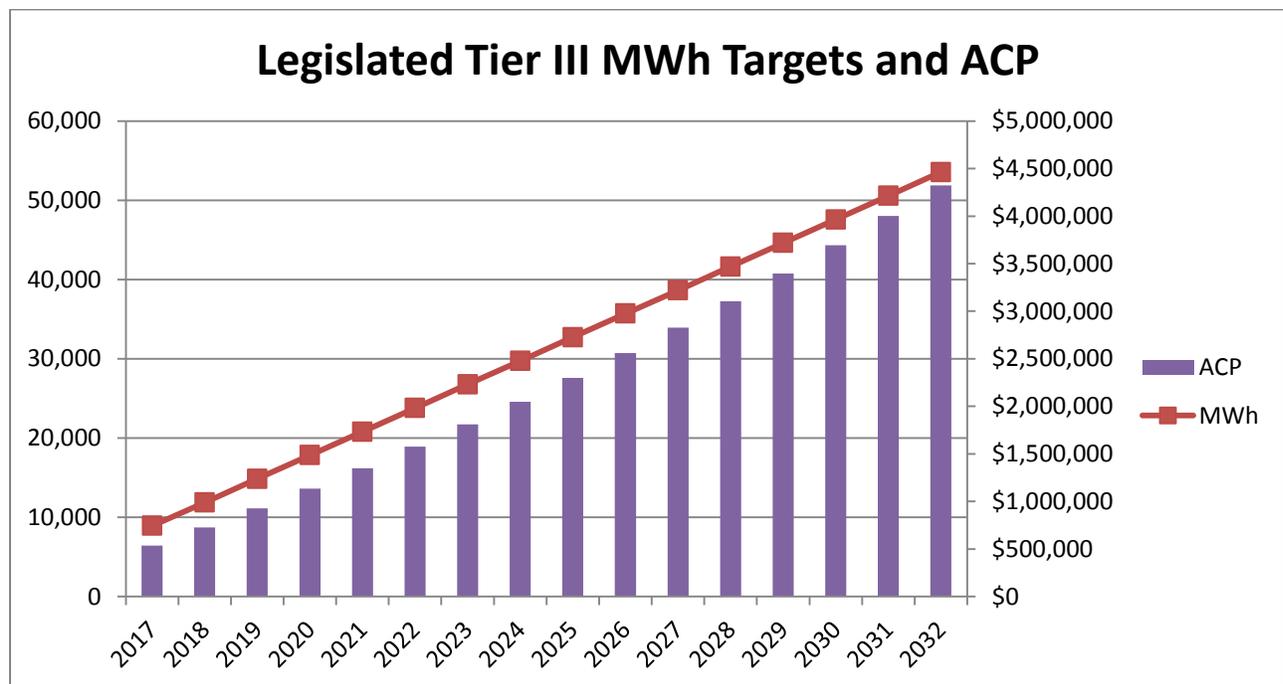
For energy transformation projects, the submitted plan must describe the project and include:

- Anticipated number of participants;
- Any collaborative efforts, or an explanation of why it is more cost-effective for the utility to work alone, or that there is no other entity with the capability to deliver the goods or services;
- Description of how all ratepayers will have an equitable opportunity to participate in and benefit from energy transformation projects regardless of rate class or income level;

- Description of the estimated electric impact of such measures and the demand management best practices that will be incorporated;
- How the technologies are appropriate for Vermont;
- How the installation of the technologies in buildings that meet minimum energy performance standards will be encouraged;
- Least-cost alternatives that do not increase electricity consumption that were analyzed;
- Methodology for allocating project costs and savings if services are shared between partners.

VEC’s Tier III Targets

In the first year of program implementation, VEC needed to demonstrate 8,883 MWh of savings for Tier III compliance. In 2018, the requirement is currently estimated to be 11,845 MWh. Our 2019 projection is 14,806 MWh. Over time this requirement will continue to increase. The targets set in statute are aggressive and could be difficult to meet with existing technologies and without imposing excessive costs on ratepayers.



Components of VEC's 2019 Tier III Program

VEC's 2019 Tier III plan is organized into three sections: the Clean Air Program, thermal, and transportation.

The Clean Air Program

VEC's Clean Air Program (CAP) offers customized opportunities to members with off-grid or underserved homes or businesses to replace fossil fuel usage with electricity. These opportunities may include service upgrades or line extensions, the costs of which are shared between the utility and the member through customized agreements. Each project is currently being treated as a custom measure with a special contract approved by the Commission.

VEC's service territory includes many maple syrup producers who collect and process their sap off-grid using diesel, oil, or propane generators. Until now, the cost of extending electric service to their seasonal sugaring operations has been prohibitive, and they have continued to run generators or are planning to add generators and burn thousands of gallons of fossil fuel each season. With these customized agreements, these businesses now have electric service, which saves them time and money and saves thousands of gallons of fossil fuel each year.

In VEC's rural service territory, we have found ample opportunity to replace existing fossil-fuel generators with new electric service or service upgrades. As members have become aware of the opportunity through outreach and word of mouth, we have also been able to prevent members from purchasing a generator in the first place and have worked with them on discounted line extensions as a cleaner alternative. While sugaring operations and off-grid homes have been the primary focus of CAP, VEC recently completed a project with a saw mill and is exploring a project with a gravel pit.

When screening CAP projects, VEC requires fuel receipts (in the case of an existing generator), estimates the additional electric load, and completes a cost estimate. In the case of a project that currently does not have a generator (eg a new sugarbush), we are estimating what the consumption would have been based on the projected power requirements of the operation.

The screening criteria include:

- Must provide Tier III credits
- Must pass the "but for" test (i.e. the project would not have been done but for VEC's contribution and outreach)
- No adverse impact to grid (i.e. will not add load in areas where the grid cannot handle it)
- Load profile – annual, monthly, and daily – and demand response potential
- Net present value (NPV) payback period of less than 7 years
- No adverse effect on the current year capital budget or future operations and maintenance budgets

For every CAP project that comes to fruition, VEC’s team evaluates several potential projects that do not move forward. In some cases, the project doesn’t meet VEC’s criteria; in other cases, the member decides not to pursue the project. CAP projects take time and effort to develop. However, when both VEC and the member determine that the project is worth pursuing, the benefits are immense.

CAP project MWh saving assumptions are based on a 30-year project life because these projects provide permanent infrastructure to serve an existing home or business. The project participants are generally paying about 75 percent of the total project cost, a significant investment that demonstrates a commitment to continued use of the electric service. We will continue to evaluate each CAP proposal to determine an incentive level that provides positive rate impacts for the overall VEC membership.

For each CAP project, VEC is working with Efficiency Vermont to identify efficiency opportunities. When Efficiency Vermont and VEC incentives have the potential to overlap, VEC will work with Efficiency Vermont to negotiate savings claims to avoid double-counting.

VEC continues to be excited about the CAP opportunities that Tier III has enabled. These projects provide meaningful fossil fuel reductions, offer service to members that had previously found the investment cost-prohibitive, and increase electric sales so that the benefit accrues to all members. Current CAP projects offer a payback of less than seven years, while the benefits last for the lifetime of the infrastructure.

All of the projects that the Commission has approved for special contracts have either been built and will be included in VEC’s 2017 or 2018 Tier III compliance reports or have been put on hold by the member. VEC expects to complete additional projects in 2019 but does not have estimates for the MWh claims since each project is customized.

Program	Clean Air Program
Objective	Discounted line extensions and service upgrades that offset use of fossil fuels
Number of participants	Unknown; we evaluate these projects on an ongoing basis
Lifetime MWh credit	Varies
Partners	Efficiency Vermont
Additional kWh	Varies
Incentive	Varies, historically about 23% of the total cost
Total budget	\$150,000
Best practices	Evaluate projects for DR potential, impact on the grid, potential for increased sales, and Tier III savings. Efficiency Vermont will perform an energy audit at the location.
Appropriate for VT	Yes
Min Building Standards	N/A
Equitable opportunity - customer class	Yes
Equitable opportunity - low-income	Yes

Thermal Measures

As identified in Vermont’s 2016 Comprehensive Energy Plan (CEP), 30 percent of Vermont’s total energy consumption is a result of heating. In order to tackle Vermont’s ambitious energy goals, we must transform the way we heat. The CEP states that 20 percent of heating in Vermont is currently from renewable sources and sets a goal of increasing that share to 30 percent by 2025.

Since 2017, we have offered a cold climate heat pump bill credit in conjunction with Efficiency Vermont’s upstream incentive. In 2018, we added an incentive for installation of new pellet stoves and heat pump water heaters. We plan to continue all three of these incentives in 2019 and are adding an incentive for Zero-Energy Modular (ZEM) homes. VEC is also considering opportunities to support lower-income weatherization services in ways that would be advantageous to our ratepayers. We plan on exploring opportunities for collaboration with low income weatherization service providers.

Cold Climate Heat Pumps

# of units	Per unit MWh Savings	Total MWh savings	% of 2019 goal
200	25*	5,000*	34%

** Efficiency Vermont has discontinued the thermal portion of their CCHP incentive; therefore, this figure represents the full CCHP Tier III credit. It is an average of the credit for CCHPs of different sizes.*

The CEP set an ambitious goal of installing 35,000 cold-climate heat pumps (CCHPs) statewide by 2025. Because VEC’s current electric portfolio is about 75 percent carbon-free (renewable resources under Tier I plus nuclear), CCHPs offer an attractive solution from a carbon emissions perspective. However, VEC is aware that the economics and efficacy of CCHPs are highly sensitive to fuel prices, appropriate sizing and placement, and user behavior. VEC promotes messaging from Efficiency Vermont to help members understand the factors they should consider when deciding whether a heat pump is right for their property and needs.

Until 7/1/18, VEC and Efficiency Vermont had been sharing Tier III savings for CCHPs that received both an Efficiency Vermont and a VEC incentive. However, as of 7/1/18 Efficiency Vermont stopped using thermal money in its CCHP incentive, and VEC began claiming 100 percent of the available Tier III credit.

Because Efficiency Vermont’s upstream incentive has decreased, VEC will increase its incentive from \$150 to \$300 per outdoor unit. To receive the VEC bill credit, members fill out a short form that identifies information required for Tier III compliance. VEC’s annual heat pump goal is 200 units installed.

Program	Cold Climate Heat Pumps
Objective	Incentivize 200 CCHPs to displace fossil fuel heating.
Number of participants	200
Lifetime MWh credit	25 expected on average
Partners	Efficiency Vermont, Energy Co-op of VT
Additional kWh	1,000 – 5,800
Incentive	\$300 bill credit
Total budget	\$60,000
Best practices	Participants will be informed about VEC's optional TOU rate and the benefits of weatherization.
Appropriate for VT	Yes
Min Building Standards	Participants will be given information about the benefits of weatherization.
Equitable opportunity - customer class	Yes
Equitable opportunity - low-income	Yes

Pellet Stoves

# of units	Per unit MWh Savings	Total MWh savings	% of 2019 goal
30	60	1,800	12%

Like cold climate heat pumps, pellet stoves are an important supplemental heating option for homes that would like to reduce the amount of fuel oil or propane they use. To offer another option to members interested in transitioning their heating away from fossil fuels, VEC will continue offering a pellet stove bill credit in 2019.

Modern wood heating is a growing market in Vermont and can play a key role in helping Vermont achieve its carbon reduction goals. Efficiency Vermont and the Clean Energy Development Fund already offer sizable incentives for pellet boilers and furnaces. Efficiency Vermont is also developing a pellet stove program, and VEC anticipates sharing Tier III savings once that program is in place.

VEC will continue to offer a \$150 pellet stove bill credit for members currently heating with oil or propane. To qualify, models must meet the emissions standards set forth by the Technical Advisory Group (< 2 g/hr of PM²) and directly offset a fossil-fuel heating system.

Program	Pellet stoves
Objective	Provide an incentive for 25 pellet stoves installed in VEC homes and businesses to displace fossil fuel heating.
Number of participants	30
Lifetime MWh credit	60 expected on average
Partners	Pellet stove distributors, Efficiency Vermont
Additional kWh	+/- 1,000
Incentive	\$150 bill credit
Total budget	\$4,500
Best practices	Participants will be informed about VEC's optional TOU rate, weatherization programs, and best practices for choosing which pellets to use.
Appropriate for VT	Yes
Min Building Standards	Participants will be given information about the benefits of weatherization.
Equitable opportunity - customer class	Yes
Equitable opportunity - low-income	Yes

Heat Pump Water Heaters

# of units	Per unit MWh Savings	Total MWh savings	% of 2019 goal
30	3*	90	1%

*VEC's anticipated share of the Tier III credit after MOU with Efficiency Vermont.

To provide an option to members interested in transitioning their water heating away from fossil fuels, VEC plans to continue offering a \$150 bill credit for heat pump water heaters in 2019. The credit will be available for Energy Star-rated models that replace fossil fuel water heaters as well as for new applications.

Program	Heat Pump Water Heaters
Objective	Provide an incentive for 30 HPWHs in VEC homes and businesses to displace fossil-fuel water heating
Number of participants	30
Lifetime MWh credit	3 after credit-sharing
Partners	Efficiency Vermont
Additional kWh	Approximately 1,300
Incentive	\$150 bill credit
Total budget	\$4,500
Best practices	Participants will be informed about VEC's TOU rate
Appropriate for VT	Yes
Min Building Standards	N/A
Equitable opportunity - customer class	Yes
Equitable opportunity - low-income	Yes

Zero Energy Modular (ZEM) Homes

ZEM homes are a high-quality alternative to traditional manufactured housing. They are more expensive to purchase, but the operating costs are extremely low by comparison. The quality of the building materials and design facilitates a much healthier and more comfortable experience than that of traditional manufactured housing. Unlike most manufactured housing, ZEM homes are designed specifically for colder climates. Currently, the company manufacturing them is Vermod in Wilder, Vermont.

ZEM homes are entirely electric. The tight building envelope allows them to heat with CCHPs, and they come with a HPWH. Despite their reliance on electricity for thermal load, solar panels on the roof ensure that the electric costs are minimal.

VEC plans to offer a \$500 credit per home to support the ZEM program. The Tier III credit methodology still needs to be determined. However, VEC supports this program because it offers a high-quality, affordable housing option in addition to significant fossil fuel savings.

Transportation Measures

According to the CEP, nearly half of Vermont's greenhouse gas emissions are the result of transportation. Vermont cannot meet its greenhouse gas reduction goals without electrifying the transportation sector.

In Vermont, the appetite for electric vehicles continues to grow as the technology improves, costs come down, and infrastructure expands. In 2019, VEC will maintain the existing bill credits for fully electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs). VEC will also offer an incentive for electric forklifts and publicly accessible charging stations.

Electric and Plug-in Hybrid Electric Vehicles

Vehicle type	# of units	Per unit MWh Savings	Total MWh savings	% of 2019 goal
EV	30	32	960	6%
PHEV	30	24	720	5%

Since 2017, VEC has offered a bill credit for fully electric and plug-in hybrid electric vehicles, used or new, purchased or leased. To obtain the bill credit, members fill out a simple form and include proof of purchase or lease. To date, 80 VEC members have taken advantage of these incentives. The chart below shows the distribution among the incentive types.

		PHEV	EV
Purchased	Used	7	7
	New	28	25
Leased		6	7
Total		41	39

The current incentive for a fully electric vehicle is \$500 for a purchase and \$100/year for a lease. The current incentive for a plug-in hybrid is \$250 for a purchase and \$50/year for a lease. We will continue promoting the incentives directly to members, as well as through local car dealers, many of whom we have been provided with incentive forms.

Tier III savings claims will be made for the full lifetime of the measure on new, purchased vehicles. However, claims on used vehicles will be prorated based on the age of the car, and claims on leased vehicles will be for the length of the lease. Credits will be tracked based on the VIN to ensure that credits are not claimed more than once. However, if VEC claimed a partial credit on a leased vehicle, VEC would consider the additional years still available for incentives and Tier III credit.

Program	Electric Vehicles and Plug-in Hybrid Electric Vehicles
Objective	Promote EVs and PHEVs and encourage their deployment in VEC service's territory.
Number of participants	30 EVs, 30 PHEVs
Lifetime MWh credit	32 for EVs, 24 for PHEVs
Partners	Car dealerships, Drive Electric Vermont
Additional kWh	3,300 for EVs; 2,000 for PHEVs
Incentive	\$250 for PHEV purchase; \$50/year for PHEV lease \$500 for EV purchase; \$100/year for EV lease
Total budget	\$22,500
Best practices	Participants will be informed about VEC's optional TOU rate.
Appropriate for VT	Yes
Min Building Standards	N/A
Equitable opportunity - customer class	Yes
Equitable opportunity - low-income	Yes, leased and used vehicles are included

Charging Stations

VEC has been promoting charging infrastructure to large employers and municipal entities. In 2018, we began offering an incentive of \$500 per head for publically accessible chargers, Level 2 and up. We have also publicized the state of Vermont's charging station grant program to our municipal members and are offering our assistance in grant applications. We will continue the incentive and promotion of funding opportunities.

Electric forklifts

# of units	Per unit MWh Savings	Total MWh savings	% of 2019 goal
5	72	360	2%

To expand opportunities for commercial and industrial members to participate in VEC’s Energy Transformation Program, we will begin offering an incentive for electric forklifts in 2019. The TAG is currently characterizing this measure, and these savings claims are based on the anticipated outcome. We plan to offer a \$1,000 incentive for the purchase of a new or used electric forklift that directly replaces an existing fossil fuel forklift or in the case of new applications.

Program	Electric forklifts
Objective	Promote the adoption of electric forklifts in VEC’s service territory
Number of participants	5
Lifetime MWh credit	95 for new, 48 for used
Partners	Forklift dealers and C&I members
Additional kWh	14,000
Incentive	\$1,000 per forklift
Total budget	\$5,000
Best practices	VEC will work with participants to recommend the optimal charging schedule for demand charges as well as peak
Appropriate for VT	Yes
Min Building Standards	N/A
Equitable opportunity - customer class	Specific to C&I
Equitable opportunity - low-income	Specific to C&I

Other Measures

Storage and Demand Management

VEC continues to develop and research storage at all scales. We anticipate having a utility-scale battery online in time to reduce 2019 summer peaks. We are also exploring an industrial storage partnership as well as medium commercial and residential and storage options.

Earlier this year, we deployed an electric resistance water heater pilot program for load control and are considering additional load control programs. Participants in the water heater control program receive \$50 in bill credits. As these programs develop and as the Commission determines whether to allow savings claims for storage and demand management, we will evaluate their relevance for Tier III savings claims.

Tier III Program Summary

Program	# participants	MWh/per unit	Total MWh	% Requirement	Budget
CAP	TBD	TBD	TBD	TBD	\$150,000
Thermal Measures					
CCHP	200	25	5,000	34%	\$60,000
HPWH	30	3	90	1%	\$4,500
Pellet stoves*	30	60	1,800	12%	\$4,500
ZEM home	TBD	TBD	TBD	TBD	\$2,000
Transportation Measures					
EV	30	32	960	6%	\$15,000
PHEV	30	24	720	5%	\$7,500
Electric forklifts	5	72	360	2%	\$5,000
Charging stations	TBD	TBD	TBD	TBD	\$15,000
2019 Total	325		8,930	60%	\$263,500

**These numbers may be adjusted to reflect credit-sharing with Efficiency Vermont.*

As mentioned earlier, VEC expects to have additional CAP projects to claim for 2019. We also expect to have a bank of credit from 2017 and/or 2018 to apply to 2019 compliance. A summary of these projections, with no assumptions for additional CAP claims, is below.

	MWh
Expected available bank	4,522
2019 total plus bank	13,452
2019 requirement	14,806
Gap	1,353

Complementary Systems and Services

Time of Use (TOU) Rates

TOU rates can be an effective tool for shifting load and giving members more control over their usage and monthly electric bill. Since January 1, 2017 VEC has offered a pilot TOU rate available for both residential and small commercial members who participate in the Tier III program. As of October 1, 2017, we also have a pilot TOU rate available for larger commercial members participating in Tier III initiatives.

These pilot rates are optional rather than mandatory so that members who may not want to be charged a TOU rate are not discouraged from participating in the Tier III program. Currently, two large commercial, one small commercial, and twelve residential members have opted to participate in the pilot TOU rate.