

2018 Tier III Plan – Vermont Electric Cooperative

November 1, 2017

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 (\$0.06 per kilowatt-hour);
- 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.

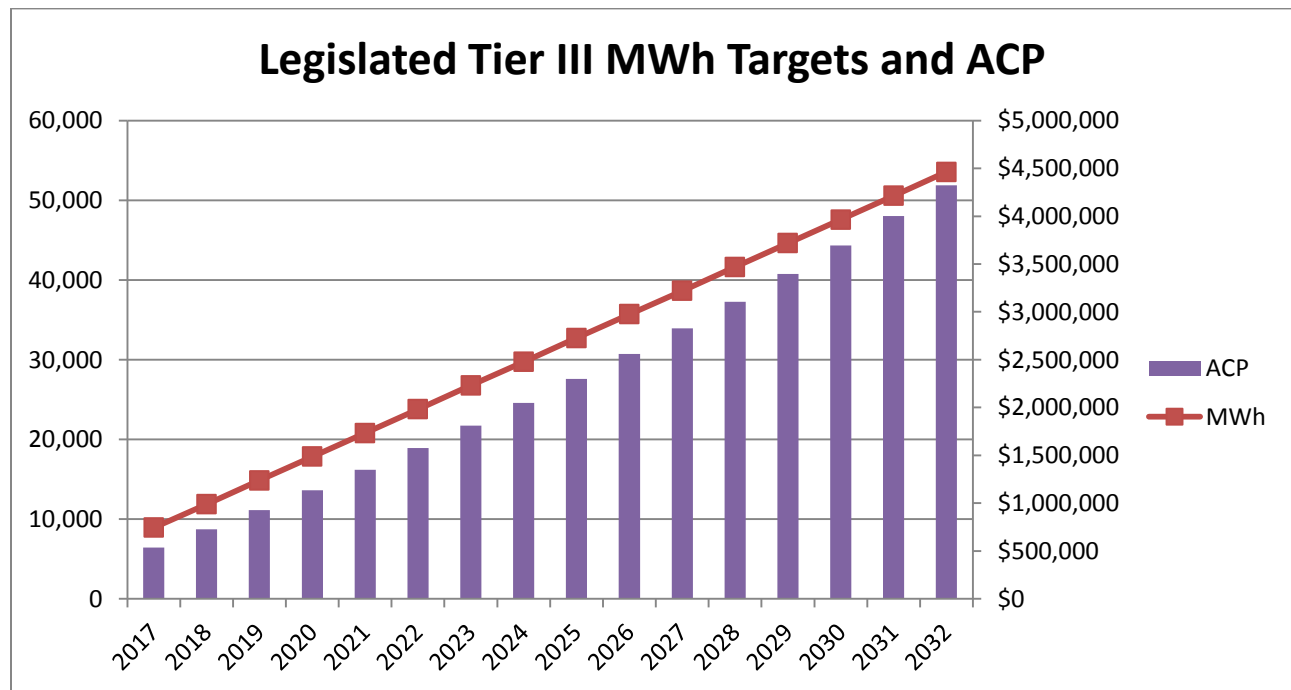
For energy transformation projects, the submitted plan must describe the project and include:

- 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 approximately 8,926 MWh of savings for Tier III compliance. In 2018, the requirement is expected to increase to 11,871 MWh. Over time this target will increase with the legislated increase in percentage requirements. The targets set in statute are aggressive and, due to circumstances that were not originally anticipated, may need to be legislatively amended (see below).



Lessons Learned from 2017 Implementation

1. **Bill credits are an efficient and effective way to offer an incentive.**

We chose to offer financial incentives in the form of bill credits for cold-climate heat pumps and electric vehicles. The member submits a one-page form with a proof of purchase/lease and receives the credit on their next electric bill. This process has been simple and easy for both VEC and the members participating.

2. **Partnerships add significant value and help promote programs.**

VEC's Tier III program has benefited from partnerships for both the cold climate heat pump and electric vehicle programs. We hope to build on the success of existing partnerships and create new partnerships in 2018.

We partnered with Efficiency Vermont (EVT) to offer a \$150 bill credit on top of their existing upstream incentive for cold climate heat pumps. We coordinated to set a goal of 200 heat pump installations in VEC's service territory and are on track to meet that goal. Both organizations marketed the program through mutually approved materials and responded to inquiries. We have also shared participant data on an ongoing basis to check our records against EVT's and vice versa. The only downside to this partnership is the sharing of Tier III credit, which VEC and other stakeholders did not anticipate during the 2015 legislative process.

We also partnered with the Energy Co-op of Vermont (ECVT) to provide an additional heat pump discount to members in the towns where our service territories overlap. ECVT extended a discount that we both publicized and around 50 members took advantage of the offer.

For electric vehicles, we were able to extend the offer of a \$10,000 discount on the 2017 Nissan Leaf to VEC members. To date ten VEC members purchased the Leaf as a result of this discount. With multiple Vermont utilities offering this discount, the program was so successful that Freedom Nissan in Burlington ran out of inventory.

3. **2017 and 2018 Tier III targets would be very difficult to reach without CAP opportunities.**

The Clean Air Program (CAP) will likely make up around 85 percent of the Tier III savings that VEC will claim for 2017. The 2018 plan outlined below expects at least half of the Tier III savings to come from CAP. Part of the reason for this is that the savings for most measures that have been characterized through the Technical Advisory Group (TAG) are small and significantly less than anticipated during the legislative process.

To put the requirement in context, the chart below shows the total number of units per measure that VEC would need to claim in 2017 and 2018 for VEC to meet all of its compliance with an individual measure:

	2017		2018	
	MWh/unit	Total needed	MWh/unit	Total needed
ccHP – credit sharing	7*	1,275	4**	2,968
ccHP – w/o credit sharing	26	343	18	496
EV	24	372	24	495
PHEV	13	687	13	913
Pellet Stove	60	149	60	198
HPWH	10	893	10	1,188

* Reflects the share of credit in VEC’s 2017 MOU with EVT.

** Reflects the share of credit in VEC’s 2017 MOU with EVT and the adjustments to the overall credit for a ccHP expected for 2018.

VEC has approximately 32,000 members. If VEC’s credit-share for cold climate heat pumps were the same in 2018 as in 2017, almost 10 percent of VEC members would need to install a cold climate heat pump in 2018 to meet the requirement.

4. Finding CAP opportunities will become more challenging over time.

CAP projects typically emerge either through word of mouth or they are identified by our field engineers. We expect plenty of opportunities in the first few years of Tier III, but they will become harder to find over time as projects that are clearly advantageous are completed.

5. Fuel prices have decreased significantly since the spring of 2015.

When Act 56 was proposed, debated, and passed into law in 2015, Vermont fuel prices were about 20 percent higher on average than they are now (see chart below). This decrease clearly makes fuel-switching a less attractive prospect for many and makes Tier III programs more challenging to implement.

	Mar-15	Oct-17	Change
Diesel	\$3.46	\$2.73	-21.10%
Kerosene	\$3.54	\$2.93	-17.23%
# 2 Fuel Oil	\$3.08	\$2.41	-21.75%
Propane	\$3.06	\$2.69	-12.09%

Source: DPS Vermont Fuel Price Report

6. It is unclear how VEC can add value to thermal efficiency programs.

In researching how to deploy the Energy Saver Program that was included in our 2017 plan, VEC discovered that the critical gap in services to low income Vermonters is in the area of weatherization. We are struggling to determine how we can be useful in that area beyond promoting the availability of these programs and services.

Weatherization Assistance Programs exist throughout the state for income-qualified households. However, these programs often have long waitlists due to funding shortages. The organization that serves the majority of our service territory is the Northeast Employment and Training Organization (NETO). When we last spoke with NETO, their waitlist for WAP services was extensive.

EVT offers incentives for weatherization with Thermal Energy and Process Fuels (TEPF) funds. For VEC, that means that we would likely be sharing any potential Tier III savings if we offered a weatherization incentive.

7. Electric transportation measures are being deployed more rapidly than expected.

2017 may have been a watershed year for the electric vehicle industry. The technology has improved to the point where more and more consumers are choosing electric vehicles, and major automakers announced their intention to transition towards an all-electric fleet. VEC saw greater than expected participation in the EV incentive program, and we plan to enhance the program for 2018 to build on this success.

Components of VEC's 2018 Tier III Program

VEC's 2018 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 looking 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.

While sugaring operations and off-grid homes are currently the primary focus of CAP, VEC is also exploring opportunities with saw mills and gravel pits that currently use generators because electric service is either unavailable or inadequate to meet their full demand.

When screening CAP projects, VEC is requiring fuel receipts, estimating the additional electric load, and completing cost estimates. 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 material adverse impacts to the current year capital budget or future operations and maintenance budgets

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.

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.

During the fall 2016 and spring 2017 construction seasons, four CAP projects were completed. Three provided electric service for maple sugaring operations, and one was a residential service for two homes. The maple sugaring projects were completed in time for the 2017 sugaring season.

Below is a list of projects that have recently received approval for special contracts.

Project or Member	Fuel Type	Annual kWh Increase	Annual Gallons Saved	Years in Service	MWh Savings	% of 2018 Goal
Sweet Tree (E Haven Rd)	Diesel	65,000	25,920	30	9,460	80%
Cieri	Propane	5,356	3,241	30	904	8%
Marquis	Diesel	76,658	25,920	30	9,759	82%

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 EVT to identify efficiency opportunities through an energy audit. When EVT and VEC incentives have the potential to overlap, VEC will work with EVT 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.

Program	Clean Air Program
Objective	Provide discounted line extensions and service upgrades for homes and businesses that currently use generators to power all or part of their home or business
Number of participants	Unknown; we evaluate these projects on an ongoing basis
Lifetime MWh credit	Varies
Partners	EVT, in cases where incentives overlap and for required energy audits
Additional kWh	Varies
Incentive	Varies, historically about 23% of the total cost
Best practices	Evaluate projects for DR potential, impact on the grid, potential for increased sales, and Tier III savings. EVT 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 buildings. 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.

In 2017, we offered a cold climate heat pump bill credit in conjunction with EVT’s upstream incentive. We plan to continue this program and offer members another renewable heating incentive with a bill credit for installation of new pellet stoves. We also plan to offer an incentive for heat pump water heaters.

Cold Climate Heat Pump Bill Credit

# of units	Per unit MWh Savings	Total MWh savings	% of 2018 goal
200	18*	3,600*	up to 30%

** This is an estimate; cCHP value will depend on its specific characteristics per the updated 2018 TRM. This figure reflects the full expected cCHP savings. The actual numbers may be discounted to reflect credit-sharing with EVT.*

The CEP sets an ambitious goal of installing 35,000 cold-climate heat pumps (ccHPs) statewide by 2025. Because VEC’s current electric portfolio is about 95 percent carbon-free (not taking Renewable Energy Certificate sales into consideration), 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 EVT to help members understand the factors they should consider when deciding whether a heat pump is right for their property and needs.

In 2017, VEC partnered with EVT to offer a bill credit in addition to EVT’s upstream incentive for ccHPs. VEC members were able to take advantage of EVT’s upstream incentive and receive an additional \$150 bill credit from VEC. To receive the VEC bill credit, members fill out a short form that identifies information required for Tier III compliance. The combined goal was to have 200 new ccHPs installed in VEC members’ homes and businesses in 2017. The current results show that we are likely to meet or exceed that goal.

Both EVT and VEC answered general inquiries, with EVT offering more in-depth technical assistance as needed. VEC supplemented EVT’s marketing activities, using communications

channels such as bill stuffers, email blasts, website features, social media, and VEC’s quarterly newsletter Co-op Life. VEC and EVT coordinated messaging to avoid customer confusion.

VEC also partnered with the Energy Co-op of Vermont to offer additional discounts on the installation of ccHPs to VEC members in the spring and another in the fall.

Program	Cold Climate Heat Pumps
Objective	Incentivize 200 ccHPs to displace fossil fuel heating.
Number of participants	200
Lifetime MWh credit	15 expected on average
Partners	EVT, Energy Co-op of VT
Additional kWh	1,000 - 7,200
Incentive	\$150 bill credit
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 Stove Bill Credit (new in 2018)

# of units	Per unit MWh Savings	Total MWh savings	% of 2018 goal
25	60	1,500	13%

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 plans to offer a pellet stove bill credit in 2018.

Modern wood heating is a growing market in Vermont and can play a key role in helping Vermont achieve its carbon reduction goals. EVT and the Clean Energy Development Fund already offer sizable incentives for pellet boilers and furnaces. However, there is currently no program available to incentivize Vermonters to purchase pellet stoves.

VEC may 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).

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	25
Lifetime MWh credit	60 expected on average
Partners	Pellet stove distributors,
Additional kWh	+/- 1,000
Incentive	\$150 bill credit
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 Heater (new in 2018)

# of units	Per unit MWh Savings	Total MWh savings	% of 2018 goal
25	10	250	2%

To provide an option to members interested in transitioning their water heating away from fossil fuels, VEC plans to offer a \$150 bill credit for heat pump water heaters in 2018. The credit will be available for Energy Star rated models that replace fossil fuel water heaters.

Program	Heat Pump Water Heaters
Objective	Provide an incentive for 25 pellet stoves in VEC homes and businesses to displace fossil fuel water heating.
Number of participants	25
Lifetime MWh credit	10 expected on average
Partners	TBD
Additional kWh	+/- 1,500
Incentive	\$150 bill credit
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

Energy Saver Program - Thermal Efficiency and Fuel-Switching

The VEC Energy Saver Program, the goal of which is to help members improve thermal efficiency, reduce carbon, and save money, was not launched in 2017 despite efforts to explore value-added partnerships and opportunities. The program was intended to target (but not be limited to) low-income/high-usage members to provide assistance and incentives customized to their individual needs. (Please refer to the 2017 plan for more detail). In 2018, VEC will continue to explore where opportunities might exist to meet these goals as part of the Tier III program.

Transportation Measures

Vermont cannot meet its greenhouse gas reduction goals without electrifying the transportation sector. The Comprehensive Energy Plan identifies that nearly half of Vermont's greenhouse gas emissions are the result of transportation. 2017 was an important year for the electric vehicle market nationwide, when two automakers announced their intention to move towards manufacturing only electric vehicles.

In Vermont, the appetite for electric vehicles continues to grow as the technology improves, costs come down, and infrastructure expands. In 2018, VEC will increase the existing bill credit incentive program for fully electric vehicles (EVs) and maintain the same incentive for plug-in hybrid electric vehicles (PHEVs). VEC will also work to identify funding opportunities and partners to install charging stations at appropriate locations throughout VEC's service territory.

Electric and Plug-in Hybrid Electric Vehicles

Vehicle type	# of units	Per unit MWh Savings	Total MWh savings	% of 2018 goal
EV	30	25	750	6%
PHEV	30	14	420	4%

In 2017, VEC offered a bill credit for fully electric and plug-in hybrid electric vehicles of \$250 for a purchase and \$50 per year for a lease. To obtain the bill credit, members fill out a simple form and include proof of purchase or lease. With two months left in the year, we have already seen greater than expected participation. We planned for 6 EV bill credits and 19 PHEV bill credits; so far, we have received 19 EV bill credit submissions (3 leased and 16 purchased) and 15 for PHEVs (3 leased and 12 purchased). In addition to the bill credit, we extended the 2017 Nissan Leaf \$10k discount to VEC members and had a great response, with 9 members taking advantage of the offer.

VEC will continue to offer bill credits for the purchase or lease of a new or used EV or PHEV. We are keeping the amounts the same for PHEVs and increasing the credit for EVs to \$500 for a purchase and \$100/year for a lease. We will promote the incentive directly to members, as well as through local car dealers, who will integrate the offer into other incentives and rebates.

VEC's intends to make savings claims for EVs and PHEVs based on the prescriptive measures determined by the TAG. 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 VIN numbers 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	25 EVs, 30 PHEVs
Lifetime MWh credit	25 for EVs, 14 for PHEVs
Partners	Car dealerships, Drive Electric Vermont
Additional kWh	2,500 for EVs, 1,500 for PHEVs
Incentive	\$250 for PHEV purchase; \$50/year for PHEV lease \$500 for EV purchase; \$100/year for EV lease
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	Leased and used vehicles are included

Level 2 Charging Stations

VEC is planning to work with large employers and municipal entities in our service territory to support the development of public charging infrastructure. In 2018, we will be offering bill credit incentives for the installation of Level 2 and Level 3 charging stations. We will also support entities in finding grant opportunities and in project partnerships.

The approach that TAG decided to take for public charging stations in 2016 was to use meter data to determine the amount of Tier III credit a utility could claim each year, rather than take the lifetime upfront. VEC would advocate for a prescriptive amount of minimum credit for public charging to provide an additional incentive for utilities to invest in this infrastructure.

Although many charging stations may be underutilized during the first few years, they are necessary to enable consumers to make the transition to electric vehicles. Moreover, their appearance may stimulate interest in EVs, generally. The Department and the Commission could further this important public policy objective through Tier III by supporting a prescriptive minimum value for public charging.

Commercial Electric Vehicles

VEC will explore the possibility of working with businesses and public entities to offer incentives for commercial electric vehicles such as fleet vehicles, buses and paratransit vehicles. In many cases, these vehicles are not quite yet a viable option to replace gasoline and diesel-powered vehicles. However, the industry continues to move quickly in this direction.

Other Measures- Storage and Demand Management

VEC is planning to install utility-scale storage in time to reduce the anticipated peak in summer 2018. VEC is also testing a battery at its Johnson facility, and in August 2017 deployed a small commercial storage project at Microstrain in Willison to mitigate both customer and utility peaks. VEC is also exploring residential storage options.

Finally, VEC is looking into a funding opportunity from the National Rural Electric Cooperatives Association (NRECA) and the U.S. Department of Energy (DOE) to optimize distribution feeder performance, including assessing how storage and other demand response technology can interact with distributed generation. As these projects develop we will be evaluating the energy transformation benefits and any associated Tier III credits that may result from peak-shaving.

Tier III Program Summary

Program	# of Participants	MWh Savings	% of 2018 Goal
CAP	3*	20,123*	170%*
ccHP	200	3,600**	30%**
HPWH	25	250**	2%**
Pellet Stoves	25	1,500	13%
EV	30	750	6%
PHEV	30	420	4%
2018 Total	313	26,663	225%

**These numbers will change as more projects are approved for CAP.*

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

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, one commercial and eight residential members have opted to participate in the pilot TOU rate.