

2020 Update to the

Triennial Plan

2018–2020

Prepared for the
Vermont Public Utility Commission

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by
Vermont Energy Investment Corporation
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This document is presented to the Vermont Public Utility Commission and to the Vermont Department of Public Service, in fulfillment of the regulatory requirement to submit an overview of Efficiency Vermont's 2018–2020 strategy for providing energy efficiency services. This annual (2020) update of the triennial plan fulfills the regulatory requirement for reporting any changes, modifications, and updates or variations to the content summarized in the triennial plan.



Opportunity and Investment in Vermont

A message from Rebecca Foster
Director, Efficiency Vermont

Looking towards the final year of our 2018-2020 plan, Efficiency Vermont is identifying new opportunities to serve Vermonters in an increasingly renewable and "smart" electricity landscape.

We are continuing to invest in relationships with partners up and down the supply chain to accelerate market transformation and increase access to affordable, efficient products for Vermonters. We've seen the success of this strategy in products like lighting, where a long history of supply chain engagement and product incentives have helped Vermonters adopt efficient technologies at high levels.

This enables Efficiency Vermont to shift our focus to reach new customers and increase uptake of emerging technologies. By pairing direct incentives with supply chain partnerships, we can motivate new families and businesses to continue Vermont's track record of success and energy cost savings.

Decisions about where and how to shift our programs are informed by market conditions, feedback from customers, and—importantly for 2020—our new research on energy burden, which is the ratio of energy spending as a percent of household income. We are bringing new programs and services to targeted high-burden communities like Rutland, Bellows Falls, and St. Johnsbury. In these communities and across the state, we have improved services to reduce household energy burden. Changes include increased incentives for weatherization, new engagement with landlords, and our updated efficient appliances program.

For the largest energy users and employers in the state, our evolving programs help these businesses stay on the cutting edge of efficiency and cost savings. Through partnership with the Department of Public Service and the Agency of Commerce and Community Development, Efficiency Vermont will support deeper investments in energy efficiency and productivity for Energy Savings Account pilot participants. And in partnership with Green Mountain Power, we are working with businesses to reduce electric demand at peak times through the Flexible Load Management pilot.

These partnerships—and more—are the core of our shifting portfolio. Collaboration with the electric and gas distribution utilities enables us all to bring a more comprehensive energy solution to our shared customers. By partnering with contractors and energy service providers, we can bolster a vibrant clean energy economy while reducing costs for all Vermonters.

In the stories we share over the next few pages, you will see the fruits of Vermont's investment in statewide energy efficiency infrastructure. By building strong relationships with the supply chain, innovating in the products and services we promote, and increasing public awareness of energy efficiency, Efficiency Vermont is bringing benefits to all energy stakeholders and making important progress on our shared energy and cost reduction goals.

2018-2020 Forecasted Impact



\$698 million
will be saved by Vermonters*

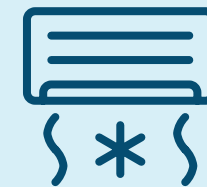
*Lifetime customer savings from 2018-2020 efficiency investments

2,100,000 tons of greenhouse gas emissions will be avoided

or the equivalent of 45,000 passenger vehicles taken off the road for 10 years, from investments made in the 2018-2020 period



Over **109,000** customers served annually in the 2018-2020 period



810
Equipment suppliers



331
Retailers



909
Contractor companies



139
Building & lighting design firms

Partnering with **2,000+** businesses to deliver efficiency excellence

Partnership with Utilities to Serve Customer Need

To provide Vermonters with comprehensive energy solutions that save money and energy, Efficiency Vermont is collaborating with utilities across program offerings, design and engineering, education and marketing, and direct customer support. Efficiency Vermont and other utilities have unique but complementary strengths when it comes to delivering cost-effective energy savings. Efficiency Vermont brings statewide infrastructure, both technical and educational, to assist in fulfilling Tier III requirements and other innovative initiatives. These partnerships enable a smooth customer experience and accelerate progress toward shared objectives.

To ensure statewide equity, Efficiency Vermont is working in partnership with each utility. Below are a few examples of collaborative activities.

Burlington Electric Department

- Improving communication and collaboration to ensure programmatic alignment across territories
- Ongoing collaboration on “Defeat the Peak” to drive behavioral changes with commercial customers

Green Mountain Power

- Continuing to collaboratively serve ten commercial and industrial customers in a pilot to reduce demand during peak times and enable load flexibility
- Providing access to Efficiency Vermont’s platform for efficient product rebates at the distributor level

Stowe Electric Department

- Targeting small and medium businesses to combine electrification and energy efficiency offers
- Continued promotion and support of collaborative cold climate heat pump program

Vermont Electric Co-op

- Expanding efforts to identify and efficiently electrify fossil fuel-based processes and heating systems for business members
- Partnering on bringing innovative heating technology to co-op members

Vermont Public Power Supply Authority

- Cooperative development of efficiency and fossil fuel reduction projects for commercial and industrial customers
- Coordinating with municipal utilities to deliver targeted customer outreach and program implementation that meets the specific needs of the local community

Vermont Gas

- Improving communication and collaboration to ensure programmatic alignment across territories
- Cross-training customer support teams to coordinate communication, and sharing resources to deliver comprehensive services to business customers in Vermont Gas territory

Washington Electric Co-op

- Coordinating efforts in weatherization, efficient electrification, and biomass services to assist members in reducing energy costs, improving home comfort, and reducing fossil fuel use
- Collaboratively developing and rolling out member electric load shifting and efficiency opportunities to reduce utility peak loads (see next page)



Wrightsville Dam on the North Branch of the Winooski River contributes a portion of Washington Electric Co-op’s 100% renewable portfolio.

Washington Electric Co-op Spotlight: Project PowerShift

Washington Electric Co-op (WEC) already benefits from 100% renewable electricity, a point of pride for its leadership and members. By partnering with Efficiency Vermont in a new pilot of demand response capabilities,¹ its members can help ensure that renewable electricity is used to its full potential, even during peak demand times for the grid.

When they sign up for Project PowerShift, residential members of WEC will allow their utility to transform their hot water heater into a thermal battery using WiFi-enabled thermostats. WEC and Efficiency Vermont are partnering with two technology companies on this project: Packetized Energy Technologies and Virtual Peaker. When peak demand is forecasted, WEC can pre-heat participating customers’ hot water with renewable electricity using the installed control. During peak demand periods, WEC can control and reduce load from these hot water heaters. This effectively shifts the electricity demand away from times of peak demand.

Efficiency Vermont is supporting WEC with direct outreach to its members by co-creating educational materials to explain how PowerShift works for them and for the grid. Efficiency Vermont is also providing WEC with existing energy efficiency-related data

and program expertise for program planning, data analysis, and verification of the results of PowerShift. WEC will provide participating customers a \$5 bill credit during a PowerShift event, but all ratepayers are expected to benefit from the program. Shifting 1 MW during a peak event can result in around \$200,000 of savings.

“We are thrilled to offer a peak management program to our members. We are all learning from this cutting edge and innovative program. WEC is excited to work with a talented team at Efficiency Vermont to help us control peaks and save our members money. The more we all can reduce peaks and manage energy, the better positioned we are to cut dollars and expenses.”

Patty Richards, General Manager,
Washington Electric Co-op

¹ Assessment of Demand Response Capability and Effectiveness, Efficiency Vermont, October 2019. www.efficiencyvermont.com/news-blog/whitepapers/assessment-of-demand-response-capability-and-effectiveness

Transforming the Energy Market in Response to Customers

Our Work is Changing

Since its founding, Efficiency Vermont has placed a special focus on market transformation. This entails working with customers and the supply chain to make energy efficient products, such as LED light bulbs and heat pump water heaters, affordable and easy to access, to the point where they become the default choice. As more Vermonters install these technologies, program dollars can continually be refocused on serving new customers, identifying new opportunities for energy savings, and bringing new leading-edge technologies to the state.

Through 2018, nearly 12,000 business customers have worked with Efficiency Vermont to complete projects that reduced their energy costs. Here are the core strategies Efficiency Vermont will employ to continue expanding our reach and shifting the market to meet these customers' changing needs in 2020:

Evolving services for Vermont's largest businesses

Efficiency Vermont has long placed a special focus on understanding and serving the needs of Vermont's largest energy users. For many of these customers, opportunities to reduce energy costs have now evolved well beyond lighting to encompass industrial process improvements, ventilation, refrigeration and, increasingly, optimizing their electric usage by shifting and managing loads.

- The **Energy Savings Account** pilot will give 12 customers the opportunity to invest their efficiency charge contribution in new kinds of projects, such as energy productivity, storage, and demand management. Efficiency Vermont's team of Energy Consultants and Account Managers will stand at the ready to support their success and help meet their goals.
- Through close partnerships with Vermont's distribution utilities, Efficiency Vermont staff will continue to provide seamless service to the state's businesses, by helping them identify, develop, and complete a range of projects – including those that shift fossil fuel consumption to electricity, qualifying

for enhanced utility support under **Tier III of Vermont's Renewable Energy Standard**.

- Efficiency Vermont will leverage low-cost metering technology to provide new insights to customers, offering **data-driven services** to identify new savings opportunities and improve productivity in their facilities.

In-person support for small businesses

Vermont's small-business owners often wear multiple hats, and they rarely have time to place energy efficiency on their priority list. Efficiency Vermont is making it easier for these hard-to-reach customers to lower their energy costs by offering free walkthroughs and project support. Efficiency Vermont has made efficiency improvements more accessible by increasing the number of product rebates available through online submittal and point of sale. These improvements combined with financing options help make adoption of lighting, HVAC, and refrigeration products more affordable. Together, this expanded program has resulted in a 40% conversion rate from walkthrough to project completion.

Focusing on projects that drive multiple benefits

For many businesses, especially in the grocery and food production sectors, refrigeration represents a significant portion of electric costs. Refrigerant leakage is commonplace, which further increases electric costs. Most commonly-used refrigerants are also a potent source of greenhouse gasses. Early analysis indicates that if all Vermont's commercial refrigeration systems cut their annual leakage rate in half, it would save 97,000 metric tons of carbon equivalent annually. If all systems were converted to natural refrigerants (which have a much smaller climate impact), the savings potential more than doubles to 200,000 metric tons of carbon equivalent annually. In 2020 Efficiency Vermont will build on a close partnership with Vermont's grocery and convenience stores and the Vermont Food Bank to upgrade systems, addressing refrigerant leaks and shift to natural refrigerants – as the first efficiency program in the country to provide incentives supporting this technology.



Long Falls Paperboard, Brattleboro, VT

When it was announced in 2018 that a paper mill in Windham County was about to close, putting 100 jobs at risk, the team at Brattleboro Development Credit Corporation (BDCC) worked quickly to engage partners and set up a sale of the facility to new operators. Only months before, Efficiency Vermont had completed a comprehensive assessment of energy savings opportunities at the mill and was able to collaborate with Green Mountain Power to offer robust incentives and support to the prospective buyers as part of the BDCC proposal – giving the new owners the opportunity to reduce their energy costs and fossil fuel usage, while upgrading their facility from day one.

Now incorporated as Long Falls Paperboard, the facility continues to serve as an anchor employer for the region, and they remain on the cutting edge of energy management. In 2019, Long Falls Paperboard joined as one of the first participants in the Green Mountain Power-Efficiency Vermont Flexible Load Management pilot. Long Falls Paperboard will continue working with Efficiency

Vermont on several ongoing projects over the course of 2020 to continue to shift electric usage away from times of peak demand, **driving** cost savings for the plant, **optimizing** use of the electric grid, and **reducing** environmental impact.

“Efficiency Vermont continues to play a critical role in our work in Brattleboro, providing ongoing consulting and financial support to improve the mill’s energy competitiveness. We are grateful for all the help from the team at Efficiency Vermont.”

Ben Rankin, Principal,
Long Falls Paperboard

Collaborating with Communities to Save Energy and Money

Based on new research on the relative energy burden of towns in Vermont, as shown on the next page, Efficiency Vermont has identified communities where energy costs represent a high portion of household income. These data will inform the development of focused offerings to serve these highly energy burdened communities including outreach and education campaigns, home energy consultations, and energy upgrades for small businesses, municipalities, and non-profits.

In 2020, Efficiency Vermont will partner with stakeholders, including the state Agency of Commerce and Community Development, community groups, and distribution utilities, to select the communities that will receive this increased level of focus for the next year.

The energy burden results have informed changes and expansions to several of Efficiency Vermont's programs to support the households that are most exposed to energy costs.

Improving access for electric burdened homes

Efficiency Vermont redesigned a program that provides free appliances to low-income Vermonters with high electricity usage. The program now qualifies households based on their electric burden, using both electric bills and household income to determine eligibility. This ensures the program is accessible to the most impacted households.

Reducing energy bills for renters

Reducing energy costs directly benefits renters, who are disproportionately low- and moderate-income. Historically, the split incentive between renters (who pay the energy bills) and landlords (who often own the equipment) has made it difficult to complete efficiency projects in multifamily households and rental units. In targeted communities, Efficiency Vermont will continue direct outreach to landlords with specialized offers that have increased the number of projects completed and reduced energy costs for tenants.

Keeping moderate-income households warm this winter

As a result of the passage of Act 62, in July 2019, Efficiency Vermont dramatically increased incentives for moderate-income households that weatherize their homes through the Home Performance with ENERGY STAR® program. About 60% of Vermont households qualify as moderate-income and will now be eligible to receive up to half of the cost of the project, up to \$4,000, as a rebate.

In addition to the new funding from Act 62, Efficiency Vermont has recently increased other efforts to reach moderate-income Vermonters. In 2019, the same customers became eligible for no-interest financing through the Home Energy Loan, which can cover weatherization and sustainable heating systems. Efficiency Vermont also offers a moderate-income adder for heat pumps, on top of the existing incentives for heat pumps from Efficiency Vermont and the distribution utilities. In addition, Efficiency Vermont offers a moderate-income adder for heat pumps, on top of the existing incentives for heat pumps from Efficiency Vermont and the distribution utilities.

In the final year of this performance period, Efficiency Vermont plans to continue expanding outreach and programs targeting households that have previously had difficulty accessing efficient technologies and services.

Focus on Energy Burdened Areas

Vermont's Energy Burden

Energy burden is defined as annual energy spending (electric, thermal, and transportation) as a percentage of household income.



Energy burden is a powerful tool to understand the context – and impact – of energy usage on people and communities.

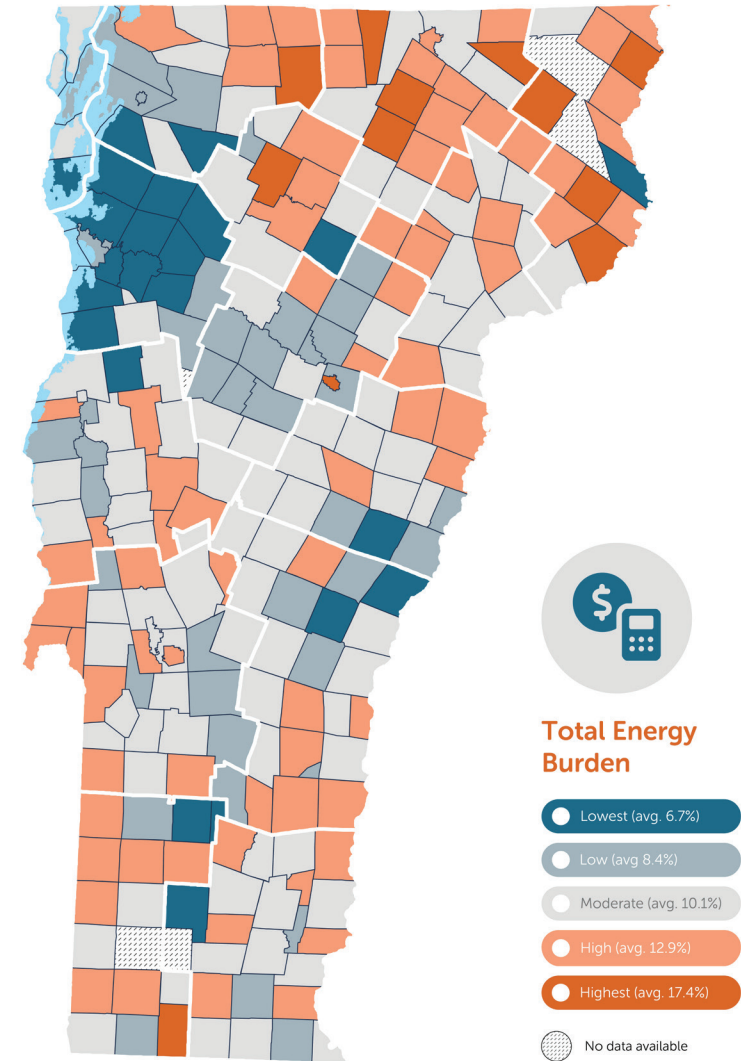
In 2019, Efficiency Vermont released an updated report on Vermont's town by town energy burden.² The results of the previous report – issued in 2016 – have guided Efficiency Vermont's efforts to **increase focus on high burden (rather than just high spending) households over the past three years.**

The 2019 report estimates that statewide, **total energy burden in Vermont is 10% of household income.** Burden varied from 6% to 20% across Vermont's towns. Variation in spending meant that households in towns with the lowest energy expenditure spent roughly 45% less on their energy annually than those in the highest-spending towns.

More than half of household energy spending goes to transportation energy (45%) followed by spending on thermal energy (35%) and electricity (20%).

The most important determinant of energy burden is household income. For many Vermonters with high energy burdens, energy competes with other necessities such as food, healthcare, and housing.

By better understanding energy burden, Efficiency Vermont will continue to create and evolve programs like those demonstrated on the previous page. These programs can **deliver long term benefits to low- and moderate-income households while driving economic development throughout the state,** especially outside of the traditional growth centers in and adjacent to Chittenden County.



² Vermont Energy Burden Report, Efficiency Vermont, October 2019. www.efficiencyvermont.com/vermont-energy-burden

ABOUT THIS PLAN

Plan Development

This 2018–2020 Plan was developed in alignment with:

- The goals of the 2008 Vermont Energy Efficiency and Affordability Act and Vermont’s 2016 Comprehensive Energy Plan
- Efficiency Vermont’s 2018–2020 Quantifiable Performance Indicators (QPIs), including Performance Indicators (PIs) and Minimum Performance Requirements (MPRs) (see Section 5) established by the Vermont Public Utility Commission (the Commission)
- Vermont’s Comprehensive Economic Development strategy, as applicable
- Vermont’s Health in All Policies aims.

Plan Structure

The services discussed in this Plan are organized by the budget categories specified by the Commission in its regulatory processes:

- Resource Acquisition (RA) Budgets: Associated services are discussed in Sections 2.1–2.3.
- Development and Support Services (DSS) Budgets: Associated services are discussed in Section 2.4.

RA services are defined as those that directly achieve energy savings. DSS activities may not directly result in efficiency savings but represent valuable aspects of energy efficiency service delivery and development, and include activities such as general administration, information technology, planning and reporting, and education and training.³

ABOUT EFFICIENCY VERMONT

Efficiency Vermont is helping the state transition to a more affordable and cleaner future. Efficiency Vermont reduces the cost of energy for all Vermonters, while creating good jobs, improving our economy and lowering carbon emissions. Efficiency Vermont helps families, businesses, and institutions understand and make better use of energy; from lowering the cost of heating and cooling buildings, to adopting efficient appliances, lighting, and other technologies that drive down the total cost of energy. With incentives, training, and expert advice, Efficiency Vermont partners with distribution utilities, heating fuel suppliers, building trades professionals, manufacturers, distributors and retailers to save customers energy and money. Since 2000, Efficiency Vermont has helped Vermonters save more than \$2.4 billion in energy costs and has kept 11 million tons of CO₂ out of the atmosphere.

³ Case No. EEU-2016-03, October 12, 2017, Commission Order Re: *Development and Support Services Budgets, Evaluation Budgets, Other Program Budgets, Forecasts of Expected Savings, and Performance Targets*, at page 2.

Efficiency Vermont operates in three-year periods with specific State-mandated performance goals linked to compensation. Efficiency Vermont was created by the Commission and the Vermont Legislature in 2000 as a statewide, third-party, objective resource for the public good. Since its inception, Efficiency Vermont has been administered by VEIC, which currently holds an appointment from the Commission to administer Efficiency Vermont through the end of 2026.



2020 Update to the Triennial Plan 2018–2020

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2. SERVICES FOR 2018-2020

In its Triennial Plans, Efficiency Vermont presents information about planned RA service activities in five major markets: Business Existing Facilities, Business New Construction, Existing Homes, Residential New Construction, and Efficient Products. In addition, Efficiency Vermont discusses its planned DSS activities. The descriptions, budgets, and projected results below are organized into these groupings.

2.1 Services for Business Customers

Efficiency Vermont services for business customers are segmented into two major markets: 1) business existing facilities; and 2) business new construction. Efficiency Vermont’s approach to serving these markets focuses on the following areas: Vermont’s largest energy users, small and medium-sized business customers, targeted markets, and key commercial technologies, which cut across both the business existing facilities and business new construction markets.

2.1.1 Business Existing Facilities

This category includes commercial, industrial, institutional, and municipal facilities. In addition to offering prescriptive rebates in lighting, heating,⁴ ventilation, air conditioning (HVAC), and refrigeration equipment, Efficiency Vermont will continue to customize its approach to business services based on business size and market sector, matching the appropriate energy-saving equipment, service delivery mechanism, financial incentives, and technical assistance to each customer’s unique needs.

<u>Business Existing Facilities</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2018-2020</u>
Electric				
Budget	\$21,915,579	\$21,544,355	\$22,465,498	\$65,925,432
Annual MWh Savings	81,062	70,461	65,408	216,931
Total Resource Benefits	\$63,914,447	\$63,438,781	\$61,810,560	\$189,163,788
Summer kW Savings	12,099	10,146	9,419	31,664
Winter kw Savings	9,699	9,512	8,830	28,041
Lifetime MWh Savings	812,808	725,748	673,702	2,212,259
Thermal				
Budget	\$2,346,059	\$1,321,168	\$1,279,334	\$4,946,561
MMBtu Savings	86,604	73,776	64,511	224,891

⁴ On September 1, 2018, Efficiency Vermont discontinued prescriptive rebates for new oil and propane boilers and furnaces in order to expand support of biomass equipment.

2.1.2 Business New Construction

Efficiency Vermont’s support for the creation of efficient new buildings will continue to focus primarily on the professionals engaged in architectural design and construction. These include architects, engineers, specialty design service providers, and practitioners of construction trades. Efficiency Vermont will also engage with developers, equipment suppliers, installation contractors, commissioning agents, appraisers, lenders, and real estate agents, as well as certain building owners as key members of project teams, particularly regarding construction undertaken by institutions, by government agencies, and by large businesses with multiple buildings.

<u>Business New Construction</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2018-2020</u>
Electric				
Budget	\$2,270,794	\$2,111,111	\$2,130,435	\$6,512,340
Annual MWh Savings	4,862	9,000	4,815	18,677
Total Resource Benefits	\$5,591,673	\$13,716,780	\$7,222,500	\$26,530,953
Summer kW Savings	752	1,440	770	2,963
Winter kw Savings	662	1,260	674	2,596
Lifetime MWh Savings	67,567	126,900	67,892	262,358
Thermal				
Budget	\$113,016	\$0	\$0	\$113,016
MMBtu Savings	4,136	-	-	4,136

Efficiency Vermont will maintain its delivery of services that encourage the integration of energy efficiency decisions into the design and construction process and the inclusion of energy goals as part of the overall construction strategy. Efficiency Vermont will provide custom services from the earliest stages of a project, working with customers and design teams to increase the number of net-zero and net-zero-ready buildings in the state.

Key aspects of ongoing efforts:

- Technical assistance throughout the design, construction, and post-construction phases
- Analysis of efficiency options
- Tiered services aimed at meeting specific building performance levels, including net zero
- Financial incentives for efficient approaches, equipment, and building operation systems
- Post-occupancy energy performance tracking and engagement with building owners to identify ongoing and future savings opportunities, including energy use management
- Training and information provision to a range of key parties involved in new construction projects
- Continued partnerships with national, regional, and international organizations, such as the American Council for an Energy-Efficient Economy, the Consortium for Energy Efficiency, the Construction Specifications Institute, the Institute for Market Transformation, the International Code Council, and the New Buildings Institute, as well as Vermont trade organizations

2.1.3 Vermont's Largest Energy Users

In service to the state's largest energy users,⁵ Efficiency Vermont will continue to take a customized approach, including:

- **Energy Savings Account Pilot:** In partnership with the Department and the Agency of Commerce and Community Development (ACCD), Efficiency Vermont is offering a pilot initiative to help business customers take energy management to the next level. (See Transforming the Energy Market in Response to Customers in Section 1.)
- **Account Management:** Designated Efficiency Vermont staff will establish and maintain long-term, proactive consultative relationships with individual businesses. Account managers will offer help in creating portfolios of savings opportunities, technical and financial analyses, guidance in developing energy savings plans, financial incentives, assistance in identifying financing options, and guidance in assessing and utilizing energy usage data. These efforts will include a focus on electricity use, fossil fuel-powered industrial process and space heating equipment, and building-shell improvements.⁶
- **Return-on-investment engagement:** Efficiency Vermont will continue to proactively identify and engage those largest energy users whose returns on energy efficiency investments are low.⁷ Efficiency Vermont will then identify and address barriers to greater savings, such as lack of capital and lack of energy savings opportunities. Solutions will be highly individualized in order to optimize energy and operational benefits and to motivate the customer to engage in long-term energy management.
- **Continuous energy improvement:** To reduce energy intensity over time through behavioral and operational changes, Efficiency Vermont will provide such services as training, industry peer workshops, software tools, metering, employee engagement strategies, and recommendations on approaches to help customers manage and improve energy use on a regular basis.
- **Peak electricity use management:** Through smart meter and submeter data analysis, custom analytics tools, and support for optimal efficiency improvements, Efficiency Vermont will provide targeted Vermont businesses with the ability to identify and mitigate the use of high levels of energy in small blocks of time, which accrue costly peak demand charges on electric bills. These efforts will be designed both to aggressively cut electricity costs for businesses and to help all Vermonters by improving system reliability, reducing the need for system upgrades in Vermont, and lowering Vermont's share of New England regional transmission costs.
- **Targeted equipment initiatives:** Efficiency Vermont will identify and provide support for investments in equipment that present significant savings opportunities within high-use industries or that have broad applicability across business markets. Examples of technologies being investigated are industrial variable frequency drives, high-efficiency condensing units, compressor leak detection, lighting controls, and advanced wood heat systems.
- **System optimization:** Efficiency Vermont will help large energy users acquire increased savings from the performance optimization of facility, data center, and process systems through such

⁵ There are approximately 300 business customers in Vermont that are account managed, and each consumes a minimum of 500 MWh of electricity per year.

⁶ On September 1, 2018, Efficiency Vermont discontinued prescriptive rebates for new oil and propane boilers and furnaces to expand support of biomass equipment.

⁷ Low returns on investment are defined as less than 50% within a rolling three-year period. Investments consist of customers' contributions to the EEC and to their energy efficiency project costs. Returns consist of financial incentives and lifetime energy savings acquired through energy efficiency projects.

approaches as benchmarking, auditing, retrocommissioning, retuning, and submeter data analysis.

- **Peer-to-peer exchange:** Efficiency Vermont will continue to act as a catalyst for connections among large businesses and institutions by hosting gatherings of facility owners, managers, and other key decision makers in a variety of industries with common challenges and opportunities to foster information exchange and awareness of best practices for energy management. These exchanges will include:
 - **Best Practices Exchange**—This annual conference fosters peer-to-peer learning and engagement among large business customers and the many stakeholders in the public and private sector who serve them. Customers hear from peer businesses, policy makers, manufacturers’ representatives, and contractors through a choice of workshops, product demonstrations, and panel discussions. The conference also recognizes companies that have made a significant contribution to energy management best practices. This unique conference brings together facility managers, decision makers, relevant product manufacturers and the most experienced contractors from across the region.
 - **Efficiency Connections**—Efficiency Vermont’s quarterly e-newsletter informs and engages large commercial and industrial customers. *Efficiency Connections* will continue to be one of several ways Efficiency Vermont works to provide peer-to-peer learning and information exchange. Editions will focus on customer projects, economics, and successes, and will provide updates or news about Efficiency Vermont services or events.
 - **Kaizens**—Also known as “energy treasure hunts,” energy Kaizens are an effective tool to engage Efficiency Vermont business customers’ employees in energy management. Participants walk through facilities to identify efficiency opportunities in buildings and equipment, as well as behaviors that can easily be overlooked in day-to-day operations. Kaizens can uncover a host of energy savings opportunities that include low-cost / no-cost solutions such as settings adjustments, employee behavioral changes, equipment optimization, and added controls. Some Kaizens include multiple businesses at a given site, including those in the same industry as the host, providing a fresh perspective as well as industry-specific solutions applicable for all attendees.
 - **Sleeping Plant Tours**—Building off the Kaizen approach, sleeping plant tours adopt a similar approach, but look for energy waste during off-peak times when operations are limited or stopped altogether. Often, a sleeping plant tour is taken after a Kaizen has been performed during normal operating hours. When one evaluates a plant during these shutdown periods, energy waste may be more apparent than or different from how it appears during normal operations.

2.1.4 Small and Medium-Sized Businesses

Efficiency Vermont will design and implement services targeting the needs of Vermont’s small and medium-sized businesses, including the following:

- **Technical guidance and education:** offering information about efficiency opportunities, technologies, and financial solutions through direct customer interaction and strategic outreach via numerous avenues, including chambers of commerce, business and trade associations, planning commissions, economic development groups, utility partners, and placements in business media.

- **On-site services:** identifying savings opportunities, making recommendations for energy-saving approaches, and providing guidance as needed to help customers complete projects.
- **Thermal efficiency services:** helping qualifying small businesses and residential rental property owners who complete efficiency improvements with members of Efficiency Vermont’s network of local, certified Building Performance contractors.
- **Phone consultations:** helping businesses identify and prioritize savings opportunities and supporting owners through the project process.
- **Seamless delivery across Efficiency Vermont services:** easing business owners’ ability to access support regarding high-efficiency commercial equipment, retail efficient products, building improvements, new construction, and market-specific services, such as those described in Section 2.1.5.
- **Third-party financing:** supporting energy-saving investments through the Business Energy Loan and other financing offerings discussed in Section 2.3.5.

In the 2018–2020 period, Efficiency Vermont will be phasing out customer incentives of ENERGY STAR® screw-based light-emitting diode (LED) lighting and increasing support for commercial and industrial LED fixtures and controls. (Section 2.1.6 includes a discussion of fixture and control support.) Efficiency Vermont’s efforts regarding this technology will focus primarily on helping buyers identify and choose high-quality screw-in LEDs over poor-quality options that have entered the market. Efficiency Vermont will increase promotion of other technologies—such as efficient HVAC⁸ and refrigeration equipment—with strong savings potential for small and medium-sized businesses. The phaseout of ENERGY STAR screw-based LED customer incentives will take place because:

- This technology has increasingly become the standard screw-based lighting choice for Vermont businesses and, therefore, will need decreasing levels of support to motivate purchases.
- Purchase prices for this technology have dropped.
- Lighting requirements of the Energy Independence and Security Act of 2007, requiring lighting manufacturers to meet specific, higher efficiency standards by 2020, will effectively make screw-based LEDs a baseline efficient technology.
- Significant potential appears to remain in commercial and industrial fixtures and controls.

2.1.5 Targeted Markets

To address the needs and challenges of distinct business sectors, Efficiency Vermont will deliver technical guidance, financial incentives for recommended measures, and access to third-party financing for targeted markets, for example: Agriculture, colleges and universities, hospitals, kindergarten through grade 12 (K–12) schools, leased commercial real estate, lodging facilities, municipalities, restaurants, ski areas, manufacturing, and state buildings. Through an understanding of the characteristics common within each market, Efficiency Vermont will shape effective approaches to acquiring greater market penetration than would be achievable through services offered only at the individual project level. Such common characteristics may include similar time and capital constraints; equipment; degrees of interest in energy efficiency; and connections to trusted service providers, suppliers, and information sources.

⁸ On September 1, 2018, Efficiency Vermont discontinued prescriptive rebates for new oil and propane boilers and furnaces in order to expand support of biomass equipment.

Efficiency Vermont will maintain awareness of evolving technologies, changing economic conditions, consumer demand, and a range of challenges and opportunities particular to specific sectors.

2.1.6 Key Commercial Technologies

Efficiency Vermont will continue to maintain awareness of technologies with the potential to provide significant benefits in a wide range of commercial applications and will engage in efforts to bring these benefits to Vermont's commercial sector.

Commercial Lighting

Efficiency Vermont will engage in increased promotion of the below technologies. Efficiency Vermont expects growth in adoption of these technologies, as their use in Vermont is currently low and customer interest is high.

- Overhead LED fixtures—delivering significant energy savings over fluorescents.
- Integrated controls—providing greater savings over full-room lighting controls by enabling lumen-level adjustment.
- Networked controls—coordinating with other building systems to cut energy use for lighting and other equipment. For example, a connected HVAC system can be alerted that a room is empty (detected by lighting occupancy controls) and adjust output accordingly. Typically, this technology will be delivered in coordination with lighting designers.

To help Vermont businesses benefit from efficient lighting technologies and design, Efficiency Vermont will:

- Expand the scope of product supply chain engagement to reduce purchase prices and improve targeted product availability
- Provide training and support to lighting designers, contractors, and suppliers through Efficiency Vermont's Efficiency Excellence Network (see Section 2.3.2)
- Monitor and evaluate emerging lighting technologies for possible inclusion in offerings
- Promote quality lighting products and initiatives in collaboration with the Consortium for Energy Efficiency, DesignLights Consortium®, ENERGY STAR, Northeast Energy Efficiency Partnerships, and the U.S. Department of Energy.

Heating, Ventilation, Air Conditioning, and Refrigeration (HVAC-R)

As part of its efforts to adjust for the anticipated decline in new adoption of screw-in LED lighting, Efficiency Vermont will place increased emphasis on HVAC-R technologies in order for customers to continue to benefit from deepening efficiency in their facilities. Key strategies will include expansion of the Efficiency Excellence Network (discussed in Section 2.3.2) to include entities throughout the equipment supply chain, with a focus on:

- Increasing the installation of high-efficiency equipment, such as hydronic circulator pumps, controls, high-efficiency condenser units, and qualifying biomass boilers and heat pump water heaters

- Optimizing entire systems through whole-building practices, including ongoing system monitoring and management, monitor-based commissioning, building retuning, retrocommissioning, benchmarking, and energy system optimization
- Providing customers with guidance about heat pump technologies, including centrally ducted, air-to-water, and geothermal heat pumps, on-site in face-to-face interactions, or through the Efficiency Vermont contact center and website, at events, and via members of the Efficiency Excellence Network (see Section 2.3.2)
- Coordinating with distribution utilities on messaging about heat pumps. Efficiency Vermont will assist customers with information about:
 - How to determine if a heat pump is the right option to pursue, based on an analysis of existing and future fuel costs, building type, and other factors to provide a limited feasibility analysis
 - How heat pump technology works, and what units will look like when installed in a home or business
 - Products and qualified product lists
 - The benefits of efficiency when coupled with the installation of a heat pump
 - The building types and locations in the home or business where heat pump technology solutions are most effective
 - How to find local suppliers of efficient technologies
 - Finding a contractor
 - Available heat pump rebates and incentives
 - All available financing options for heat pumps.

Toward these ends, Efficiency Vermont will:

- Expand the scope of equipment supply chain engagement to reduce purchase prices, improve product availability, and leverage relationships in the delivery of efficiency information to customers.
- Extend supply chain efforts, including upstream incentives, to an expanded range of technologies—most notably an increase in commercial refrigeration.
- Continue to evaluate emerging technologies for inclusion in services.
- Maintain involvement with industry trade associations and marketing / buying groups.
- Deploy refrigerant leak detectors at selected large commercial customer sites to identify leaks of refrigerant. This will be done with the aim of decreasing both electricity use and greenhouse gas emissions stemming from refrigerant leaks. Refrigerant leaks cause equipment to operate inefficiently. The refrigerant itself is also a highly concentrated greenhouse gas, having a global warming potential thousands of times that of carbon dioxide.
- Partner with contractors to help small and medium-sized business customers identify and repair refrigerant leaks, beginning in 2020.
- Help businesses that aim to switch to natural refrigerants identify high-efficiency equipment. Engage with a new supply channel (commercial kitchen equipment) to promote midstream adoption of natural refrigerant reach-in refrigerators and freezers.

Industrial Process Equipment

Efficiency Vermont will work with manufacturers and other businesses to identify improvements for pumps, motor controls, variable frequency drives, compressed air systems, and process heating and cooling systems. Efforts will include:

- Supply chain partnerships to increase the adoption of efficient technologies
- Coordination with qualified auditors to take a system-wide or facility-wide approach to equipment auditing
- Deepened engagement with the small and medium-sized business sector by way of personalized walk-throughs
- Continued research and service development to deepen market knowledge, to further develop internal processes, and to increase customer engagement and optimized savings.

Combined Heat & Power (CHP)

To promote the use of best practices and best-in-class CHP systems, Efficiency Vermont will continue to engage with customers on lost-opportunity, customer-initiated, or vendor-initiated projects where CHP and distributed renewable generation technologies are being considered. These customers are often operators of wastewater treatment, agricultural, industrial, and institutional facilities that have: 1) on-site electricity generation capability, and 2) substantial heating needs. Customers will be encouraged to pursue any available funding or technical assistance from other sources. Efficiency Vermont resources will focus primarily on the provision of technical assistance, although incentive funds for CHP projects may also be provided to customers when CHP systems meet requirements established by the Commission. Additionally, Efficiency Vermont will team up with other distribution utilities and community partners to promote CHP efforts.

2.2 SERVICES FOR RESIDENTIAL CUSTOMERS

The existing homes and residential new construction markets serve customers of all income levels and building types. *Single-family* refers to buildings with up to four units and *multifamily* refers to buildings with five or more units.

2.2.1 Existing Market-Rate Homes

The Existing Homes thermal and electric budget will include services for homes that are retrofitted with new energy efficiency measures to make the homes more safe, durable, healthy, comfortable and energy efficient. The budgets and savings include those for all income levels and building types.

Existing Homes	2018	2019	2020	2018-2020
Electric				
Budget	\$3,892,033	\$5,322,837	\$5,320,400	\$14,535,270
Annual MWh Savings	1,870	2,774	2,770	7,414
Total Resource Benefits	\$1,462,136	\$2,774,000	\$2,772,770	\$7,008,906
Summer kW Savings	168	250	249	667
Winter kw Savings	385	583	582	1,549
Lifetime MWh Savings	15,823	25,521	25,484	66,827
Thermal				
Budget	\$4,411,054	\$6,629,097	\$6,674,854	\$17,715,005
MMBtu Savings	20,046	18,000	17,527	55,573

Single-Family Homes

In continued alignment with Vermont’s thermal efficiency goal of lowering energy use by 25% in 80,000 homes by 2020, Efficiency Vermont will build upon effective approaches to improve the energy efficiency, durability, safety and comfort of existing residential buildings statewide. Efficiency Vermont will continue to expand its residential efforts with a view toward enabling more Vermonters to participate in and benefit from taking energy efficiency actions. These efforts will be designed to provide customers with greater ability to approach household energy performance improvement as a process with multiple, often interactive opportunities rather than as a single project. This focus will empower customers to take control of household energy performance and to make informed decisions according to their priorities and budgets. For homeowners unable to afford whole house upgrades, Efficiency Vermont will continue to focus on approaches designed to improve homes over time.

Efficiency Vermont will:

- Continue to support a network of contractors to identify and implement energy upgrades for homeowners. The Efficiency Excellence Network (see Section 2.3.2) provides Building Performance Institute (BPI) certified contractors with ongoing support and resources as they engage with homeowners.
- Partner with Vermont banks and credit unions offering the Heat Saver Loan to finance heating system purchases and comprehensive thermal efficiency projects completed by contractors in Efficiency Vermont’s Efficiency Excellence Network.
- Offer financial incentives for the completion of home improvement projects completed by Home Performance with ENERGY STAR contractors.
- Continue efforts, as described in Section 2.2.4, to increase Vermonters’ access to and awareness of high-quality efficient products and to lower consumer prices for efficient products.
- Deliver a digital engagement initiative (also known as Advanced Residential Integrated Efficiency Services, or ARIES). Home energy monitors will provide participating customers with live energy usage information. This effort aims to motivate behavioral changes and efficiency upgrades, as appropriate, to reduce energy consumption. Efficiency Vermont will continue to coordinate with distribution utilities to avoid duplicative services. At the time of this update to the Triennial Plan, Efficiency Vermont was exploring the use of home energy monitors as a method of customer engagement. Additional analysis of program and monitor data in 2020, may support future savings claims.⁹
- Test a prescriptive option for “do it yourselves,” providing best practice information, post-project quality assurance follow-up, and financial incentives for completion of energy efficiency projects.
- To continue supporting the State’s weatherization goals, Efficiency Vermont will provide a rebate for the completion of air sealing and insulation of attics and basements by a contractor of the homeowner’s choice. Homeowners who qualify as moderate income (80–120% of area median

⁹ If or when Efficiency Vermont decides to claim savings for this program in the future, Efficiency Vermont will submit a Program Implementation Plan for the Department to review. Efficiency Vermont anticipates that any savings claims would go through the standard Technical Advisory Group process for Department review and approval.

income) will receive additional incentives for this service.¹⁰ Efficiency Excellence Network contractors will have access to the Heat Saver Loan to help their customers finance a project.

- The Home Performance with ENERGY STAR program will provide increased incentives for all Vermonters, including focused support for moderate-income customers. Incentives for the Home Performance with Energy Star work will be based on a customer’s income level.¹¹
- Continue to offer a high-efficiency wood pellet boiler and furnace initiative providing financial incentives for whole-house heating system replacements.

Multifamily Homes

Efficiency Vermont will offer rental property owners financial and technical assistance in support of efficiency improvements in their buildings. As part of its efforts to inform and engage owners, Efficiency Vermont will leverage relationships with nonprofit affordable housing and market-rate property developers and operators, construction professionals, the Vermont Landlords Association, and the Vermont Housing Managers Association. Efficiency Vermont will partner with Vermont Gas Systems on projects in buildings with natural gas service. Renters will have access to all the Efficiency Vermont retail efficient products rebates and prescriptive incentives available to other residential customers and will be able to access financial and technical assistance through Efficiency Vermont for other direct services.

2.2.2 Existing and New Low-Income Housing

Efficiency Vermont will invest more than \$15.5 million over the three-year performance period to help low-income households reduce their energy costs through long-standing partnerships with: 1) low-income housing and service providers, including the agencies of Vermont’s Weatherization Program; 2) affordable housing funders, including the Vermont Housing and Conservation Board and the Vermont Housing Finance Agency; and 3) multifamily housing developers, including Housing Vermont.

Minimum Low-Income Efficiency Spending

Low Income Services	2018	2019	2020	2018-2020
Budget	\$5,254,059	\$5,214,586	\$5,086,356	\$15,555,000
MWh Savings	2,183	2,286	2,462	6,931
MMBtu Savings	5,681	5,562	5,125	16,368

Services in 2018–2020 will include:

- Installation of lighting, appliances, and—as applicable—cold climate heat pumps to replace electric resistance heat, heat pump water heaters for electric resistance domestic hot water, and cost-effective custom measures in high-use low-income households.¹²

¹⁰ This was launched in the second quarter 2019 and was reported in Efficiency Vermont’s 2019 First Quarter Program Notice. The Notice was filed on May 23, 2019 in Case No. 18-3838-INV. See page 2 of the Notice.

¹¹ Previously, the amount of the incentive was based on the energy saved from the weatherization work.

¹² In the third quarter 2019, Efficiency Vermont updated secondary qualification criteria for targeted high use (THU) services: any income-eligible customer with an electric energy burden greater than or equal to 3% of

- Continue distribution of energy savings kits containing LED bulbs, advanced power strip, efficient showerhead and faucet aerators through the Vermont Foodbank. Additionally, Efficiency Vermont will work with partner organizations, including Habitat for Humanity and Housing Authorities, to ensure their low-income customers and clients have access to free LED lightbulbs.
- Improvement of the energy efficiency of buildings housing low-income Vermonters through agencies of Vermont’s Weatherization Program.
- Support for the application of design and construction approaches that result in housing that exceeds Vermont’s Residential Building Energy Standards and ENERGY STAR specifications by partnering with Vermont’s network of nonprofit affordable housing providers.
- A zero energy modular (ZEM) option for prospective mobile home buyers and renters, in partnership with the Vermont Housing and Conservation Board. In 2020, Efficiency Vermont plans to expand production capacity by partnering with a new ZEM home developer. Also in 2020, Efficiency Vermont aims to test the construction of a HUD-compliant unit on a steel chassis with wheels, after codeveloping a specification with a HUD manufacturer using key targets for energy efficiency, health, and durability.
- Technical and financial support for new construction and major renovations of multifamily properties developed by Vermont’s affordable housing delivery network, which uses state and federal subsidies.
- Identification and implementation of innovative measures in targeted high-performance multifamily buildings to support net-zero goals or Passive House standards.
- Customer engagement activities designed to empower households with information about their energy usage and to motivate behavioral changes and adoption of efficient products.¹³ Given the uncertainty of anticipated savings levels, Efficiency Vermont did not claim savings in 2019. Based on its preliminary evaluation of 2019 activities, Efficiency Vermont is not planning to claim savings in 2020, and will continue to implement the lessons learned to engage with property owners, managers, and residents of low income, multi-family buildings.
- Continuing to offer a program to replace or install new (where appropriate) wood or pellet stoves at no cost for low-income customers. These new replacement stoves are more efficient, safer, and cleaner to operate than traditional wood or pellet stoves. The service will operate in partnership with the Clean Energy Development Fund, leveraging existing Low-income Electrical Efficiency Partnership contracts with state weatherization agencies, and partnering with local retailers to provide competitively priced stoves and complete installation.¹⁴
- Continuation of the appliance replacement voucher program, which launched in the third quarter 2019. This program allows low-income customers that do not qualify for the comprehensive targeted high-use program, to replace one appliance in their home at no cost, by redeeming a customized voucher at a participating retailer. Available appliances include refrigerators, freezers, washing machines, air conditioners, dehumidifiers, and wood or pellet stoves. Efficiency Vermont will continue to recruit and train retailers and plans to expand the number of participating retailers.

household income may qualify for THU services. These criteria replace the previous 10,000 kWh per year consumption threshold.

¹³ This has been referred to as the “Energy Choices” program.

¹⁴ This was launched in the first quarter 2019 and was reported in Efficiency Vermont’s 2019 First Quarter Program Notice. The Notice was filed on May 23, 2019 in Case No. 18-3838-INV. See page 2 of the Notice.

2.2.3 Residential New Construction

Efficiency Vermont’s support for the creation of efficient new buildings will continue to focus primarily on the professionals engaged in architectural design and construction. These include architects, engineers, specialty design service providers, and practitioners of construction trades. Efficiency Vermont will also engage with developers, equipment suppliers, installation contractors, commissioning agents, appraisers, lenders, and real estate agents, as well as certain building owners, as key members of project teams, particularly regarding construction undertaken by institutions, by government agencies, and by large businesses with multiple buildings.

Residential New Construction	2018	2019	2020	2018-2020
Electric				
Budget	\$3,323,926	\$3,541,667	\$3,383,333	\$10,248,926
Annual MWh Savings	2,138	1,917	1,833	5,888
Total Resource Benefits	\$8,016,432	\$6,901,200	\$6,782,100	\$21,699,732
Summer kW Savings	239	192	183	614
Winter kw Savings	488	427	409	1,324
Lifetime MWh Savings	41,725	33,356	31,894	106,975
Thermal				
Budget	\$193,985	\$0	\$0	\$193,985
MMBtu Savings	3,427	-	-	3,427

The Residential New Construction budget will include services for homes that are built with new energy efficiency measures, to make the homes more safe, durable, healthy, comfortable and energy efficient. The budgets and savings include those for all income levels and building types. The residential new construction budget in 2019 and 2020 is entirely funded by electric efficiency funds, not TEPF funds.¹⁵

Efficiency Vermont will deliver a range of technical services appropriate to support the varying efficiency aims that Vermonters seek in their new homes and will offer financial incentives and rating services to encourage building to high-performance efficiency standards. To assist builders and owner–builders in meeting and exceeding Vermont Residential Building Energy Standards while promoting low-load and net-zero building practices, Efficiency Vermont will offer services in support of the construction of homes meeting the following levels of energy performance:

- **Efficiency Vermont Certified Base Level 2.0:** Homes meeting or exceeding specifications for air leakage levels, continuous insulation, and balanced ventilation.
- **Efficiency Vermont Certified High-Performance Level:** Homes meeting elevated criteria for comprehensive energy efficiency and suitability to achieve net-zero energy use with the incorporation of renewables.

¹⁵ For more information on residential new construction funding, see Efficiency Vermont’s October 11, 2019 “Response to requests made in the first workshop” in Case No. 19-2956-INV.

- **Zero-Energy Modular Homes:** Manufactured homes meeting high-performance criteria for low energy use, durability, health, and safety. This effort is also mentioned in the discussion of low-income services in Section 2.2.2.

Customers that meet program requirements will also be eligible for additional incentives that go beyond Efficiency Vermont’s standard offering:

- **All-Electric Bonus:** Homes that are built without any fossil fuel appliances or heating systems will be eligible for a bonus incentive. Efficiency supports customers in making cost effective decisions by providing objective advice and information.
- **Moderate-Income Adder:** Customers that meet program requirements and have a household income of between 80% and 120% of the area median income will be eligible for an additional incentive.

All other residential customers building new homes who will not meet program requirements will be able to call in to receive technical support over the phone and via e-mail.

To advance efficiency in the marketplace, Efficiency Vermont will:

- Collaborate with builders, appraisers, lenders, developers, and real estate agents through the Vermont Green Home Alliance, advocating for efficient new construction and promoting the value of efficiency in home sales
- Disseminate information about efficiency through media placements
- Support builders through the Efficiency Excellence Network (see Section 2.3.2)
- Partner with the Home Builders and Remodelers Associations of Vermont through trainings and events
- Continue outreach efforts with building supply houses and electric utilities, to share information with their customers
- Provide trainings for technical schools and other partners with a focus on workforce development.
- In response to developer requests for fossil-free multifamily developments, Efficiency Vermont will work with a multifamily customer to deploy and monitor heat pump water heating systems for a mid-sized multifamily development. The goal of this project will be to determine the design considerations, cost, and performance of efficient electrical water heating systems for new construction multifamily properties in Vermont.

New Construction Information and Education

Efficiency Vermont will provide energy efficiency information and education to professionals and tradespeople involved in new construction and renovation projects through the Energy Code Assistance Center and the annual Better Buildings by Design Conference. Discussion of these efforts can be found in Section 2.4.1.

2.2.4 Retail Efficient Product Services

Efficient Products	2018	2019	2020	2018-2020
Electric				
Budget	\$11,581,147	\$11,103,669	\$10,673,973	\$33,358,789
Annual MWh Savings	50,068	40,853	26,147	117,068
Total Resource Benefits	\$30,015,821	\$26,554,450	\$16,995,550	\$73,565,821
Summer kW Savings	4,748	3,677	2,484	10,909
Winter kw Savings	12,747	10,213	6,537	29,497
Lifetime MWh Savings	398,824	330,909	211,791	941,524
Thermal				
Budget	\$1,790,332	\$1,049,735	\$545,812	\$3,385,879
MMBtu Savings	63,412	19,300	17,961	100,673

Efficiency Vermont will provide support for a range of consumer products that meet or exceed efficiency standards set by the U.S. Department of Energy’s ENERGY STAR program. These products include lighting fixtures, appliances, air conditioners, dehumidifiers, pool pumps, heat pump water heaters, heat pump clothes dryers, smart thermostats, electronics, and indoor horticultural¹⁶ lighting. Services will be designed to motivate product purchases by increasing efficiency knowledge and reducing purchase costs for Vermonters making retail purchases for their homes and businesses. Support will include consumer rebates, price reductions at the manufacturer and retail level, midstream sales incentives that influence stocking practices, point-of-purchase information, advertising, an online marketplace that scores the energy efficiency of products to inform customer buying decisions, and promotional and public information activities.¹⁷ Efficiency Vermont will continue offering a recycling program for refrigerators and freezers launched in the third quarter 2019.

Key to the success of these efforts will be Efficiency Vermont’s continuing services to retailers and upstream partners in the product supply chain to ensure the availability of high-quality efficient products in Vermont stores. Efficiency Vermont field staff will deliver merchandising support, guidance on efficient product differentiation on the sales floor, and product knowledge training to staff of efficient product retailers.

In the 2018–2020 period, Efficiency Vermont will be phasing out customer incentives of screw-based LED lighting, and will continue to promote smart energy choices in residential lighting by raising awareness of ENERGY STAR lighting. Efficiency Vermont’s efforts with respect to this technology will shift from customer incentives to helping buyers identify and choose high-quality screw-in LEDs over poor-quality options that have entered the market. Efficiency Vermont will place an increased emphasis on other beneficial technologies, such as connected lighting, smart thermostats, and heat pump water heaters, and will

¹⁶ Efficiency Vermont launched the horticultural lighting rebate in the second quarter 2019, which was reported in Efficiency Vermont’s 2019 First Quarter Program Notice filed in 18-3838-INV on May 23, 2019, at page 2.

¹⁷ The online marketplace is on the Efficiency Vermont website at <https://marketplace.encyvermont.com/>.

explore expanded or new efforts for additional technologies. A discussion of the reasons leading to the phaseout of screw-based LEDs can be found at the end of Section 2.1.4.¹⁸

On September 1, 2018, Efficiency Vermont discontinued prescriptive rebates for new oil and propane boilers and furnaces and expanded support of biomass equipment, including a high efficiency wood pellet and cord wood stove offer.

2.3 ACTIVITIES IN SERVICE TO ALL MAJOR MARKETS

While serving specific markets, Efficiency Vermont will also provide services with an impact on multiple sectors. A key element of this cross-sector approach will be Efficiency Vermont's ongoing support for the businesses that Vermonters turn to for efficient products and services. These businesses include retailers of appliances, lighting, and electronics; companies that manufacture, distribute, supply, install and service HVAC-R equipment; firms that design and construct new buildings; and financial institutions. Efficiency Vermont's efforts in coordination with these businesses, although not always evident to the public, have a profound impact on Vermonters' ability to lower energy use in their homes and places of business. Efficiency Vermont's services enable Vermont homes and businesses to have access to a valuable network of knowledgeable providers while driving business to these providers.

Also notable in 2018–2020 will be Efficiency Vermont's efforts designed in response to customer interest in objective and consistent guidance on fossil fuel and electric energy consumption, generation, and load management for buildings and equipment, including vehicles. Customer choices made today in these matters will affect use of the electric system and all forms of energy within the state for years to come. Efficiency Vermont will continue to be eager to collaborate with distribution utilities and market actors to provide customers with optimally cost-effective approaches to energy use management, including energy efficiency, renewable generation, energy storage, demand response technologies, and other solutions as appropriate. These efforts to respond to customer interest in complete energy solutions will be incorporated into the framework of existing services, without creating separate or incremental costs charged to the electric or thermal energy and process fuels (TEPF) budgets.¹⁹ This is achieved by providing customers with information about relevant distribution utility, and other programs, to help customers find comprehensive energy solutions, which is enabled by collaborative efforts with partner organizations.

2.3.1 Coordination with Energy Efficiency Utilities and Distribution Utilities

Efficiency Vermont will continue its work with Vermont Gas Systems and Burlington Electric Department to ensure coordination in the implementation of Energy Efficiency Utility (EEU) services. Efficiency Vermont will engage in ongoing communications, coordination and collaboration with electric distribution

¹⁸ Section 2.1.4 is Small & Medium-Sized Businesses. The reasons leading to the phaseout of screw-based LEDs, discussed in 2.1.4, is also applicable to households.

¹⁹ Efficiency Vermont will not use EEC or TEPF funds to provide technical assistance or incentives to customers with respect to renewable generation, transportation measures saving fossil fuels, or storage measures. Efficiency Vermont's role will be to provide general information about these technologies and to direct interested customers to the appropriate distribution utilities or market actors for further information regarding incentives and programs administered by such entities.

utilities across the state in support of efforts to meet the specifications of the Renewable Energy Standard—Tier III, which requires distribution utilities to implement programs intended to achieve fossil fuel reduction targets. Efficiency Vermont’s collaboration with utilities includes both program level and joint visits and project development. The teaming effort is providing customers a more seamless experience while also maximizing the impact and value to customers. Efficiency Vermont will coordinate with distribution utilities to draw on one another’s experiences and goals to design and implement programs that maximize the value delivered to shared customers.

2.3.2 Services to Contractors and Equipment Suppliers

The Efficiency Excellence Network

“We are fortunate having Efficiency Vermont’s Energy Efficiency Network trade partners handy to fit together complex solutions. This network builds my confidence and ability to lead. Succeeding in making energy efficiency happen regularly provides our team meaningful personal rewards beyond basic profit and loss.” —Bill Chidsey, Owner, Solar Harvester, Newbury, Vermont

Efficiency Vermont will continue to coordinate and expand its Efficiency Excellence Network, providing workforce development and promotional support for providers of efficient goods and services. Efficiency Excellence Network services will support the following sectors in identifying and promoting efficient approaches for their customers:

- Contractors: Electrical, HVAC (whole building and mini-split heat pumps, heat pump water heaters, advanced wood heat, oil and propane dealers) and refrigeration
- Designers (architects, engineers, and lighting)
- Homebuilders (see Section 2.2.3 for a discussion of additional services to new construction trades and professions)
- Building improvement contractors
- Equipment manufacturers, distributors, and suppliers
- Retailers selling efficient products (see Section 2.2.4 for a discussion of additional services to the retail product supply chain).

Efficiency Vermont will provide Efficiency Excellence Network members with:

- **Workforce development:**
 - Training: Technical, sales, and customer service
 - Education credits and training for equipment installers, system designers, and service technicians through Efficiency Vermont’s annual Better Buildings by Design Conference (see Section 2.4.1) and monthly training offers.
 - Professional certifications, in affiliation with the Building Performance Institute, to deliver retrofit efficiency services to Vermont homes (Home Performance with ENERGY STAR contractors) and small businesses and rental properties (Building Performance contractors)
 - A designated website, providing information about available services, training, and business opportunities at <https://contractors.encyvermont.com/>
- **Support for member businesses:**
 - Extensive program promotion

- Consumer financial incentives, and third-party financing options for projects completed by contractors in the network
- Enhanced listings and an improved search tool for consumers at <https://www.encyvermont.com>
- Cooperative advertising opportunities
- **Personal engagement**, in support of the commercial and residential equipment supply chain, with:
 - Distributors, manufacturers, and suppliers, in order to reduce equipment purchase costs, ensure Vermont product availability to contractors and consumers, and reduce lead times for product ordering
 - Manufacturers, regarding emerging and rapidly advancing efficiency technologies, such as lighting technologies.

2.3.3 Trade Association Partnerships

In addition to engaging in direct customer interaction, Efficiency Vermont will work with professional and trade member organizations representing a wide range of constituents. By sharing targeted information through these trusted channels, Efficiency Vermont will empower businesses with knowledge about best practices and resources that they can use to strengthen their bottom line. Vehicles will include association newsletters, websites, and technical materials, as well as event sponsorship, speaking engagements, conference and trade show participation, training workshops, and promotional and educational campaigns.

Partner organizations will include:

American Institute of Architects—VT Chapter	Vermont Association of School Business Officials
American Society of Heating, Refrigerating, and Air-Conditioning Engineers—VT Chapter	Vermont Convention Bureau
Building Performance Professionals Association of VT	Vermont Fuel Dealers Association
Construction Specifications Institute	Vermont Green Building Network
Farm to Plate Network	Vermont Green Home Alliance
Green Mountain Water Environment Assoc.	Vermont Healthcare Engineers Society
Heating, Air-conditioning, and Refrigeration Distributors International	Vermont Hospitality Council
Home Builders & Remodelers Associations of VT	Vermont Inn and Bed & Breakfast Association
ICC Building Safety Association of VT	Vermont Maple Sugar Makers Association
Illuminating Engineering Society of North America	Vermont Rental Property Owners Association
Regional development corporations	
University of Vermont Extension	Vermont Retail & Grocers Association
Vermont Alliance of Independent Country Stores	Vermont Rural Water Association
Vermont Apartment Owners Association	Vermont Ski Areas Association
Vermont Association of Hospitals & Health Systems	Vermont Superintendents Association

2.3.4 Community-Based Activities

Efficiency Vermont will expand its engagement of targeted areas of the state in community-wide efficiency efforts. Building upon successful pilot efforts in six Vermont communities, Efficiency Vermont will partner with ACCD to work in additional communities, selected in part based on highest energy burdened areas, to assist local businesses, municipalities, nonprofits, and residential property owners and occupants in saving energy. Efficiency Vermont will continue to offer the following services, some of which launched in mid-2019, including:

- Enhanced incentives for municipalities and nonprofits
- Commercial and small to medium-sized business energy walk-throughs
- Referral and completion bonuses for small to medium-sized businesses
- Residential rental property energy walk-throughs
- Home Energy Visits

Efficiency Vermont will also engage with Vermonters interested in creating or joining efforts to reduce energy use in their towns, institutions, businesses, nonprofits, and homes. Efficiency Vermont will partner, support, and collaborate with town officials, town energy committees, local organizations, partners, and businesses to increase the impact of existing efforts, statewide campaigns, such as Button Up Vermont, or to support interest in creating new groups, devoted to increasing the impact of efficiency efforts. Offered services will include planning guidance, promotions, educational materials, volunteer training, and the contribution of efficient products for local energy-saving efforts.

2.3.5 Financial Services

In its ongoing commitment to help Vermonters overcome financial barriers to investing in cost-effective efficiency for their buildings and equipment, Efficiency Vermont will engage in the following efforts in 2018–2020.

Product and Service Price Reductions

To motivate Vermonters to make energy-efficient choices in the marketplace, Efficiency Vermont will target specific products and services for purchase price reductions. Primary mechanisms will be: 1) negotiated cooperative promotions that provide incentives to manufacturers, distributors, and retailers—both independent and chain stores—to lower the purchase price of products, and 2) rebates and financial incentives for:

- Efficient products and equipment purchased at the retail level and through commercial suppliers and installation contractors
- Process equipment for such businesses as farms, manufacturers, and industrial facilities
- The incorporation of advanced cost-effective techniques and approaches that enable the design and construction of high-performance residential and commercial buildings
- Building shell upgrades made by Building Performance contractors in small commercial and multifamily properties
- Efficient home improvement projects conducted by Home Performance with ENERGY STAR contractors.

Financing for Energy Efficiency Projects

Efficiency Vermont will work with lenders to ensure the availability of cost-effective financing for energy efficiency projects. By including energy savings in the repayment formula, lenders may be able to provide funding for individuals and businesses not otherwise qualifying for financing. In many instances, such financing creates a positive cash flow for borrowers, because of monthly energy savings that are larger than the loan payments. Efficiency Vermont will provide technical and financial analysis, promotions, and informational support for customers.

Efficiency Vermont will engage with third-party lenders regarding a range of financing vehicles, including:

- **Business Energy Loan:** Increasing opportunities for businesses, including agricultural operations, to finance efficiency projects by factoring energy savings into loan qualification calculations
- **Municipal Tax-Exempt Leasing:** Opportunities for municipalities and K-12 schools to make energy-saving upgrades without raising budgets or establishing bonds
- **Green Revolving Fund:** Financing for colleges, universities, and other nonprofit institutions, with financial support from the High Meadows Fund and in partnership with the Sustainable Endowments Institute
- **Heat Saver Loan / Efficiency Excellence Network Partnership:** Financing for heating system purchases and comprehensive thermal efficiency projects completed by Efficiency Vermont's Efficiency Excellence Network members.

As part of its efforts to bring efficiency within reach to more Vermonters, Efficiency Vermont will continue to:²⁰

- Conduct research and analysis of barriers faced by customers in using financing mechanisms
- Explore non-loan approaches to financing energy efficiency projects
- Deliver training for customer-facing staff and contractors to help them understand financing and explain financing options to customers to moving energy efficiency projects forward.

Financing Education and Analysis

To enable Vermonters to be aware of, understand, and make decisions regarding financing options, Efficiency Vermont will provide easy access to information by phone, through its website, in printed materials, and in media placements. Efficiency Vermont will continue to provide financial analysis for custom projects to help customers understand the financial aspects of efficiency investments. Efficiency Vermont will:

- Offer contractors tools to calculate and present financing options for their customers
- Provide <https://www.encyvermont.com> listings of financing options and lenders
- Make the discussion of cost-effective financing a standard part of service to customers lacking capital who can benefit from efficiency upgrades
- Present information on energy efficiency financing at community-based workshops in coordination with local energy committees.

²⁰ These activities were formerly DSS Financial and Leveraged Product Development activities.

- Train customer-facing staff and contractors on financing options, how to effectively educate and explain financing options to customers, and how to use financing to move energy efficiency projects forward.
- Conduct research and analysis of barriers faced by customers in using financing mechanisms

See Section 2.4.5 for a discussion of financial and leveraged product development

2.3.6 State, Regional, and National Partnerships

In service to Vermonters and in support of the State’s energy goals, Efficiency Vermont will continue to leverage the expertise and resources of entities engaged in a range of energy and efficiency endeavors, both in Vermont and outside the state. Efficiency Vermont will share its own expertise at regional and national gatherings, enabling Vermont to be both recognized for its innovations and informed by best practices in other states. Efficiency Vermont’s regional and national work has influenced the establishment of product specifications that ensure that Vermont consumers have access to the highest quality and most energy efficient products. In Vermont, partners will include the High Meadows Fund, the Vermont Housing and Conservation Board, the Regulatory Assistance Project, and many others. On a regional and national level, Efficiency Vermont will maintain ongoing partnerships with such organizations as the Northeast Energy Efficiency Partnerships, the New Buildings Institute, the Consortium for Energy Efficiency, ENERGY STAR, and the American Council for an Energy-Efficient Economy, working to share information on best practices and to establish uniform product eligibility criteria and program designs.

2.3.7 Data Analytics Platform

Efficiency Vermont hosts and manages a data platform, which was previously hosted by a contractor, to provide access, analyze, and report on energy usage for essential services and growing areas of service across markets. In 2018–2020, Efficiency Vermont will undertake work to expand the uses of and benefits from this platform, including efforts to increase the incorporation of energy usage data from Vermont distribution utilities and of new data types. Efficiency Vermont utilizes this usage information to help customers identify opportunities for efficiency measures or to modify operational plans or behaviors to reduce energy consumption. Although Advanced Metering Infrastructure (AMI) data sharing was limited in 2018 and 2019, monthly data was readily accessible for utilization and will continue to be available in 2020.

In 2019, Efficiency Vermont stood up a revised data analytics platform, taking the management of the data in-house to reduce costs further, to fulfill obligations under Docket 8316, and align use with portfolio offerings. This platform provides controlled internal access to data shared by Green Mountain Power and other AMI-enabled distribution utilities, restoring more complete AMI data use within Efficiency Vermont for its programs and services to ratepayers in 2020.

2.4 DEVELOPMENT AND SUPPORT SERVICES

Efficiency Vermont will continue to engage in efforts that build customer awareness and knowledge; help shape energy and efficiency policies; and identify approaches for optimal service development, delivery, and improvement. DSS activities may not directly result in efficiency savings but represent valuable aspects of energy efficiency service delivery and development, and include activities such as general administration, information technology, planning and reporting, and education and training.²¹ In 2018–2020, the below activities will be essential to Efficiency Vermont’s efforts to deepen energy savings and to have a lasting, positive impact on Vermont households, businesses, and communities. DSS activities are funded through a combination of electric and TEPF budgets. The three-year budgets by category and initiative follow.

	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2018-2020</u>
<u>Education & Training</u>				
Codes & Standards Support - Res	\$34,132	\$26,999	\$26,999	\$88,130
Codes & Standards Support - C&I	\$10,583	\$13,364	\$13,364	\$37,311
Energy Literacy Project	\$226,272	\$201,010	\$201,010	\$628,292
General Public Education	\$84,992	\$135,859	\$135,859	\$356,710
BBD Conference	\$27,907	-\$19,358	-\$19,358	-\$10,808
Customer Support	\$213,112	\$187,238	\$187,238	\$587,588
Public Affairs	\$91,905	\$99,685	\$99,685	\$291,274
Building Labeling	<u>\$9,083</u>	<u>\$26,713</u>	<u>\$26,713</u>	<u>\$62,509</u>
Sub-Total Education & Training	\$697,985	\$671,510	\$671,510	\$2,041,005
<u>Applied Research & Development</u>				
Emerging Data Services	\$246,953	\$215,769	\$200,000	\$662,722
Technology Demonstrations	<u>\$149,227</u>	<u>\$161,878</u>	<u>\$160,856</u>	<u>\$471,962</u>
Sub-Total Applied Research & Development	\$396,180	\$377,648	\$360,856	\$1,134,684
<u>Planning and Reporting</u>				
Annual Plan	\$32,396	\$28,337	\$57,875	\$118,609
Demand Resources Plan	\$20,396	\$285,482	\$270,000	\$575,878
VSPC Participation	\$7,480	\$18,119	\$21,100	\$46,699
ISO NE FCM Administration	\$117,007	\$136,032	\$139,300	\$392,339
External Reporting	\$127,526	\$103,248	\$115,200	\$345,974
Non-Regulatory Reporting	<u>\$55,427</u>	<u>\$80,257</u>	<u>\$53,000</u>	<u>\$188,683</u>
Sub-Total Planning and Reporting	\$360,232	\$651,475	\$656,475	\$1,668,182
<u>Evaluation</u>				
Savings Verification	\$46,976	\$27,138	\$27,138	\$101,251

²¹ Case No. EEU-2016-03, October 12, 2017, Commission Order Re: Development and Support Services Budgets, Evaluation Budgets, Other Program Budgets, Forecasts of Expected Savings, and Performance Targets, at page 2.

Technical Advisory Group	\$56,944	\$63,863	\$63,863	\$184,669
Technical Reference Manual	\$243,796	\$251,672	\$251,672	\$747,140
ISO-NE FCM Metering/M&E	\$120,130	\$97,312	\$97,312	\$314,753
Quality Management	<u>\$9,745</u>	<u>\$19,117</u>	<u>\$19,117</u>	<u>\$47,980</u>
Sub-Total Evaluation	\$477,591	\$459,101	\$459,101	\$1,395,793
<u>Administration & Regulatory Affairs</u>				
General Administration	\$123,092	\$157,397	\$160,000	\$440,489
Regulatory Affairs	\$293,040	\$304,114	\$313,448	\$910,602
Financing / Leveraging	<u>\$32,030</u>	<u>\$2,000</u>	<u>\$2,000</u>	<u>\$36,030</u>
Sub-Total Administration & Regulatory Affairs	\$448,162	\$463,511	\$475,448	\$1,387,121
<u>Information Technology</u>				
Core Business Software Applications	\$1,056,831	\$1,026,252	\$960,000	\$3,043,083
Utility Data Management	\$130,047	\$175,880	\$175,000	\$480,927
Reporting and Business Intelligence	<u>\$198,379</u>	<u>\$196,514</u>	<u>\$200,000</u>	<u>\$594,893</u>
Sub-Total Information Technology	\$1,385,257	\$1,398,646	\$1,335,000	\$4,118,903
Total Development and Support Services	\$3,765,409	\$4,021,890	\$3,958,390	\$11,745,689

2.4.1 Education and Training

Codes and Standards Support—Residential and Commercial and Industrial

To help Vermonters comply with or surpass State energy codes for new construction and renovation projects, Efficiency Vermont will provide a range of services, including key training and education for Vermonters involved in the design, construction, renovation, sale, and ownership of new and existing homes and commercial buildings.

- Energy Code Assistance Center
 - Technical assistance—In 2020, Efficiency Vermont expects to provide approximately 650 technical assists through this call center.
 - Distribution of code materials—In 2020, Efficiency Vermont expects to distribute approximately 1,000 code handbooks and other energy code-related materials.
- Energy code training and market partner support
 - Training for building professionals, real estate professionals, and municipal staff—In 2020, Efficiency Vermont expects to facilitate four building energy code training sessions, and to train more than 200 contractors.
 - Advisory support for market groups and partners—In 2020, Efficiency Vermont expects to participate in at least two advisory group meetings.
 - Blower door training—In 2020, Efficiency Vermont expects to facilitate at least four blower door training sessions.
- In 2020, Efficiency Vermont expects to assist approximately 100 partners including Vermont agencies, town energy committees, and commercial and industrial Account Management

customers Vermont agencies, town energy committees, and commercial and industrial Account Management customers, to discuss best building practices to meet code requirements.

Energy Literacy Project

In collaboration with Vermont's K-12 associations in every county of the state, nonprofit organizations, government agencies, and utility providers, Efficiency Vermont will continue to deliver the Energy Literacy Project through its implementation contractor. The project will provide information about energy, its use, and the impact of energy consumption to students, educators, and staff of Vermont's K-12 schools. The aims of the project are to promote energy literacy and to transform energy-related behaviors both within and beyond the classroom. This project will provide:

- Teacher training on incorporating energy literacy into all subject areas in all grades
- Support for the establishment of educator / peer learning groups specific to teaching energy literacy
- Continuing education credits and an Energy Literacy Certification program for teachers
- Learning resources for students and teachers such as curriculum-based workshops, hands on learning and energy management practices

In 2020, Efficiency Vermont estimates that it will collaborate with at least 50 schools and deliver approximately 200 workshops equitably distributed across the state. These workshops range from teaching an understanding of how the sun and wind work to renewable energy and home heat transfer, and are in alignment with the split electric and TEPF funding discussed in the Section 2.4 introductory paragraph above.

General Public Education

In alignment with the Commission's directive to provide general information to the public in order to increase customer awareness and understanding of the benefits of reducing energy use, and of the best technologies available to the public, Efficiency Vermont will provide information through:

- Print and electronic materials such as seasonal energy-saving tips and energy use guides for homes and businesses. In 2020, Efficiency Vermont expects to generate approximately 55,000 views of guides, tools, and question-and-answer content on www.encyvermont.com. This information will be created to build public knowledge of the value of energy efficiency and of ways people can make their homes and businesses more energy efficient.
- The e-mail newsletter *Watts New* and the blog *Energy. Forward.* In 2020, Efficiency Vermont's residential newsletter, *Watts New*, will be e-mailed to more than 15,000 subscribers. Efficiency Vermont projects that its news and blog section on www.encyvermont.com will draw more than 13,000 views in 2020.
- Social media and www.encyvermont.com. Efficiency Vermont estimates that in 2020 it will have more than 17,000 followers on its Facebook page.
- Participation in events such as home shows and energy fairs throughout the state. Efficiency Vermont staff will attend more than 100 community events in 2020, ranging in scope from exhibiting at regional home shows to presenting at local community workshops. Through this work, Efficiency Vermont staff will connect directly with tens of thousands of Vermonters.
- Proactive efforts with the media to develop stories that highlight how Vermonters can participate in and benefit from Efficiency Vermont services. In 2020, Efficiency Vermont estimates that it will

issue between 12 and 24 press releases, statewide, that highlight new customer services and resources, customer success stories, and other information of benefit to Vermonters.

- Relationships with strategic partners whose missions align with the overall objectives of Efficiency Vermont.

Better Buildings by Design Conference

Efficiency Vermont will present its Better Buildings by Design Conference annually. This two-day gathering is the region's premier design and construction conference, serving as a key resource to approximately 1,000 construction and design professionals, as well as equipment installation and service contractors. The conference will focus on best practices for building durability, superior performance, energy efficiency, and value for both residential and business new construction and retrofit projects. In addition to 40 workshops and hands-on demonstrations given by industry leaders, the conference will host a trade show of 50 exhibitors of efficient technologies and will present its *Best of the Best* awards for exceptional achievement in new and renovated high-performance buildings and homes.

Customer Support

Vermonters will continue to have easy access to expert energy efficiency information and guidance through Efficiency Vermont's multichannel Contact Center. Efficiency Vermont anticipates that the contact center will respond to more than 60,000 inquiries from existing customer and new Vermonters about energy use and management throughout the 2018–2020 performance period.

The Contact Center will provide the following services with an 85%²² or higher average satisfaction rating reported from both residential and commercial customers.

- Support customers with information about Efficiency Vermont's services, electric and thermal efficiency, efficient buildings and equipment, emerging energy technologies, renewable energy, and transportation efficiency.
- Efficiency Vermont will provide information resources and referrals aligning with customer needs, for the following customer groups:
 - Existing homeowner consultation for addressing electric and thermal energy solutions
 - Residential New Construction intake and consultation
 - Small and medium-sized business engagement
 - Commercial and industrial customer intake and consultation.

Additionally, the Customer Support team will coordinate and communicate with distribution utilities and other partner organizations to maintain a high level of knowledge of the services available to customers, so that Customer Support may provide consistent and accurate information to customers to ensure a positive experience.

²² As per Metrics 1 and 2 in *Efficiency Vermont's Service Quality and Reliability Plan*, the percentage of residential and business customers that contact Efficiency Vermont and are satisfied or very satisfied with Efficiency Vermont customer service must be greater than or equal to 80% for each customer group respectively.

Public Affairs

To deepen understanding among policy makers and the public about the broad policy, statutory, and regulatory bases for Efficiency Vermont's work, and about the benefits Efficiency Vermont provides to ratepayers, Efficiency Vermont will:

- Serve as a resource for government officials, regulators, businesses, and community organizations, providing information about energy, efficiency, and Efficiency Vermont. Efficiency Vermont estimates that it will hold 50 informational meeting exchanges and workshops in 2020 to provide such information
- Brief the Vermont General Assembly, other government officials, and other interested stakeholders on energy efficiency issues. Efficiency Vermont estimates that it will provide 25 educational testimonies or letters to lawmakers on these issues.
- Assist legislators with review and development of policy proposals related to the Efficiency Vermont scope of work.
- Draft papers on major Efficiency Vermont initiatives. Efficiency Vermont estimates that it will publish six white papers and blog posts focused on industry specific topics.
- Engage with potential partners and stakeholders to deepen the impact of Efficiency Vermont's services.
- Present information about Efficiency Vermont at public forums and meetings.

Building Labeling and Benchmarking

Efficiency Vermont will continue to support activities that increase the visibility and valuation of energy efficiency improvements in the market, including the issuance of certificates, energy labeling and benchmarking of commercial buildings. Examples of activities include the following:

- Coordination of the Vermont Home Energy Labeling Advisory Board, including coordination with partners and stakeholders as needed to support statewide labeling and benchmarking activity
- Issuing certificates for completed home energy improvement projects, outlining specific improvements made and anticipated energy savings
- Outreach and education for real estate professionals, appraisers, and home inspectors
- Support, training, and quality assurance as needed for qualified assessors delivering home energy labels
- Monitoring of activities and modification of plans in order to maximize impact.

2.4.2 Applied Research and Development

Efficiency Vermont will engage in a range of projects as part of its applied research and development efforts. The project areas shown below will undergo ongoing assessment to ensure alignment with the goals and priorities outlined in this Plan.

Emerging Data Services

These efforts explore new approaches and technologies that show promise for increasing energy savings, decreasing delivery costs, and increasing customer engagement and satisfaction. This work enables Efficiency Vermont to continue leveraging Vermont's investment in smart grid infrastructure, connected devices, inexpensive submetering technology, and other emerging data innovations. It also permits

unique information technology investments in research and development that improve Efficiency Vermont's ability to manage large and complex data resources and to build systems that use data to help people achieve energy savings goals.

The work of the initiative is ongoing and targets a specific outcome: Determining the value of an emerging data service. This exploration involves three basic scenarios that can lead to transformation in the ways energy services are provided:

1. Investigating novel data applications for which no prior research exists. Efficiency Vermont will investigate the potential of ideas—involving software, hardware, or a combination—to lead to successful implementation of cost-effective data services. The aim of such studies will be to identify effective technologies that can scale under other (presumably RA) budget categories.
2. Analyzing an emerging data application for which prior research exists. Efficiency Vermont will analyze existing research on data products or services with potential to better enable successful implementation of cost-effective services. Efforts will aim to determine the extent to which the approaches should move directly into RA or other DSS categories.
3. Creating applications to be supported under RA or the core business software applications DSS budgets. Efficiency Vermont at times needs to change application infrastructure to support continued integration, program enhancement, and savings opportunities. Efficiency Vermont will use the initiative to create such applications for deployment through RA programs. Activities under this scenario involve identification, investigation, evaluation, development, and testing of technology and approaches designed to achieve energy service objectives.

Technology Demonstrations

Technology demonstration funding supports applied research, development, and demonstration designed to optimize the creation of cost-effective solutions for meeting Efficiency Vermont's long-term RA goals. Efficiency Vermont will plan these activities to advance the goals of sound product and program design over time through field testing, technology demonstrations, and research on emerging technologies and implementation strategies.

2020 Activities—Started in 2018 or 2019 and continuing in 2020

Healthcare Partnership: In alignment with customer interest and national trends, Efficiency Vermont launched an effort to assess the impact of efficiency measures on resident health. Preliminary research outside Vermont has proven that links exist between efficiency measures (such as air sealing and use of efficient heating systems, ventilation, clothes dryers, and cookstoves), indoor air quality, and resident health. Efficiency Vermont will continue to work with the Vermont Office of Economic Opportunity's Weatherization Assistance Program, and partners within the healthcare industry, with the goal of better understanding which healthcare measures could be implemented at the time of energy efficiency upgrades, and understanding how these measures might work together to achieve better patient health and reduce health and energy costs simultaneously. The study will aim to document the impact of these efforts in specific Vermont locations, and to grow the body of research at Vermont-specific sites. The outcomes of this project may support long-term funding for health-related efficiency measures and will inform future resource acquisition residential programs.

Demand Response Capability and Effectiveness Assessment:

- Activities exclusive to 2018—This project involved coordinating with the Department and distribution utilities to review and finalize a catalog of demand response measures that was commissioned by the Department as part of its recent potential study. The catalog was available in 2018. This will enable Efficiency Vermont, the Department, and distribution utilities to assess the potential value—for ratepayers, distribution utilities, and the grid—in combining energy-efficient approaches with demand response-capable equipment. The project began with a thorough literature review of demand response measures, including but not limited to distribution utility AMI-enabled dynamic pricing, rate designs, and demand response programs to determine the opportunity for collaboration with EEU services.
- 2019 activities—In partnership with one or more distribution utilities, Efficiency Vermont assists with identification of efficient consumer products, energy management systems, and commercial equipment with demand response capabilities and applicability in Vermont. Efficiency Vermont also assists with assessing consumer informed-consent standards relevant to demand response-capable equipment. Through this effort, Efficiency Vermont aims to identify and demonstrate where it can complement existing demand response services while bringing new value to customers.
- 2020 activities—The 2019 demonstration project will continue with one or more utility partners continuing to test the capabilities and reliability of controlling residential technology. The current pilot in partnership with Washington Electric Co-op (WEC) tests both electric resistance and heat pump water heater demand response abilities. Efficiency Vermont’s role in this pilot will continue. In addition, Efficiency Vermont will support WEC in exploring the addition of new electrification efficiency measures for the demonstration, such as electric vehicle charging equipment and cold climate heat pumps, for both the ability to respond to demand events and more complex flexibility in supporting the grid during times of constraint or projected constraint, as well as overall management for greater beneficial outcome. The outcomes of this project will guide future summer and winter peak demand savings programs.

Greenhouse Gas Reduction:

- 2019 activities—Efficiency Vermont assesses new and innovative greenhouse gas reduction strategies related to energy efficiency with the potential to influence manufacturing and supply chain processes for efficient products, and Vermont business and building-level greenhouse gas footprint calculations and incentive programs. Examples include quantifying the greenhouse gas savings associated with incentivizing certain weatherization materials over other weatherization materials that have similar uses (e.g., one type of insulation compared with another type).
- 2020 activities—The 2019 work will continue with deepening the understanding of the greenhouse gas impact of Efficiency Vermont’s portfolio. By expanding and undertaking projects for both residential and commercial products that have GHG and efficiency opportunity, Efficiency Vermont will continue to map out associated GHG impacts and how to report and make decisions based on this expanded understanding regarding those greenhouse gas impacts. Some of those projects will include additional weatherization materials comparisons, advanced wood heating lifecycle mapping, and natural refrigerants impact tracking. The outcomes of this research will inform future total resource benefits calculations.

New 2020 Activities

The following activities are planned to launch in 2020:

Healthy Buildings: Efficiency Vermont will partner with commercial and industrial customers, the Vermont Department of Health, and healthcare providers to identify a healthy building pilot project in order to evaluate the impact of energy efficiency services on indoor environmental quality and occupant health. The goal of the pilot will be to better understand which healthy building measures could be implemented at the time of energy efficiency upgrades, and to understand how these measures might work together to achieve better occupant health and reduce health and energy costs simultaneously. For example, a potential pilot could evaluate the health impact of air sealing, controlled ventilation and spot humidification on reducing viral spread in schools or health care centers. The outcomes of this project will support long-term funding for health-related efficiency measures and will inform commercial programs for meeting future resource acquisition targets.

Deeper Energy Savings through Advanced Regression Modeling: Efficiency Vermont will work with commercial, industrial and small business customers to explore the benefits of using advanced machine learning modeling tools for capturing energy savings. These tools provide higher accuracy than conventional linear regression modeling but tend to be more opaque. The goal of this project is to determine if the savings measured by these methods is significantly better than what we can currently capture using linear regression modeling. We will also explore the most effective ways to make these black box methods interpretable and explainable, as well as the most effective approaches for communicating the results of these models with customers. The results of this research will help inform our continuous energy improvement (CEI) resource acquisition programs as well as forward capacity market savings calculations.

Phase Change Materials in Refrigeration: Efficiency Vermont will work with customers to deploy one or more phase change material retrofit projects for refrigeration efficiency. Phase change materials (PCM) store energy in the form of latent heat. They are typically constructed with salt hydrates, paraffin, or some other bio-material. When the PCM changes from a solid to a liquid, it absorbs and stores heat energy from the outside air. When it changes from a liquid to a solid, it releases that energy back into the air. The goal of the project(s) will be to determine the design, cost, and performance considerations for this new technology, including how the technology can impact time-of-use energy consumption. The outcomes of this project will help guide future summer and winter peak demand savings programs.

Resiliency Payback: Efficiency Vermont will research payback on resiliency investments such as thermal envelope, storage, controller programs, renewables and cybersecurity, for customers with loads critical to life and property. The goal will be to identify an effective tool for customers to calculate payback of energy-related design decisions on resiliency, and to optimize building energy use. The outcomes of this project will help guide future summer and winter peak demand savings programs and thermal and electric savings programs.

Section 6 presents a discussion of recent applied research and development projects impacting 2018–2020 plans.

2.4.3 Planning and Reporting

Annual Plans and External Reporting

Efficiency Vermont will prepare and submit required documents to the Commission, the Department, and other required stakeholders. The below documents will be presented in fulfillment of requirements specified under agreements with State agencies, to maintain accountability and to provide accurate tracking of progress for service delivery optimization, for public benefit, and for the benefit of entities outside Vermont seeking replication.

- Annual updates to the 2018–2020 Triennial Plan and, in 2020, the 2021–2023 Triennial Plan
- Annual Savings Claim Summary and Annual Report
- Annual highlights document
- Monthly and quarterly reports
- Quarterly customer complaint and feedback report
- Quarterly and annual budget variance reports
- Service quality reports
- Ad hoc reports by request
- Department monthly invoices
- Fiscal Agent monthly reports.

Demand Resources Plan (DRP)

The DRP is a process, occurring every three years, undertaken to plan for the electric savings and budgets for the coming 20 years. The DRP process will establish Efficiency Vermont budgets, savings forecasts, and performance targets for 2021–2023. Efficiency Vermont will undertake the work of modeling 20-year projections of the electric energy efficiency savings and 10-year projections of the thermal energy efficiency savings expected from system-wide programs. Efficiency Vermont will provide the Commission, the Department, and Vermont’s utilities with these savings projections. During the DRP process, Efficiency Vermont will engage in efforts regarding the following:

- The establishment of annual budgets and energy savings goals for electric and TEPF activities in the 2021–2023 performance period
- QPIs to measure EEU results for the 2021–2023 performance period
- Plans and budgets for DSS activities
- Compensation and performance award structure.

Participation in State and Regional Integrated Planning

Efficiency Vermont will continue its active participation in the Vermont System Planning Committee (VSPC), a collaborative body bringing together Vermont’s utilities, the Vermont Electric Power Company (VELCO), the Department, and individuals representing the interests of ratepayers to address approaches to electric transmission system planning and management. Efficiency Vermont will participate in VSPC quarterly and subcommittee meetings, will conduct data analysis and research, will collaborate with subcommittee members, and will make presentations at VSPC meetings. Efficiency Vermont will support

the VSPC in its effort to provide formal input to the transmission organization VELCO in the development and review of the Vermont Long-Range Transmission Plan. Efficiency Vermont will provide expertise on such topics as non-transmission alternatives and the planning of geographic targeting for energy efficiency and strategic electrification initiatives.

Independent System Operator–New England (ISO-NE) Forward Capacity Market (FCM)

Administration

As the implementer of Efficiency Vermont, VEIC will continue to represent the interests of Vermont ratepayers by participating in the ISO-NE FCM, in which energy efficiency savings are bid as a resource for the regional grid. VEIC will prepare and submit bids to provide Efficiency Vermont’s capacity savings as an electricity demand resource in annual FCM auctions. Activities will include capacity forecasting, resource qualification, bid development, and auction bidding. VEIC will track and report resource development, submit claims during capacity delivery periods, deliver reports to ISO-NE and Vermont stakeholders, and undertake all other activities required to support this market participation. VEIC will perform all necessary administrative and fiscal activities associated with these responsibilities, including budgeting and revenue forecasting. VEIC will also continue to participate in rule-making processes established by ISO-NE regarding the establishment and operation of the FCM and other responsibilities associated with being a participant in the New England Power Pool. Net revenues generated from FCM auctions are directed into Efficiency Vermont services addressing efficient use of TEPF. In 2020, Efficiency Vermont expects to generate more than \$7million for thermal efficiency programs and services from savings acquired through electric energy efficiency projects that Efficiency Vermont completed and bid into the FCM.

External Non-Regulatory Reporting

Efficiency Vermont will provide utility data analysis and efficiency savings reporting to support Vermont’s growing regional and municipal energy planning needs. Efficiency Vermont will also deliver additional support of Vermont distribution utility reporting and tracking, including requirements specified under Vermont Act 56 Renewable Energy Standard Tier III provisions. All data contained in external reports follow strict confidentiality requirements as prescribed by the Commission.

Examples of reports produced and distributed will include:

- **Energy Action Network**—Efficiency Vermont will provide data for the Community Energy Dashboard for communities across the state.
- **Regional Planning Commissions**—Efficiency Vermont will produce a periodic report of investments and savings by region.
- **Distribution Utilities**—Efficiency Vermont will distribute periodic updates of data related to Efficiency Vermont. investments, savings, and customer contact by distribution utility.
- **Regional Greenhouse Gas Initiative (RGGI)** —Efficiency Vermont will produce an annual report of benefits and spending associated with the revenue that flows to Vermont from RGGI.
- **ISO-NE FCM**—Efficiency Vermont will produce an annual report of benefits and spending associated with activities and revenues that flow to Efficiency Vermont from savings bid into the ISO-NE FCM market.
- **Tier III reports**—Efficiency Vermont will provide utility-specific customer participation data for shared savings programs.

2.4.4 Evaluation

As an essential part of its reporting efforts, Efficiency Vermont will engage in activities designed to maintain the accuracy of reported savings claims, including:²³

- Working with the Department as it conducts its annual savings verification to review the initial savings claim.
- Participating in the Technical Advisory Group with the Department, Vermont's EEs, Burlington Electric Department, Vermont Gas Systems, and other stakeholders. The Technical Advisory Group: 1) reviews and approves the methods and associated assumptions underlying measure savings calculations contained in the Technical Reference Manual (TRM); 2) functions as a general forum for technical issues related to EEU savings claims and methods; 3) resolves issues arising from annual savings verification; and 4) is a proactive mechanism for developing energy characterization and savings calculations. Efficiency Vermont also will coordinate with Vermont distribution utilities regarding Tier III activities.
- Maintaining and updating the TRM, which characterizes energy-saving measures based on several parameters: Annual electric savings, annual coincident peak savings, annual fossil fuel energy savings, incremental costs and measure lives, and other applicable resource savings such as water savings and operational and maintenance cost savings.
- Performing metering, monitoring, and evaluation activities related to ISO-NE FCM participation.
- Conducting quality management activities in alignment with the Efficiency Vermont Service Quality and Reliability Plan and the Efficiency Vermont Administrative Efficiency Quantifiable Performance Indicator Plan. For the 2018–2020 period, the Program Implementation Efficiency work that was conducted in the last performance period will be replaced with the following administrative efficiency work, the purpose of which is for Efficiency Vermont to assess its operations to continue to deliver services that maximize ratepayer value. This work involves defining and reporting all administrative costs, incentives, and other costs, including a metric on the ratio of incentive costs to non-incentive costs and total administrative costs as a percentage of total budget for the current performance period.

Discussion of initiative-specific evaluation activities and of recent evaluation efforts that had an impact on 2018–2020 plans can be found in Sections 7.2. and 7.3, respectively.

2.4.5 Administration and Regulatory Affairs

General Administration

In support of the efforts outlined in this Plan, Efficiency Vermont will undertake activities centering on such needs as general staff meetings; coordination of service implementation across different functions; and management, monitoring, and internal communication of overall performance and spending. Additionally, Efficiency Vermont:

²³ More detailed information about evaluation activities can be found in Section 7.

- Pursuant to Commission Rule 5.300, annually calculate and propose EEC rates for the upcoming year using the Commission-approved methodology, for which Efficiency Vermont may propose alternatives.
- Beginning January 1, 2020, Efficiency Vermont will assume duties as its own EEU fiscal agent and RGGI trustee. In this role, Efficiency Vermont will be responsible for the administration of the electric and TEPF funds generated for Efficiency Vermont services.

Regulatory Affairs (Non-DRP)

Efficiency Vermont's regulatory affairs efforts will entail the following:

- Working with the Department to write, revise, and maintain governing documents necessary for the EEU to operate as a regulated utility. Examples: the Process and Administration of an Energy Efficiency Utility Order of Appointment, Standards of Conduct, Service Quality and Reliability Plan, Confidential Information Management System, and Intra-Company Cost Allocation Methodology.
- Participating in Commission proceedings that affect energy efficiency implementation in Vermont. For example: EEU regulation and Act 62 proceedings, Renewable Energy Standard proceedings for energy transformation, proceedings related to RGGI and FCM, proceedings on avoided cost determinations, VSPC proceedings, and AMI activity.
- Reviewing and advising on regulator-required, coordinated services and initiatives with Vermont's other EEUs and weatherization agencies to provide seamless, cost-effective, statewide energy efficiency programs.
- Reporting Efficiency Vermont results to external organizations, in order to track energy efficiency impact on both a regional and a national scale.
- Working closely with RGGI to help inform its Model Rule, report greenhouse gas reductions resulting from Vermont's RGGI-funded programs, and help maximize efficiency benefits from regional cap-and-trade activity.
- Researching regulatory policies to support best practices for efficiency programs, in order to enable continuous improvement in Efficiency Vermont's services and support Vermont's position as a national leader in energy efficiency ideas and practices.
- Pursuing regulatory approval of flexible and robust strategies to cost-effectively avoid or control capacity and energy supply, in support of electric distribution utility integrated resource planning.
- Reviewing and providing guidance on Efficiency Vermont internal policies to ensure regulatory compliance.
- Managing regulatory requests for data, analysis, and comments.
- Updating electric and thermal goals and budgets related to changes in regional avoided costs and RGGI and FCM auction revenues.
- Participating in the review of distribution utilities' triennial integrated resource plans, annual energy transformation plans (Tier III), updating of avoided costs, and all other Commission-ordered proceedings that could affect energy efficiency service delivery.

Financial and Leveraged Product Development

As part of its efforts to bring efficiency within reach of more Vermonters, Efficiency Vermont will continue to:

- Work with financial institutions, utilities, and government leaders to reduce barriers to implementing financing mechanisms for Vermonters' energy efficiency projects

- Engage in activities designed to acquire or leverage public and private resources for Vermonters undertaking efficiency projects in their homes and businesses

2.4.6 Information Technology

Core Business Software Applications

Core business software applications enable Efficiency Vermont program delivery and value through the development, maintenance, and integration of software applications and associated database systems. The chief priority is to design and maintain the mission-critical energy savings system of record used daily by nearly all Efficiency Vermont staff. The system involves the primary tracking database application, as well as the software necessary to develop energy savings estimates; to track measure, project, and customer information; and to upload those data into the tracking system. Other priorities involve a broad range of functionality to enable Efficiency Vermont to plan, analyze, and manage portfolio, program, customer, measure, and energy data—as well as modernization and integration of Efficiency Vermont’s line of business software applications with the goal of improving process efficiency and the external customer experience.

Utility Data Management

The integration of accurate and up-to-date distribution utility data into Efficiency Vermont’s database and business processes enables Efficiency Vermont to fulfill its responsibilities as an EEU, including: 1) performing mandated tracking of efficiency measure installations and evaluations; 2) monitoring progress toward achievement of Efficiency Vermont’s QPIs, including PIs and MPRs; 3) meeting reporting objectives; and 4) optimizing services to ratepayers, including providing customers with accurate estimates of the savings they could achieve through energy efficiency actions. Efficiency Vermont’s efforts will include the following:

- Development and maintenance of utility data documentation such as EEU data transfer standards, data definitions, and data models
- Technical guidance and support for Docket 8316
- Regular coordination and communication with 16 Vermont distribution utilities to ensure iterative transfer of weekly, monthly, and quarterly data files
- Implementation of cybersecurity measures, privacy practices, and secure transfer protocols
- Management of customer data, monthly usage data, and 15-minute AMI usage data transfers from Vermont electric distribution utilities
- Development and maintenance of custom integrations designed to standardize, clean, and ingest data into Efficiency Vermont’s database and reporting warehouse.

Reporting and Business Intelligence

Data storage, management, and access are critical functions that support EEU operations and enable the continued success of all services offered by Efficiency Vermont. As the volume of data and number of business software applications have grown, so has the need to provide scaled data systems and architecture to support this growth. In the 2018–2020 performance period, Efficiency Vermont’s baseline activities will include:

- Data life-cycle management and database infrastructure and services

- Critical support for regulatory and operational reporting
- Business intelligence—analyzing, designing, and implementing solutions to meet Efficiency Vermont’s business needs
- Budget analysis.

3. ENERGY EFFICIENCY UTILITY FUNDING

The Commission has specified that the funding sources for Efficiency Vermont’s electric efficiency and TEPF services be separate and distinct. Electric services will be funded through the EEC, whereas TEPF services will be funded by a combination of Vermont’s RGGI revenues and revenues generated by Efficiency Vermont’s bidding of electricity capacity savings into the regional ISO-NE FCM. Efficiency Vermont will strive to ensure that from the customer’s perspective, the provision of services will be seamless, regardless of the funding source.

TEPF services will support Vermont state energy policy goals as outlined in Section 581 of Act 92 (the Vermont Energy Efficiency and Affordability Act, enacted in 2008) and Vermont’s Comprehensive Energy Plan. A key provision of Act 92 is improving the energy fitness of 80,000 homes by 2020. Although TEPF funding levels will not be sufficient on their own to achieve this goal, Efficiency Vermont will design its TEPF services to be scalable to levels consistent with these public policy goals.

3.1 ACT 62 FUNDING

Vermont Act 62 authorized a transfer of funds from the State’s General Fund (“State Weatherization Grant”) and unspent EEC funds (“Act 62 Weatherization”) to be used to expand weatherization services in Vermont. These activities launched on July 1, 2019 and will continue through December 31, 2020. The new funding will be incremental to existing TEPF funds for comprehensive weatherization projects and is intended to specifically support incentives for moderate-income customers.

By leveraging \$350,000 in State Weatherization Grant funds and \$2,050,000 in Act 62 Weatherization funds, Efficiency Vermont intends to significantly increase the number of Home Performance with ENERGY STAR projects. With the additional funding, Efficiency Vermont is planning on 250 incremental Home Performance with ENERGY STAR projects in 2019, and 1,250 incremental projects in 2020 by offering the following incentive for comprehensive weatherization projects: 50% of project costs, up to \$4,000 for moderate income customers, and up to \$2,000 for higher-income customers. The goal for the Home Performance with ENERGY Star program in total, is to serve 1,250 homes in 2019 in total, and 2,250 homes in 2020. These same moderate-income customers will be able to access 0% financing to cover the balance of their weatherization expenses.

Additionally, Efficiency Vermont will allocate \$200,000 of the Act 62 Weatherization funds for marketing directed to moderate-income homeowners, and to significantly increase workforce development activities. These activities will include offering free BPI trainings to contractors, in partnership with Vermont Technical College, to ensure customers have reliable access to BPI-certified contractors statewide. Efficiency Vermont will also simplify project submission procedures to remove administrative

barriers to participation, as well as to reduce administrative costs to maximize this new funding on customer incentives.

Act 62 Funding: Budgets and Total Estimated Homes Served

	2018	2019	2020	2018-2020
Act 62 Weatherization Budget	NA	\$100,000	\$2,150,000	\$2,250,000
State Weatherization Grant Budget	NA	\$250,000	\$100,000	\$350,000
Total Estimated Homes Served	NA	250	1,250	1,500

4. EFFICIENCY VERMONT BUDGETS

4.1 ELECTRIC EFFICIENCY BUDGETS

<u>Electric Efficiency Budgets</u>	<u>2015-2017</u>	<u>2018-2020</u>
Resource Acquisition	132,370,917	130,580,756
Development and Support Services	12,654,752	9,748,921
<u>Base and Performance Compensation</u>	<u>6,526,155</u>	<u>6,314,795</u>
Total	151,551,824	146,644,472
Change		-3.2%

Efficiency Vermont acknowledges that Vermont is making a significant investment in the services provided by Efficiency Vermont. The electric efficiency RA budgets were developed with a sensitivity to the economic concerns of Vermonters; the budgets sought to lower, and then stabilize, the EEC rate.

To maintain a high level of RA performance with a flat budget, Efficiency Vermont will find internal efficiencies throughout its operations that offset inflationary costs for labor and expenses for the performance period. Efficiency Vermont estimates that it will need to find efficiencies of approximately 2% per year in the RA budget to offset the cost of inflation. The DSS budget includes a 2% budget reduction proposed for each of the three years of the performance period, necessitating additional operational efficiencies. Efficiency Vermont is up to this challenge and takes its responsibility for fiscal prudence seriously.

The services of Efficiency Vermont are a critical energy resource for ratepayers, and the energy savings it achieves represent Vermont’s least-cost supply resource. If efficiency were a supply-side resource, Efficiency Vermont would be meeting the equivalent of 16% of the state’s total energy demand. It has taken Efficiency Vermont since 2000 to build its programs to the size they are today, and to support the scale of market transformation that ensures that more than 90% of Vermonters are benefiting from

Efficiency Vermont services.²⁴ Further, these resources have proven to be very reliable for grid operators and planners,²⁵ and generate significant energy savings for Vermonters.

As Efficiency Vermont shows in its 2018 Annual Report, Vermonters will save more than \$214.3 million over the lifetime of their 2018 investments in efficient equipment and buildings.²⁶ Additional benefits appear to customers through lower electricity bills, reduced capacity charges in wholesale electricity prices, reduced transmission and distribution costs through deferral of new infrastructure development, and societal and health benefits achieved through cleaner air and more healthful buildings. Efficiency Vermont has a long history of reducing energy bills for customers and enhancing local economic development through strong trade ally relationships. All customer classes have access to Efficiency Vermont programs and services: residential customers of all income levels; and small, medium-sized, and large commercial, industrial, and institutional customers.

Efficiency Vermont projects that the energy efficiency resource being provided to ratepayers today through its services is sustainable over the long term, and creates significant quantifiable benefits. The scale of Efficiency Vermont programs and customer services today is well suited to the needs of the market in Vermont. Efficiency Vermont does not currently see a need to dramatically increase the level of efficiency service it provides to address an unmet need in the electric end-use market, but neither does it see a need to scale back to avoid an oversupply of services. The Commission established 2018–2020 performance period budgets as proposed by Efficiency Vermont; they are essentially flat when compared with those of the 2015–2017 period.²⁷

4.2 THERMAL ENERGY AND PROCESS FUEL BUDGETS

Thermal Efficiency Budgets	2015-2017	2018-2020
Resource Acquisition	18,442,925	26,354,446
Development and Support Services	2,444,668	1,996,767
<u>Base and Performance Compensation</u>	<u>939,942</u>	<u>1,275,805</u>
Total	21,827,535	29,627,018
Change		35.7%

Efficiency Vermont’s TEPF funding is composed of revenues from the RGGI and FCM auctions. There have been wide fluctuations in auction prices—and, therefore, auction revenues—in recent years. In developing early budget analysis, Efficiency Vermont discovered that assuming a one-for-one match of RA

²⁴ The Vermont Department of Public Service’s Response to Joint Energy Committee Questions Regarding Energy Efficiency Investments, January 8, 2016.

²⁵ February 5, 2014, memo from Hantz Pr sum  (VELCO): Energy Efficiency’s Role in Transmission Deferrals.

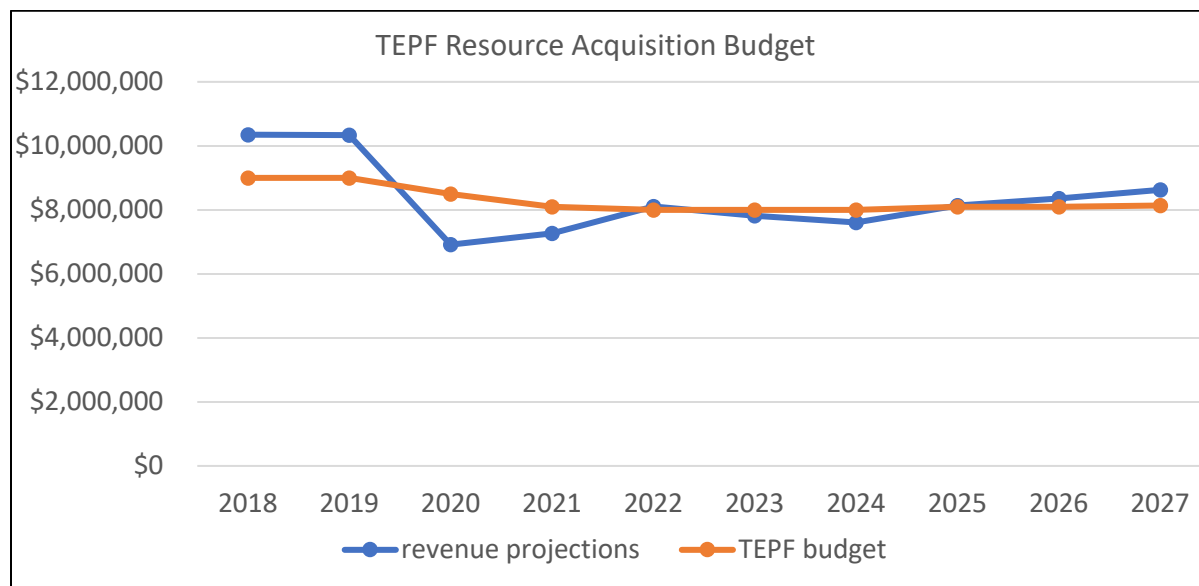
²⁶ Efficiency Vermont 2018 Annual Report at page 1, <https://www.energyc Vermont.com/Media/Default/docs/plans-reports-highlights/2018/Efficiency-Vermont-2018-Annual-Report.pdf>

²⁷ EEU 2016-03. State of Vermont Public Utility Commission, July 7, 2017. Resource Acquisition Budgets Order.

budgets and yearly estimated revenue jeopardized realistic modeling of customer, marketplace, and program implementation costs and benefits. That is, Efficiency Vermont had historically been directed to model programs according to the expected rhythm of incoming revenue, even though revenue from carbon and environmental credit markets could be in flux throughout the planning period. Designing and carrying out programs to conform to the specified planning approach could well result in highly volatile program delivery, particularly if large swings in funding occur from one year to the next.

To address the TEPF revenue fluctuations, Efficiency Vermont developed annual TEPF budgets that assumed level RA funding across a 10-year planning horizon. The balanced budgets created a sustainable portfolio of programs and services intended to allow for greater predictability for customers and across the marketplace.

The below figure illustrates the difference in annual revenue projections relative to Efficiency Vermont’s budgets. Revenue projections reflect a steady level between 2018 and 2019. However, they show a significant drop of \$3.4 million from 2019 to 2020 (\$10.3 million in 2019 to \$6.9 million in 2020). A dramatic change in available funding from one year to the next will negatively affect TEPF program delivery and lead to severe program activity curtailments or even termination of some activities. The Efficiency Vermont budget shows a gradual transition from \$9 million in 2018 and 2019 to \$8.5 million in 2020. This approach allows for continued effective program delivery from year to year, prevents likely associated decreases in customer satisfaction, and helps contractors and the supply channel plan for predictable levels of activity. Unlike the electricity budgets, which did not account for inflationary factors, the TEPF budgets include the impacts of a projected inflation rate of 2% annually.



Efficiency Vermont 10-year TEPF RA budget, relative to revenue projections

4.3 DEVELOPMENT AND SUPPORT SERVICES BUDGETS

There are six categories of DSS that support RA activity for Efficiency Vermont programs and initiatives. Within each DSS category, there are multiple initiatives. DSS budgets for the 2018–2020 period were developed to avoid an increase in the EEC to ratepayers. The DSS budgets have been reduced over the three-year period by approximately 7%, from \$14.4 million in the 2015–2017 period to \$13.8 million in the 2018–2020 period to declining annually in 2019 and 2020.

To achieve the lower budgets, Efficiency Vermont applied additional scrutiny to how it provides and delivers DSS. The result was a simpler and more representative DSS structure. Efficiency Vermont incorporated one component of public affairs into the general public education subcategory, and moved the other public affairs components into the education and training category. Efficiency Vermont also integrated the existing general administration subcategory into the regulatory affairs subcategory. The analytics and reporting category was separated into two components to allow tighter management of diverging segments of work for greater efficiency. The two components are 1) utility data management and 2) reporting and business intelligence.

These structural changes reduce the total number of categories and subcategories (thus reducing the administrative burden of monitoring them) and offer more cohesive grouping of services.

As was the plan in 2018 and 2019, in 2020 Efficiency Vermont is actively seeking cost efficiencies in the DSS budgets. In 2018, Efficiency Vermont reduced DSS spending by \$862,593 and is forecasting over \$600,000 in savings for both 2019 and 2020. These savings will be redirected to reduce 2020 EEC collections or to generate more customer benefits.

4.4 COMPENSATION

Efficiency Vermont is regulated as a performance-based utility, under an Order of Appointment issued by the Commission pursuant to 30 V.S.A. § 209(d)(5). VEIC is the entity appointed by the Commission to administer Efficiency Vermont. VEIC's total compensation structure for the administration of Efficiency Vermont and delivery of services contemplated in the DRP is described in the Order of Appointment issued on February 12, 2016, in Docket 8455, Section III: Compensation. The compensation requirements stipulate, in part:

The structure of VEIC's compensation for the provision of services and initiatives under this Appointment shall be composed of:

- A. Reimbursement of actual costs incurred (direct labor and expenses and allocation of eligible indirect and fringe costs) for both RA and DSS activities
- B. Performance compensation to be paid based on the attainment of QPI targets established under the DRP proceeding, from funds collected through EEC or other sources under the jurisdiction of the Commission and withheld from the budget for this purpose
- C. Operations fees that may be charged as a percentage of all or a portion of reimbursed costs, on both RA and DSS activities.

The performance award is calculated as a percentage of the total approved budget and sets the maximum financial award to which the Efficiency Vermont administrator is entitled for attainment of specific performance indicators. The role of the performance award is to create an incentive for achieving the quantitative and policy goals that are established in the QPIs (PIs and MPRs). The time frame for distribution of performance awards is after the Commission's verification of Efficiency Vermont performance at the completion of a three-year performance period.

The operations fee is a fixed percentage of the total approved budget and is applied to all Efficiency Vermont expenditures. In contrast to the performance award, the role of the operations fee is to provide financial stability to the operator of Efficiency Vermont in the years when performance awards are not distributed. The revenues received via its operations fee represent vital cash flow that enables the organization to efficiently administer Efficiency Vermont without increasing its credit lines. Lowering the cost of debt is directly beneficial to ratepayers. These revenues are also used by VEIC to further its public interest mission. An example of one of VEIC's mission-related activities is the VEIC Founders' Fund, which was launched in 2018 to allow the organization to directly support Vermont community organizations and individuals in making clean energy choices and working on projects that further VEIC's mission.

In effect, the performance award and operations fee make up the operator's total allowable earnings for the administration of Efficiency Vermont in the performance period. The combined maximum compensation for the operator if it achieves the maximum performance award is 4.5% of the RA and DSS budgets. The operations fee is 30% of the total compensation rate or 1.35% of the budget and the performance award is 70% of the total or 3.15% of the budget.

The remainder of Section 4 presents a budget summary and more detailed budgets.

4.5 2018-2020 RESOURCE ACQUISITION AND DEVELOPMENT AND SUPPORT SERVICES BUDGET SUMMARY

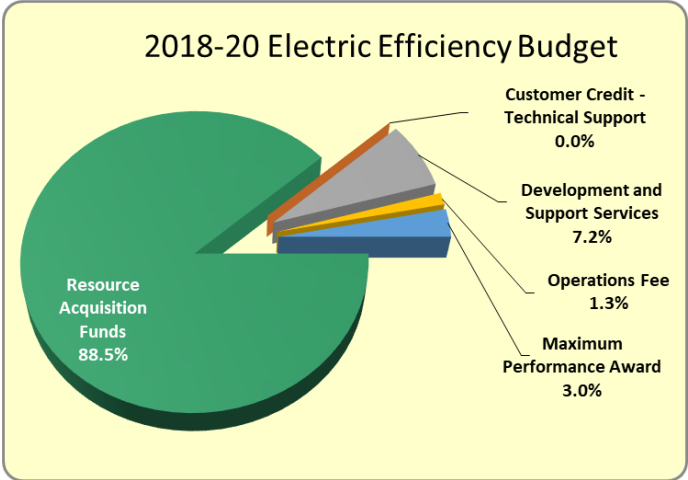
Resource Acquisition	2018	2019	2020	2018-2020
Total Electric EEU Funds for Resource Acquisition	\$42,983,478	\$43,723,639	\$46,123,639	\$132,830,756
Total Customer Credit - Technical Support	\$4,544	\$0	\$0	\$4,544
Total Thermal Energy and Process Fuels Funds	<u>\$8,854,446</u>	<u>\$9,000,000</u>	<u>\$8,500,000</u>	\$26,354,446
Total Resource Acquisition Budget	\$51,842,467	\$52,723,639	\$54,623,639	\$159,189,745
Development and Support Services				
Total Electric EEU Funds	\$3,125,288	\$3,338,169	\$3,285,464	\$9,748,921
Total Thermal Energy and Process Fuels Funds	<u>\$640,119</u>	<u>\$683,721</u>	<u>\$672,926</u>	\$1,996,767
Total Development and Support Services Budget	\$3,765,407	\$4,021,890	\$3,958,390	\$11,745,688
State Weatherization Grant	\$0	\$200,000	\$150,000	\$350,000
Operations Fee	<u>\$750,700</u>	<u>\$764,700</u>	<u>\$761,800</u>	\$2,277,200
Subtotal	\$56,358,574	\$57,710,229	\$59,493,829	\$173,562,633

4.6 2018-2020 BUDGET BY MARKET AND INITIATIVE

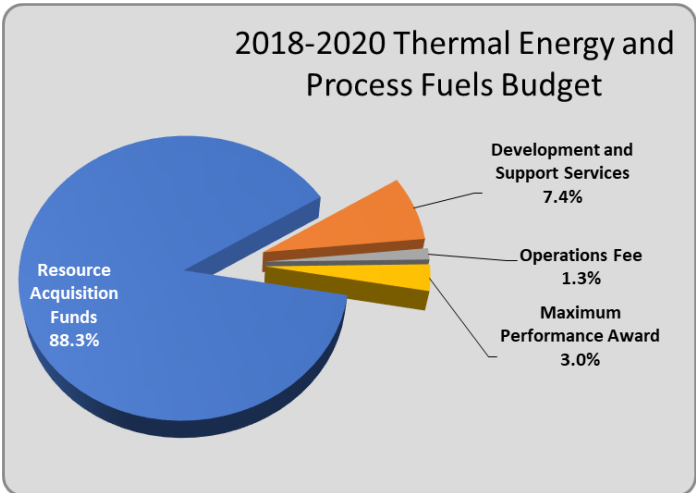
RESOURCE ACQUISITION ACTIVITIES				
<u>Electric Efficiency</u>				
<u>Business Sector</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2018-2020</u>
Business Existing Facilities	\$21,915,579	\$21,544,355	\$22,465,498	\$65,925,432
Customer Credit Technical Support	\$4,544	\$0	\$0	\$4,544
<u>Business New Construction</u>	<u>\$2,270,794</u>	<u>\$2,111,111</u>	<u>\$2,130,435</u>	<u>\$6,512,340</u>
Subtotal Business Sector	\$24,190,916	\$23,655,466	\$24,595,933	\$72,442,315
<u>Residential Sector</u>				
Efficient Products	\$11,581,147	\$11,103,669	\$10,673,973	\$33,358,789
Existing Homes	\$3,892,033	\$5,322,837	\$5,320,400	\$14,535,270
<u>Residential New Construction</u>	<u>\$3,323,926</u>	<u>\$3,541,667</u>	<u>\$3,383,333</u>	<u>\$10,248,926</u>
Subtotal Residential Sector	\$18,797,105	\$19,968,173	\$19,377,706	\$58,142,984
<u>Act 62 Weatherization</u>	\$0	\$100,000	\$2,150,000	\$2,250,000
Total Electric Efficiency	\$42,988,021	\$43,723,639	\$46,123,639	\$132,835,299
<u>Thermal Energy and Process Fuels Efficiency</u>				
Business Sector	\$2,459,075	\$1,321,168	\$1,279,334	\$5,059,578
Residential Sector	\$6,395,370	\$7,678,832	\$7,220,666	\$21,294,868
Total Thermal Energy and Process Fuels Efficiency	\$8,854,446	\$9,000,000	\$8,500,000	\$26,354,446
TOTAL RESOURCE ACQUISITION ACTIVITIES	\$51,842,467	\$52,723,639	\$54,623,639	\$159,189,745
DEVELOPMENT & SUPPORT SERVICES				
	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2018-2020</u>
Education and Training	\$697,985	\$663,058	\$663,058	\$2,024,101
Applied Research and Development	\$396,180	\$360,856	\$360,856	\$1,117,892
Planning and Reporting	\$360,232	\$651,475	\$651,475	\$1,663,182
Evaluation, Measurement, and Verification	\$477,591	\$474,401	\$474,401	\$1,426,393
Administration and Regulatory Affairs	\$448,162	\$473,454	\$473,600	\$1,395,217
<u>Information Technology</u>	<u>\$1,385,257</u>	<u>\$1,398,646</u>	<u>\$1,335,000</u>	<u>\$4,118,903</u>
TOTAL DEVELOPMENT & SUPPORT SERVICES	\$3,765,409	\$4,021,890	\$3,958,390	\$11,745,689
STATE WEATHERIZATION GRANT	\$0	\$200,000	\$150,000	\$350,000

Operations Fee (1.35%)	\$750,700	\$764,700	\$761,800	\$2,277,200
Performance Award (3.15%)	<u>\$1,751,500</u>	<u>\$1,784,300</u>	<u>\$1,777,600</u>	<u>\$5,313,400</u>
TOTAL BUDGET	<u>\$58,110,076</u>	<u>\$59,494,529</u>	<u>\$61,271,429</u>	<u>\$178,876,035</u>

4.7 2018-2020 ELECTRIC EFFICIENCY BUDGET



4.8 2018-2020 THERMAL EFFICIENCY BUDGET



5. QUANTIFIABLE PERFORMANCE INDICATORS

Efficiency Vermont performance compensation is determined by results in 19 performance indicators. Performance targets are established through a modeling exercise that creates a portfolio of measures and programs within the defined budget. Modelers incorporate past program activity, future opportunities, market factors, new technologies, and Commission-ordered policy assumptions that strive to maximize QPI performance while ensuring the achievement of sector and income equity constraints with MPRs. The remainder of this section provides descriptions and targets for Efficiency Vermont QPIs, including PIs and MPRs.

5.1 2018-2020 ELECTRIC EFFICIENCY PERFORMANCE GOALS AND MINIMUM PERFORMANCE REQUIREMENTS²⁸

QPI#	Title	Performance Indicator / Milestone	100% Target
1	Total Resource Benefits	Present worth of lifetime electric, fossil, and water benefits	\$318,107,900
2	Annual Electricity Savings	Annual incremental net MWh savings	357,400
3	Statewide Summer Peak Demand Savings	Cumulative net summer peak demand kW savings	45,900
4	Statewide Winter Peak Demand Savings	Cumulative net winter peak demand kW savings	62,400
5	Lifetime Electricity Savings	Lifetime incremental net MWh savings	3,582,000

MPR#	Title	Minimum Requirement	Minimum
6	Minimum Electric Benefits	Total electric benefits divided by total costs	1.2
7	Threshold (or Minimum Acceptable) Level of Participation by Residential Customers	Total residential sector spending	\$39,956,000
8	Threshold (or Minimum Acceptable) Level of Participation by Low-Income Households	Total low-income single and multifamily services spending	\$11,050,000

²⁸ Efficiency Vermont performance indicators include statewide funds associated with the Customer Credit program. On October 24, 2018, the Commission approved the customer's move from Customer Credit to a self-managed energy efficiency program. This will impact all performance indicators, which are expected to be modified in late 2019 or in 2020.

9	Threshold (or Minimum Acceptable) Level of Participation by Small Business Customers	Total number of non-residential premises with annual electric use of 40,000 kilowatt-hour (kWh)/year or less that acquire kWh savings	2,000
10	Geographic Equity	Total Resource Benefits amount for each geographic area is greater than values shown on geographic equity table	(See Section 5.2)
11	Administrative Efficiency	To clearly define and track all administrative costs, including incentive and non-incentive costs, associated with Efficiency Vermont's delivery of services under the Order of Appointment	1
12	Service Quality	Achieve 92 or more metric points	92
13	RA Performance Period Spending	Total spending for a three-year performance period (including applicable operations fees)	<\$135,906,528
14	DSS Performance Period Spending	Total spending for a three-year performance period (including applicable operations fees)	<\$14,138,248

5.2 2018-2020 ELECTRIC MINIMUM TOTAL RESOURCE BENEFITS (TRB) PER GEOGRAPHIC AREA

Geographic Area*	Required TRB per Geographic Area**
Addison	\$8,560,403
Bennington	\$10,017,250
Caledonia	\$6,857,686
Chittenden	\$49,652,236
Essex/Orleans	\$7,204,954
Franklin	\$14,070,521
Grand Isle/Lamoille	\$7,859,883
Orange	\$5,109,183
Rutland	\$17,017,418
Washington	\$13,534,722
Windham	\$15,170,850
Windsor	\$14,124,738
Total	\$169,179,844

* All geographic names above refer to Vermont counties.

** Required TRB targets have been adjusted for Customer Credit.

5.3 2018-2020 THERMAL ENERGY AND PROCESS FUELS PERFORMANCE GOALS AND MINIMUM PERFORMANCE REQUIREMENTS

QPI#	Title	Performance Indicator / Milestone	100% Target
1	Thermal & Mechanical Energy Efficiency Savings	Annual incremental net MMBtu savings	388,700
2	Residential Single-Family Comprehensiveness	a. Average air leakage reduction per project	34%
		b. Percentage of projects with square feet of insulation added equivalent to at least 50% of the home's finished square feet of floor area	44%
		c. Percentage of households (premises) that implement shell measures, and also have a heating system measure installed within three years of the shell measure	16%
		d. Number of comprehensive projects completed	2,286

MPR #	Title	Minimum Requirement	Minimum
3	Threshold (or Minimum Acceptable) Level of Participation by Residential Customers	Total residential sector spending as a percentage of total TEPF Fund expenditures	>62.5%
4	Threshold (or Minimum Acceptable) Level of Participation by Low-Income Households	Total low-income spending as a percentage of total TEPF Fund expenditures	>17.0%
5	RA Performance Period Spending	Total spending for a three-year performance period (including applicable operations fees)	<\$27,116,193

6 RECENT APPLIED RESEARCH AND DEVELOPMENT PROJECTS IMPACTING 2018-2020 PLANS

Deep Commercial and Industrial Energy Retrofits

Description: This study was designed to help determine the feasibility and scalability of 50% energy reduction retrofits in Vermont commercial, institutional, and municipal facilities. A series of participant groups consisted of decision makers for buildings of various uses, sizes, and degrees of energy performance. Designated Efficiency Vermont staff members were assigned to provide custom assistance throughout the study. Insights gained included information about costs, optimal conditions for success

(such as a committed owner and existing interest), and the value of effective customer support. The study resulted in energy savings for participants and presented opportunities for innovative approaches.

In 2018–2020: The Deep Retrofit offering and approach proved successful in 2018, when it became a regular offering as part of the business portfolio for approved customers.

Pump Up the Savings

Description: Cold climate heat pumps (CCHPs) have become increasingly popular, owing to their role in reducing fossil fuel use, and they have exhibited potential for deeper user benefits as well as positive impacts on grid performance. However, some uncertainty has existed about CCHP energy savings and about operating characteristics during various seasonal conditions. Efficiency Vermont measured CCHP performance in 38 submetered homes and 62 homes providing AMI data. Results showed that: 1) installation of a CCHP increased electricity usage in all seasons, averaging an increase of 0.14 kW in summer and 0.28 kW in winter; 2) the greatest CCHP power consumption occurred in the outdoor-temperature range of 30–50 degrees F; 3) most heat pumps are used primarily for heating; and 4) cooling season loads are not greatly increased when CCHPs replace existing cooling systems. A full report, including recommendations for further study, was completed.

In 2018–2020: Efficiency Vermont will use insights from this study to help inform savings and service approaches for this new technology. Assumptions around customer use, building thermal shells, and seasonal demand impacts will benefit utility planning and future HVAC program impacts. Another lesson learned from the study was that customers require more educational information about CCHPs to properly operate their equipment in heating mode. (See the discussion of HVAC-R in Section 2.1.6.)

Maple Sugaring Electric Consumption

Description: Efficiency Vermont conducted an analysis of maple sugarers' electric usage in an effort to better understand usage patterns of sugaring technologies. Results included these promising discoveries: 1) there is a correlation between the frequency of wash cycles of reverse osmosis membranes and the energy efficiency of the operation (as measured by the consumption per unit of production of maple syrup), and 2) there is evidence that reverse osmosis units are not the largest electrical energy user in a sugar house. The findings proved valuable in improving the accuracy of calculations used for existing Efficiency Vermont reverse osmosis efforts and enabled a better characterization of statewide electric usage in the Vermont maple sugaring industry. As a result of these findings, Efficiency Vermont identified the benefits of rotary screw maple sap vacuum pumps in sugaring operations and launched a financial incentive for this technology in 2017.

In 2018–2020: Efficiency Vermont will continue to promote and support the incorporation of rotary screw maple sap vacuum pumps in sugaring operations.

Dairy Farm Refrigeration System Assessment

Description: Efficiency Vermont engaged in efforts to deepen knowledge about the savings potential associated with efficient milk chillers. This technology is increasingly being adopted in Vermont; it is a significant investment for farmers and provides many energy and non-energy benefits. Efficiency Vermont discovered variations in savings claim methodologies among analysts, and found that most chiller projects are determined not to be cost-effective by the Vermont State screening tool. Efficiency Vermont

determined that the savings potential for efficient milk chillers was not promising from a retrofit standpoint. However, this research led to the identification of two refrigeration measures with strong potential to be of benefit to dairy farmers. As a result, in 2017, Efficiency Vermont launched financial incentives for high-efficiency condensing units and floating-head pressure controls for application on dairy farms.

In 2018–2020: Efficiency Vermont will continue to promote and support the adoption of high-efficiency condensing units and floating-head pressure controls in dairy operations.

Energy Management Systems for Dairy Farms

Description: Efficiency Vermont explored how energy management systems (typically used in processing and manufacturing facilities) may be integrated with herd management systems and other monitoring equipment for optimal energy performance and herd health. Research quickly showed the approach to be too complex to enable easy integration into existing data management systems and, thus, of insufficient interest to customers. However, the effort led to conversations with dairy equipment manufacturers about innovative energy-saving controls for dairy barn ventilation systems, resulting in the 2017 launch of a pilot initiative promoting this technology.

In 2018–2020: Efficiency Vermont will convert its 2017 pilot initiative promoting barn ventilation control to an official offering.

Low-Income Solar Plus Battery Storage

Description: Efficiency Vermont tested the hypothesis that solar-plus-storage systems offer a cost-effective approach to adding resiliency to low-income housing and to reducing peak usage. The study aimed to assess installation cost and complexity, verify homes' resiliency in power outages, and verify related distribution utility interactive capability regarding peak-use reduction. Efficiency Vermont, in collaboration with Green Mountain Power, Clean Energy Group, Cathedral Square, and Addison County Community Trust, installed battery-storage and occupant-accessed energy management systems in 14 new ZEM homes in Waltham. Each home was a low-income rental unit equipped with a solar roof system. The batteries were remotely accessible to Green Mountain Power, which managed battery usage as needed to lower peak demand. Efficiency Vermont remotely monitored battery performance. This research proved its hypothesis. Additionally, this study revealed that the inclusion of storage increased interest in ZEM homes among potential occupants concerned about reliable electricity availability.

In 2018–2020: Efficiency Vermont will work with Vermod, a ZEM manufacturer based in Wilder, Vermont, to include battery storage in more homes. Vermod will work with Tesla to become a certified Powerwall2 installer so it can incorporate solar plus battery storage at the factory. In addition to collaborating with Green Mountain Power in its residential battery storage program, Efficiency Vermont will work with other utilities to evaluate piloting residential battery storage in ZEM units. Efficiency Vermont, in collaboration with Vermod and Randolph Area Community Development Corporation, will deploy two model ZEM homes with solar plus battery storage. One home, the "ZEM on Tour," will travel the state throughout 2019 to demonstrate the benefits of solar plus battery storage as the home runs off grid; a second ZEM on Tour home will also travel the state in 2020.

Low-Cost Monitoring

Description: Efficiency Vermont tested the ability of remote monitoring equipment to alert commercial facility managers to energy efficiency opportunities and maintenance issues in advance of equipment failure. Efficiency Vermont built upon recent project experience with customers that operate commercial refrigeration equipment that would benefit from such monitoring. The sensors demonstrated their ability to detect equipment issues up to two days earlier than they would normally manifest themselves to Efficiency Vermont customers. The customers found value in using the data visualization tool to identify energy savings and other opportunities such as avoiding food waste and preventing equipment failure.

In 2020: Efficiency Vermont will continue to refine the monitoring design and customer application interfaces for owners and facility managers and will promote the metering service for energy efficiency, benchmarking buildings across a customer's portfolio, process improvements, and other business cost savings.

7 EVALUATION ACTIVITIES

7.1 2018-2020 PORTFOLIO-WIDE EVALUATION ACTIVITIES

Annual Savings Verification

Activities will be undertaken in three categories. These efforts will not include the annual savings verification activities of the Department.

1. Savings Preparation

Savings preparation includes the initial conference among the Department, third-party evaluators, and Efficiency Vermont. It also involves several steps with the Efficiency Vermont KITT customer database: Reconciliation, freezing, and providing the third-party evaluation contractor with a snapshot of the savings database. The third-party evaluation contractor generates the savings sample plan and provides Efficiency Vermont with a detailed list of projects the contractor wishes to review. Full project analysis files and documentation are provided for those sampled projects to facilitate the evaluation review. Following project review, the contractor provides preliminary project reports to Efficiency Vermont.

2. Savings Review

Upon receiving the preliminary project report results from the Department, Efficiency Vermont develops preliminary responses for each project and provides the Department and its third-party evaluation contractor with any additional data and engineering assumptions used to calculate energy savings. The scope of the savings review can vary greatly, depending on the number of custom projects reviewed and the number and type of general questions. The scope can also vary from year to year, depending on the total number and types of projects closed. The number of custom projects selected for review typically ranges from 70 to 100 per year.

3. Savings Finalization

Efficiency Vermont, the third-party evaluation contractor, and the Department meet in a savings finalization conference in early June to resolve any outstanding project and program issues highlighted in

the preliminary findings. After the conference, Efficiency Vermont develops “realization” spreadsheets to be applied to its KITT database, once the evaluation results are finalized. Using recommendations emerging from the evaluation, staff update quality assurance and control processes, modify data tools for future custom projects where appropriate, and update and revise prescriptive screening tables to reflect the savings verification outcomes.

Technical Advisory Group (TAG)

The TAG consists of representatives from the Department, Vermont’s EEs, the external evaluator, and other stakeholders. It reviews and approves the methods and associated assumptions underlying measure savings calculations in the TRM. In addition, TAG has functioned as a general forum for technical issues related to EE savings claims and methods. TAG also resolves issues that arise from annual savings verification and is a proactive mechanism for developing energy characterization and savings calculations.

Efficiency Vermont anticipates that work in the TAG will fall into one of the following six areas.

1. TAG Coordination

TAG coordination consists of scheduling monthly meetings, updating the TAG tracker, and coordinating communications around proposals and responses.

2. Review and Approval of TRM Measure Characterizations

Efficiency Vermont staff members submit proposals for new measure characterizations via TAG. The Department and other relevant stakeholders review these characterization drafts and agree on measure assumptions and savings estimates before incorporating new measure characterizations into the TRM. This coordination and collaboration can involve general scoping meetings, measure research, and surveys that provide information to shape programmatic proposals.

3. Savings Verification Recommendations

TAG tracks issues that arise from annual savings verification, including recommendations for process improvements and updates to savings characterization and calculations.

4. Program Implementation Procedures

For measures or programs that require a more comprehensive review of savings delivery methodology, Efficiency Vermont staff document program implementation details and explain inputs and methods used to calculate savings. External evaluators and other stakeholders use these documents to understand how a program or measure works, so that they can evaluate the savings claim accordingly.

5. Adjustments Due to Outcomes

Assumptions and measure characterizations in Efficiency Vermont’s KITT database and energy analysis tools need to be modified and revised after the Department and Efficiency Vermont reach agreement. This activity is a collaboration among Efficiency Vermont information technology, operations, and technical staff.

6. General Technical Topics

This category explores issues related to EEU savings claims and methods not directly covered by the other TAG categories.

Technical Reference Manual

The TRM provides reliable, standard savings values for efficiency measures. This resource supports consistency in reported results and provides values that can be used without the need for repeated analyses. The TRM scope of work is based on ongoing, frequent, and rigorous annual TRM review during the three-year performance period, in the context of new measures designed to support program efforts and updates of existing measures to reflect changes in standards, technology, costs, and other factors. TRM work is broken down into the following categories:

1. TRM Management

This activity involves managing submission of measure characterizations and updating the TRM tracker. Managing the TRM also involves the re-characterization of measures and savings methods to be applied to Efficiency Vermont's prescriptive tools for savings upload and calculation. This activity involves maintenance of uploads to the online TRM application and release of a stand-alone data file that contains all currently active measure characterizations for hosting on the publicly available website of the Department.

2. TRM Development and Research

Revisions to the TRM reflect research in new technologies and changing market conditions. All measure characterizations require considerable research, ensuring that assumptions accurately reflect the most current savings determination methods that incorporate efficiency evaluation findings from other states and those at the national level.

3. TRM Reliability

This activity involves the completion of annual updates to existing measure characterizations, based on findings during savings verification. It also involves changes to baselines or potential market transformation as a result of new evaluations. All measure characterizations receive a review and reliability update, as necessary, at least once every three years.

4. TRM Review

Efficiency Vermont internally reviews all updated TRM measure characterizations prior to submitting them to the Department for comment and approval. The review group is composed of technical staff, planning and development managers, and contractors. This activity also involves yearly review of older TRM characterizations that could be reaching obsolescence. In such cases, the TRM characterizations might be identified for update or removal from the TRM.

5. TRM Meetings and Workshops

These meetings, between Efficiency Vermont and Department staff, are convened as needed for in-depth discussions, separate from the normal TAG review process. Efficiency Vermont assumes the historical frequency of these meetings will persist through the performance period and throughout the respective forecasts.

6. TRM Pilots

To develop measure characterizations for new technologies where no readily available data on energy performance exist or where there are conditions of variable savings and a high degree of uncertainty, Efficiency Vermont might conduct pilot measurement and verification studies to gather the information necessary to accurately estimate savings. A typical pilot's scope includes the following:

- Initial measure research
- Development of a measurement and verification plan
- Scheduling of on-site measurement and verification deployment
- Data analysis and report finalization.

ISO-New England Measurement & Verification

VEIC operates as a New England Power Pool market participant on behalf of Efficiency Vermont's performance in the ISO-NE FCM. This performance is measured via an annual sampling plan for small, medium-sized, and large custom business projects. FCM measurement and evaluation has four activities:

1. Measurement and Verification Implementation

This implementation begins with the development of an initial sampling plan representative of the entire Efficiency Vermont portfolio. Subsequently, metering plans are developed and reviewed to ensure that the correct approach is implemented for the projects in the sampling plan. Activities entail implementing the metering plan, installing meters on customers' equipment, collecting metered data, and removing the meters.

2. Measurement Review

All project meter data undergo review for reliability and validity. This includes analyzing meter data at 15-minute intervals across a season, with an average of two weeks' data. Additionally, a review of engineering assumptions and measure characterizations is undertaken when required.

3. Measurement and Verification Finalization

As in the annual savings verification process, realization rates are calculated and applied to the appropriate databases by Efficiency Vermont technical personnel. Efficiency Vermont might amend analysis tools to reflect updated measure assumptions. A third-party independent process audit is undertaken, as required by ISO-NE, to verify that VEIC has complied with its submitted and approved measurement and verification plan.

4. Equipment and Calibration

Efficiency Vermont purchases metering equipment to conduct testing and analysis of projects identified in the sampling plan. Occasionally, because of the unique nature of a measure, specialized equipment is fabricated. All equipment used is required to be National Institute of Standards and Technology calibrated in accordance with ISO-NE requirements. Efforts include meter calibration and the scheduling of meters for selected projects.

7.2 2018-2020 INITIATIVE-SPECIFIC EVALUATION ACTIVITIES

Initiative-level evaluation activities will be assessed and adjusted as needed to ensure their alignment with the goals and priorities outlined in this Plan. All efforts will be guided by process feedback, customer input, and data needs resulting from the administrative efficiency QPI.

Years	Activity	Description/Intent
2018–2020	Residential New Construction	<p>Continue to conduct best practices exchange meetings with a range of home builders (custom home builders, mid-scale builders, developers) across different regions of Vermont. As part of these meetings, Efficiency Vermont will assess:</p> <ul style="list-style-type: none"> • What home attributes customers value most (such as comfort, durability, low purchase price, low operating costs, healthy indoor air) • How builders are currently marketing homes to customers • What resources and training Efficiency Vermont could provide to help builders promote the value of the Residential New Construction program (and energy efficiency in general) to customers. <p>The goal is to work more collaboratively with builder partners as an extended sales force for energy-efficient homes.</p>
2018	Low-Income Residential	<p>Work with the American Council for an Energy-Efficient Economy to evaluate potential impact metrics for low-income services. The intent is to quantify impact beyond Efficiency Vermont’s low-income spending goal and to further Efficiency Vermont’s ability to serve low-income Vermonters.</p>
2018	Dairy Ventilation Variable Frequency Drive Controls	<p>Assess the savings claims associated with new dairy barn ventilation controls that use variable frequency drives to control fan speeds based on sensors that measure wind speed, temperature, and humidity. Electric use will be compared alongside a control group with standard temperature controls with simple on/off switches.</p>
2018	Maple High Brix Reverse Osmosis	<p>Assess the savings claims associated with the latest in maple reverse osmosis technology, high brix reverse osmosis, which is purported to remove up to 95% of the water from sap before processing it into syrup. Flow meters will be used to measure fuel use and concentration levels of the sap.</p>
2018–2020	Commercial & Industrial	<p>Assess impact (energy and non-energy benefits, market transformation, public energy literacy); process (cost-effectiveness, operational efficiency, quality assurance, and quality control); and customer/partner satisfaction regarding Efficiency Vermont services, in order to steer continuous improvement efforts.</p>

<p>2018–2020</p>	<p>Digital Engagement & Disaggregation</p>	<p>Assess different strategies for customer engagement and behavioral savings methodologies using home energy use disaggregation and other targeted digital engagement offerings.</p>
<p>2018–2020</p>	<p>Low-Income Multifamily Behavior</p>	<p>Assess different engagement strategies and behavioral savings methodologies in low-income multifamily buildings.</p>

7.3 RECENT EVALUATION ACTIVITIES IMPACTING 2018-2020 PLANS

2018 Program Year Savings Verification

Description: In order to certify achieved savings toward Efficiency Vermont’s performance goals, the Department is required to verify the energy, coincident peak, and TRB savings claimed by Efficiency Vermont on an annual basis. For 2018, the Department contracted with Cadmus to conduct these verification efforts. Cadmus reviewed the preliminary savings claim put forward by Efficiency Vermont, including the program tracking database and sampled project data, in order to develop realization rates for energy (kWh), winter and summer peak demand reduction (kW), and thermal savings (MMBtu).

Evaluation Activities: The savings verification evaluation is primarily a paper review. Cadmus reviewed sampled project files and an extensive database of claimed measure data to verify that savings values and calculations had been applied correctly, and to calculate evaluated savings that incorporated any necessary corrections. The evaluation did not include conducting surveys or site visits to verify the installation or correct operation of products or to verify baseline conditions. Similarly, no metering was performed, though the evaluation used available AMI data to verify and adjust savings where practical for evaluated custom commercial and industrial projects.

Evaluation Results: Evaluation results showed relatively few errors in Efficiency Vermont’s savings claim, with realization rates of 97.6% for MWh, 99.2% for winter kW, and 98.0% for summer kW. Total MMBtu realization rates (EEC- and TEPF-funded measures) were evaluated at 99.2%. In addition to the realization rate results, Cadmus provided several recommendations to further improve savings documentation and program process moving forward. These recommendations focused on Efficiency Vermont’s custom projects, prescriptive measures, and database:

Custom Projects

- Consistently collect invoices for installed equipment
- Consistently document baseline equipment and operating conditions
- Avoid use of TRM assumptions
- Improve post-installation measurement and verification
- Consistently provide thorough overview documentation
- Improve online tracker calculation methods

- Ensure consistency of methods

Prescriptive Measures

- Ensure database values allow as many significant digits as the TRM does.
- Ensure all measures use updated TRM values
- Increase rigor in applying the TRM methods when practical

Database Review and Generation

- Update database documentation.

Following verification of results and the finalization of realization rates for the 2018 savings claim, Efficiency Vermont applied the savings adjustments to its project tracking database to develop a final verified savings claim. Efficiency Vermont has also been focused on reviewing the evaluation recommendations and implementing improvement processes to address these issues. Ongoing continuous improvement efforts include training sessions on the custom project process and documentation best practices for engineering staff, development of custom project analysis guidelines for inclusion in future program documentation, updates to TRM measures where applicable, and a streamlined process for the transfer and documentation of claimed program savings. These efforts are expected to continue into 2020.

Home Performance with ENERGY STAR

Description: Home Performance with ENERGY STAR is a national brand, managed by the U.S. Department of Energy, designed to ensure a whole house approach to energy efficiency and to maximize long-term savings for homeowners.

Evaluation Activities: During 2017 and 2018, Efficiency Vermont's Home Performance with ENERGY STAR program underwent a process-and-impact evaluation, carried out by an independent third-party evaluator through a contract with the Department. The evaluation scope focused on:

- Projects completed in the 2014–2016 program years
- Impact evaluation based on a pre / post participant billing analysis for natural gas, electric, and bulk fuels
- Process evaluation including surveys of participants, contractors, and other stakeholders to assess possible approaches to increasing participation rates and average savings per participant, to reduce administrative costs, and to improve installed measure quality and longevity.

Evaluation Results: Despite proactive and ongoing program improvement efforts, the results from this evaluation were similar to those from the Home Performance with ENERGY STAR study completed in 2013, showing that the program was overestimating savings. Initial findings showed a realization rate of 80% for kWh and 37% for winter kW for projects focused on electric savings and 65% for MMBtu for those projects focused on unregulated fuel savings. At the time of the development of the 2020 update of the Triennial Plan, Efficiency Vermont was working in collaboration with the Department to identify drivers for the low realization rates and plans to incorporate the study's findings into updates to the delivery and savings estimation for the Home Performance with ENERGY STAR program.

Market Assessments

Description: Market assessment evaluations were conducted by the Department in 2017 to characterize the saturation of energy-efficient equipment and building envelope features in the Vermont residential, commercial, and industrial building markets. These market assessments take place every three years to benchmark existing energy characteristics of Vermont's building stock and to understand the potential for future energy savings opportunities.

Evaluation Activities: These evaluations involved statewide data collection, analysis, and delivery of market assessment reports for each market category. The commercial and industrial markets were assessed by the Cadmus Group and the residential markets by the New Market Research Group. These studies were performed from late 2015 to mid-2016.

The residential market assessment included a variety of data collections to inform existing and new construction building energy performance. The report addressed a heating fuel analysis, existing homeowner survey, HVAC contractor interviews, Residential Building Energy Standard compliance, residential baseline single-family new construction, residential baseline HVAC distributor interviews, retailer interviews, Residential New Construction homeowner surveys, and single-family existing homes. A total of 508 homes were surveyed via telephone, 140 existing homes were visited for on-site data collection, and 111 of those homes received blower door tests. A total of 163 new construction single-family and two-family homes were sampled. Surveying of distributors and contractors allowed for understanding of installation issues, promotion of energy-efficient technologies, perceptions of existing home efficiency, and opportunities for incorporation of emerging technologies.

The commercial and industrial market assessment reviewed existing and new construction building energy performance and opportunities for future energy savings. Code compliance was also a key focus in this report for meeting Vermont's 2011 and 2015 Vermont Commercial Building Energy Standards. Missed opportunities in new construction, demand-side resource potential, and market intervention strategies were also analyzed in this assessment. On-site visits to 192 existing buildings and 48 new construction sites provided data informing these assessments. In some instances, phone calls and review of building plans were necessary to understand building characteristics. Envelope and lighting code compliance were the lowest-performing end uses found in the code compliance study. Interviews were also performed with electrical distributors, lighting suppliers, lighting professionals, and building decision makers.

Evaluation Results: Reports for all individual market assessments were provided to Efficiency Vermont in late 2017. The residential assessment provided a basis for Efficiency Vermont to strategically market emerging technologies and to understand opportunities for future savings potential. The data informed—and will continue to be referenced in the development of—baselines for the TRM and custom defaults for measures in residential applications. Code compliance with Vermont's Residential Building Energy Standards was also an insight into the Residential New Construction market that was a result of this assessment. The commercial and industrial assessment has allowed Efficiency Vermont to focus on specific aspects of the energy market, including demand savings opportunities and envelope performance in the design phase of new construction projects. This report informs baselines used in the Efficiency Vermont TRM for commercial and industrial measures, as well as analysis defaults for custom projects.

8. 2020 ADDENDUM: OVERVIEW OF CHANGES TO THE TRIENNIAL PLAN

This Plan, as a 2020 update to the Revised 2019 Update to the Efficiency Vermont Triennial Plan 2018-2020, includes changes to the aforementioned 2019 document. This addendum is provided to characterize changes made to that document. Note the Executive Summary (Section 1) was rewritten to highlight some of the shifts in Efficiency Vermont's services due to its growing partnerships and the changing energy landscape. The following list is provided to enable easy identification of areas of this Plan that reflect significant changes to, or new plans for, services and activities.

Executive Summary (1)

Services for Business Customers (2.1)

- **Power\$aver** (See 2.1.4)
- **Solar hot water systems**²⁹ (See 2.1.6 HVAC+R)
- **Identify and repair refrigerant leaks** (See 2.1.6 HVAC+R)

Services for Residential Customers (2.2)

- **ARIES** (See 2.2.1 Single-Family Homes)
- **Air sealing and insulation of attics and basements** (See 2.2.1 Single-Family Homes)
- **Home Performance with ENERGY STAR** (See 2.2.1 Single-Family Homes)
- **Targeted high-use eligibility** (See 2.2.2 Existing and New Low-Income, Footnote 10)
- **Zero Energy Modular** (See 2.2.2 Existing and New Low-Income)
- **Energy Choices** (See 2.2.2 Existing and New Low-Income. See program description associated with Footnote 11)
- **Market rate pilot for income eligible customers with Capstone Community Action** (See 2.2.2 Existing and New Low-Income)
- **Wood and pellet stoves** (See 2.2.2 Existing and New Low-Income)
- **Appliance replacement voucher program** (See 2.2.2 Existing and New Low-Income)
- **All-electric bonus** (See 2.2.3 Residential New Construction)
- **Moderate income adder** (See 2.2.3 Residential New Construction)
- **Technical support** (See 2.2.3 Residential New Construction)
- **Heat pump water heaters for a mid-sized multifamily development** (See 2.2.3 Residential New Construction)
- **Indoor horticultural lighting** (See 2.2.4 Retail Efficient Products)
- **Midstream sales incentives** (See 2.2.4 Retail Efficient Products)
- **Online market place** (See 2.2.4 Retail Efficient Products)
- **Refrigerator and freezer recycling** (See 2.2.4 Retail Efficient Products)

Activities in Service to All Major Markets (2.3)

- **Monthly training offers** (See 2.3.2 Services to Contractors and Equipment Suppliers: Workforce Development)

²⁹ In the third quarter 2018, Efficiency Vermont discontinued prescriptive rebates for solar hot water heaters.

- **Highest energy burdened areas** (See 2.3.4 Community Based Activities)
- **Financial Services**
 - See 2.3.5 Financing for Energy Efficiency Projects: Footnote 16 and associated activities)
 - See 2.3.5 Financing Education and Analysis: training and research.
- **Hosting revised data analytics platform** (See 2.3.7 Data Analytics Platform)

Development and Support Services (2.4)

- **Supporting energy code updates** (See 2.4.1 Codes and Standards Support)
- Technology Demonstrations (2.4.2)
 - See “2020 Activities—Started in 2018 or 2019 and continuing in 2020”
 - **Advanced Metering Infrastructure Based Efficiency Analysis**
 - **Demand Response Capability and Effectiveness Assessment** (See 2020 Activities)
 - **Low Cost Monitoring**
 - **Greenhouse Gas Reduction** (See 2020 Activities)
 - See “New 2020 Activities”
 - **Healthy Buildings**
 - **Deeper Energy Savings through Advanced Regression Modeling**
 - **Phase Change Materials in Refrigeration**
 - **Resiliency Payback**
- **EEC rate calculation** (See 2.4.5 General Administration)
- **Fiscal agent duties** (See 2.4.5 General Administration)
- **Financial and leveraged product development activities**³⁰ (See 2.4.5 Financial and Leveraged Product Development)

Energy Efficiency Utility Funding (3)

- **Act 62 Funding** (See 3.1)

Efficiency Vermont Budgets (4)

Recent Applied Research and Development Projects Impacting 2018-2020 Plans (6)

- **Low Cost Monitoring**

Evaluation Activities (7)

- **Evaluation Framework Potential Changes** (See 7.1 2018 -2020 Portfolio Wide Evaluation Activities: Technical Advisory Group)
- **2018 Program Year Savings Verification: Evaluation Results** (See 7.3 Recent Evaluation Activities Impacting 2018-2020 Plans)
- **Home Performance with ENERGY STAR: Evaluation Results** (See 7.3 Recent Evaluation Activities Impacting 2018-2020 Plans)
- **Cold Climate Heat Pumps** (See 7.3 Recent Evaluation Activities Impacting 2018-2020 Plans)

³⁰ The selected activities that were removed from this initiative are taking place in 2.3.5 Financing for Energy Efficiency Projects.



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