

# Triennial Plan

## 2018–2020

Prepared for the  
Vermont Public Utility Commission

**November 16, 2017**

by

Vermont Energy Investment Corporation  
128 Lakeside Avenue  
Burlington, VT 05401





A message from Karen Glitman, Director, Efficiency Vermont

# A More Affordable, Prosperous Vermont

It is my honor to present Efficiency Vermont's plan for the delivery of energy efficiency services in 2018–2020.

In every county of our state, we have the privilege of helping reduce the energy burden of hardworking Vermonters—from the business owner trying to cut overhead expenses, to the family making sacrifices to pay heating bills. We provide objective advice and financial assistance to enable Vermonters to lower their energy costs while improving their homes, businesses, institutions, and communities.

We are proud that our presence throughout Vermont allows us to have a statewide impact on the affordability and quality of efficiency goods and services. Through this statewide presence we listen to and engage with Vermonters about their energy priorities and provide the objective and consistent guidance they seek about managing all types of energy use.

As we help Vermonters address today's energy needs, we also work in support of our state's aims for a secure energy future. Efficiency Vermont maintains knowledge of rapidly evolving technologies and methods that present new opportunities to deepen efficiency's beneficial impact in Vermont. We are proud to align our efforts with the State of Vermont's goals to increase the percentage of renewable power in the state's energy mix, to reduce greenhouse gas emissions, and to improve the indoor health of buildings.

In this document, we outline our plan to help Vermonters meet their energy needs with low-cost, clean efficiency. We look forward to working with our fellow Vermonters to help secure **a more affordable and prosperous Vermont for all.**

## 2018–2020 Goals



**\$687 million** saved by Vermonters<sup>1</sup>

<sup>1</sup>Lifetime customer savings from 2018-2020 efficiency investments

**\$200 million in revenue** for local businesses

from Efficiency Vermont customers' purchases of efficient goods and services.



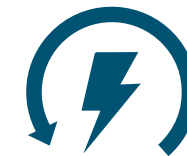
### The Least Expensive Energy Source



**3.3¢/kWh<sup>2</sup>**

Cost of saving electricity with efficiency

VS



**9.2¢/kWh**

Cost of supplying electricity



**\$14.77/MMBtu<sup>3</sup>**

Cost of saving fossil fuel with efficiency

VS



**\$19.36/MMBtu**

Cost of supplying fossil fuel

<sup>2</sup>This is the levelized net resource cost of electric efficiency, taking into account participating customers' costs and savings as well as Efficiency Vermont's cost of delivery, which is expected to be 4.7 cents/kWh.

<sup>3</sup>This is the levelized net resource cost of thermal energy and process fuel efficiency, taking into account participating customers' costs and savings as well as Efficiency Vermont's cost of delivery, which is expected to be \$4.63/MMBtu.

# Strengthening Vermont Employers

When businesses invest in the energy efficiency of their facilities, they become **more profitable and competitive**. To help Vermont employers cut overhead while improving their buildings and operations, Efficiency Vermont provides:



Designated account managers who identify customized solutions and provide guidance on long-term energy management for **the state's largest energy users** by staying aware of owners' priorities over time.

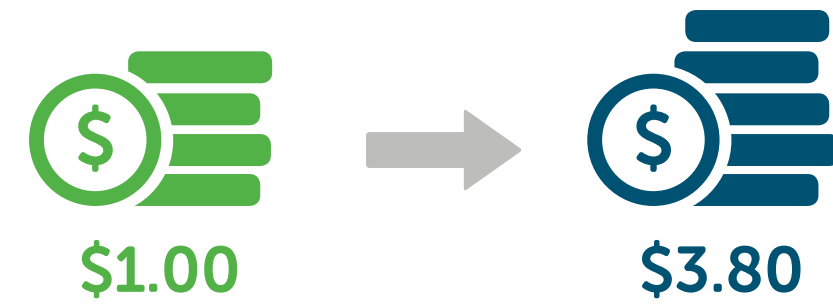


Services to address the particular needs of **specialized Vermont facilities**: Farms, hospitals, leased commercial buildings, lodging facilities, municipalities, restaurants, schools, ski areas, small businesses, state-owned buildings, and water/wastewater processing plants.



**Resources for all businesses:** Identification of energy-saving opportunities, usage analysis, technical support and guidance, and access to financial resources and referrals through consultations in person, by phone, and through [www.encyvermont.com](http://www.encyvermont.com).

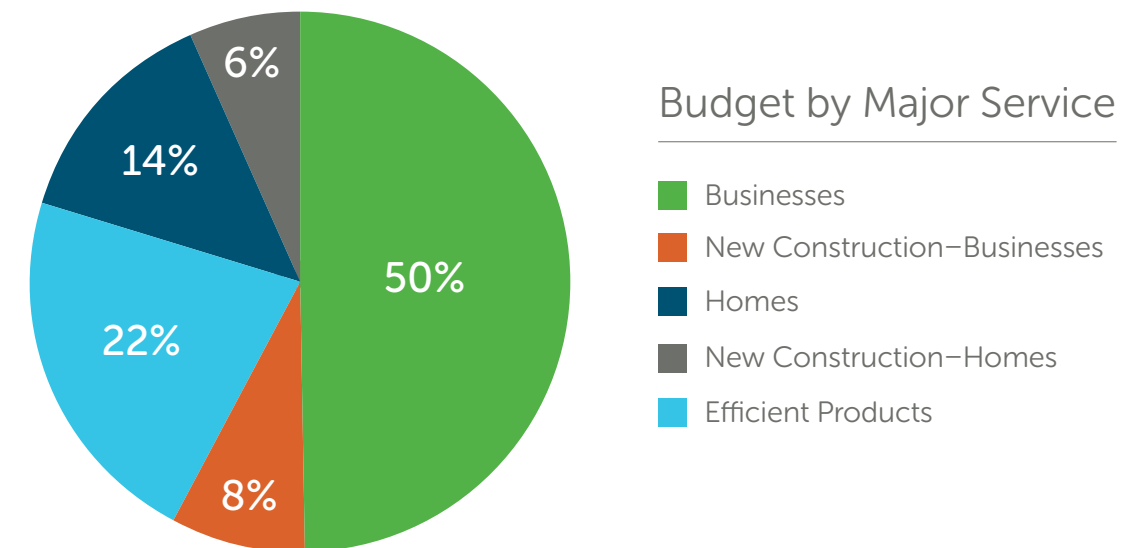
# Investing in Vermonters



Every **\$1** invested in efficiency = **\$3.80** lifetime savings<sup>4</sup>

<sup>4</sup>The ratio of Efficiency Vermont budgets for the 2018–2020 period to customer savings over the lifetime of efficiency measures

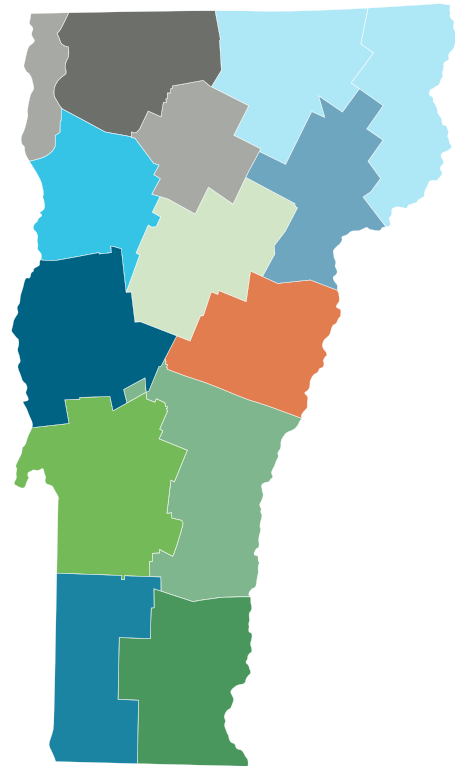
# Services Designed to Reach All



# More Affordable, Comfortable, Healthy Homes for All

## Helping Vermonters in Every Region: 2018–2020 Benefits by County

County	% of Benefits
Addison	5.1
Bennington	5.9
Caledonia	4.1
Chittenden	29.3
Essex/Orleans	4.3
Franklin	8.3
Grand Isle/Lamoille	4.6
Orange	3.0
Rutland	10.1
Washington	8.0
Windham	9.0
Windsor	8.3



Vermonters rely on Efficiency Vermont for objective technical guidance and financial resources to cut energy costs and improve their homes. Efficiency Vermont's customers have easy access to:

**Skilled home-improvement contractors** with Home Performance with ENERGY STAR® certification and **equipment technicians** in Efficiency Vermont's statewide Efficiency Excellence Network.

**Quality efficient appliances, lighting, and electronics**—Efficiency Vermont works with retailers to reduce purchase prices and ensure that high-quality efficient products are available in Vermont.

**Knowledgeable builders of energy-efficient homes**—supported through Efficiency Vermont's technical services and training.

## Helping Low-Income Service Providers Deliver Efficiency

Efficiency Vermont is committed to bringing energy efficiency within reach for the more than 125,000 Vermonters who live in fuel poverty, meaning that they spend over 10% of their income on energy. Toward this end, Efficiency Vermont delivers financial and technical assistance to low-income service providers, to support them in incorporating energy efficiency into their efforts to improve and build affordable housing, statewide.

In addition to reducing energy costs, efficient housing delivers cleaner indoor air and healthier indoor temperatures. That can mean more than **\$1,070 saved, per low-income Vermont household**, from fewer illnesses and lost days of work.<sup>5</sup>

<sup>5</sup>Beyond Energy Savings: A Review of the Non-Energy Benefits Estimated for Three Low-Income Programs, Hall & Riggert, TecMRKT Works LLC

## Efficiency Vermont's Partnering Low-Income Service Providers



# Securing Jobs in Vermont's Green Economy

Vermonters' energy efficiency investments bring significant revenue to local businesses that provide energy-efficient goods and services.

Efficiency Vermont delivers **workforce development training, technical support, and promotional assistance** to retailers, wholesalers, and service providers in order to lower consumer prices and to ensure that top-quality goods and skilled services are available in Vermont. Efficiency Vermont also helps Vermont banks and credit unions develop low-interest loans for Vermonters making energy efficiency upgrades to their properties.

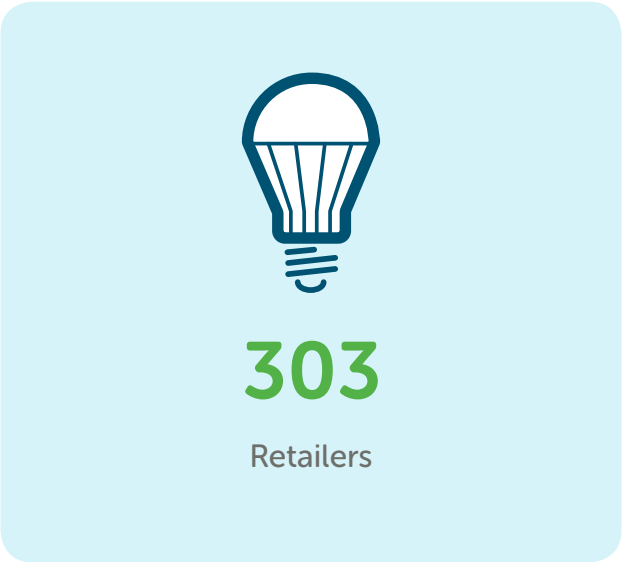
It's a winning formula for all, as Vermonters can obtain the efficiency resources they need while benefiting trusted local businesses.



Efficiency Vermont's efforts contribute to the  
**10,900+**  
 energy efficiency jobs in Vermont<sup>6</sup>

<sup>6</sup>Employees working in utilities, construction, manufacturing, trades, professional services, and other services (source: U.S. Energy and Employment Report, January 2017, U.S. Department of Energy)

Supporting 2,000+ businesses to deliver efficiency excellence, statewide



## 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 and Minimum Performance Requirements (see Section 5) established by the Vermont Public Utility Commission (Commission)
- Vermont's Comprehensive Economic Development strategy, as applicable
- Vermont's Health in All Policies aims
- Input gathered from the general public (see Section 8).

Through the course of the performance period, Efficiency Vermont will refine and revise the activities and services outlined in this Plan as needed to maintain responsible management of funds, to take advantage of changing technological and market opportunities and to maximize benefits to Vermonters.

### 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 services include those with immediate and a long-term impact on Vermonters' ability to cut energy costs. DSS services include those providing necessary support for the operation of Efficiency Vermont.

## ABOUT EFFICIENCY VERMONT

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 Vermont Energy Investment Corporation (VEIC), which currently holds an appointment from the Commission to administer Efficiency Vermont through the end of 2026.



## Triennial Plan 2018-2020

### Table of Contents

1. Overview.....	1
2. Services for 2018-2020.....	11
2.1 Services for Existing Business Facilities .....	11
2.1.1 Vermont’s Largest Energy Users.....	11
2.1.2 Small and Medium-Sized Businesses.....	12
2.1.3 Targeted Markets .....	13
2.1.4 Key Commercial Technologies.....	13
2.2 Services for Homes.....	15
2.2.1 Existing Market-Rate Homes .....	15
2.2.2 Existing and New Low-Income Housing.....	16
2.3 Activities in Service to Multiple Customer Sectors .....	16
2.3.1 New Construction Services.....	17
2.3.2 Retail Efficient Product Services.....	18
2.3.3 Services to Contractors and Equipment Suppliers .....	19
2.3.4 Trade Association Partnerships .....	20
2.3.5 Community-Based Activities.....	20
2.3.6 Financial Services.....	21
2.3.7 Coordination with Energy Efficiency Utilities and Distribution Utilities.....	22
2.3.8 State, Regional, and National Partnerships.....	22
2.3.9 Data Analytics Platform .....	23
2.4 Development and Support Services .....	23
2.4.1 Education and Training.....	23
2.4.2 Applied Research and Development .....	25
2.4.3 Planning and Reporting .....	27
2.4.4 Evaluation .....	28

2.4.5	Administration and Regulatory Affairs.....	29
2.4.6	Information Technology.....	30
3.	Energy Efficiency Utility Funding .....	31
4.	Efficiency Vermont Budgets.....	32
4.2	2018–2020 Resource Acquisition and Development and Support Services Budget Summary .....	36
4.3	2018–2020 Budget by Market and Initiative .....	37
4.4	2018–2020 Electric Efficiency Budget.....	38
4.5	2018–2020 Thermal Efficiency Budget .....	38
5.	Quantifiable Performance Indicators.....	38
5.1	2018–2020 Electric Efficiency Performance Goals and Minimum Performance Requirements.....	39
5.2	2018–2020 Electric Minimum Total Resource Benefits (TRB) per Geographic Area .....	40
5.3	2018–2020 Thermal Energy and Process Fuels Performance Goals and Minimum Performance Requirements.....	40
6.	Recent Applied Research and Development Projects Impacting 2018–2020 Plans .....	41
7.	Evaluation Activities.....	43
7.1	2018–2020 Portfolio-Wide Evaluation Activities .....	43
7.2	2018–2020 Initiative-Specific Evaluation Activities .....	46
7.3	Recent Evaluation Activities Impacting 2018–2020 Plans .....	47
8.	Community Input .....	49



## 2. SERVICES FOR 2018-2020

### 2.1 SERVICES FOR EXISTING BUSINESS FACILITIES

This category includes commercial, industrial, institutional, and municipal facilities.

#### 2.1.1 Vermont's Largest Energy Users

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

- **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.
- **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.<sup>1</sup> 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.
- **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 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,

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<sup>1</sup> Low returns on investment are defined as less than 50% within a rolling three-year period. Investments consist of customers' contributions to the Energy Efficiency Charge and to their energy efficiency project costs. Returns consist of financial incentives and lifetime energy savings acquired through energy efficiency projects.

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.

## 2.1.2 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 completing efficiency improvements with members of Efficiency Vermont's network of local, certified Building Performance contractors
- **PowerSaver:** pending Vermont Department of Public Service (Department) evaluation, a pilot initiative delivering approaches, adjusted for use in this market, proven successful with the state's largest energy users, as described in Section 2.1.1
- **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 2.1.3.
- **Third-party financing:** supporting energy-saving investments through the Business Energy Loan and other financing offerings discussed in Section 2.3.6.

In the 2018-2020 period, Efficiency Vermont will be phasing out promotion of screw-based light-emitting diode (LED) lighting and increasing support for LED fixtures and controls. (Section 2.1.4 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 heating, ventilation, and air conditioning (HVAC) and refrigeration equipment—with strong savings potential for small- and medium-sized businesses. The phaseout of screw-based LED promotion will take place because:

- This technology has increasingly become the standard screw-based lighting choice for Vermont businesses and households 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.

### 2.1.3 Targeted Markets

To address the need and challenges of distinct business sectors, Efficiency Vermont will deliver technical guidance, financial incentives for recommended measures, and access to third-party financing for the following markets: Agriculture, colleges and universities, hospitals, kindergarten through grade 12 (K–12) schools, leased commercial real estate, lodging facilities, municipalities, restaurants, ski areas, 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. Efficiency Vermont will maintain awareness of evolving technologies, changing economic conditions, consumer demand, and a range of challenges and opportunities particular to specific sectors.

### 2.1.4 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 lumiere-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 2.3.3)
- 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 2.3.3) 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 solar hot water systems (small commercial and residential)
- 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 onsite in face to face interactions, or through the Efficiency Vermont call center and website, at events, and via members of the Efficiency Excellence Network (see Section 2.3.3). Efficiency Vermont will also coordinate 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 choice, based on fuel source, building type, and other factors
  - 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
  - Finding a contractor
  - All financing options for heat pumps
  - Local distributors that supply efficient technology
  - Available heat pump rebates and incentives.

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 commercial and residential customer sites to identify leaks of refrigerant. This will be done with the aim of decreasing both electricity use and greenhouse gas emissions.

### **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 have the ability to engage operators of wastewater treatment, agricultural, industrial, and institutional facilities that have: 1) on-site electricity generation capability and 2) substantial heating needs. Efficiency Vermont’s services will include financial support for third-party cost-benefit CHP feasibility studies, and for CHP systems meeting requirements established by the Commission.

## **2.2 SERVICES FOR HOMES**

### **2.2.1 Existing Market-Rate Homes**

#### **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, health, and safety of existing residential buildings statewide. In the coming performance period, 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.

In 2018-2020, Efficiency Vermont will:

- Continue to support a network of contractors to identify and implement energy-saving upgrades for homeowners. The Efficiency Excellence Network (see Section 2.3.3) provides certified contractors with ongoing support and resources as they engage with homeowners.
- Through partnering Vermont banks and credit unions, offer 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 2.3.2, to increase Vermonters’ access to and awareness of high-quality efficient products and to lower consumer prices for efficient products.
- Deliver a digital engagement pilot initiative, with an aim to provide participating households with software delivering their home’s live energy usage information. This pilot will aim to motivate behavioral changes and home upgrades, as appropriate, to improve identified household-wide and equipment-specific usage.
- Explore the design of 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.

## **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 the Vermont Apartment Owners Association, the Vermont Rental Property Owners Association, large property developers, and construction professionals.

### **2.2.2 Existing and New Low-Income Housing**

Efficiency Vermont will 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 (VHCB) and the Vermont Housing Finance Agency; and 3) multifamily housing developers, including Housing Vermont. Services in 2018–2020 will include:

- Installation of lighting, appliances, and—as applicable—heat pumps to replace electric resistant heat and cost-effective custom measures in high-use low-income households
- Distribution of efficient lighting through the Vermont Foodbank and other organizations that serve low-income Vermonters
- 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 option for prospective mobile home buyers and renters, in partnership with VHCB
- 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
- Training and information, pending Department evaluation, to enable affordable-housing organizations to engage tenants in multifamily dwellings in efforts to save energy. These activities will be designed to empower households with information about their energy usage and to motivate behavioral changes and adoption of efficient products.

## **2.3 ACTIVITIES IN SERVICE TO MULTIPLE CUSTOMER SECTORS**

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 HVACR 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 to the below sectors enable Vermont homes and businesses to have access to a valuable network of knowledgeable providers while strengthening these providers' bottom line.

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 effect 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 programs and services, and will not create separate or incremental costs charged to the EEC or TEPF.<sup>2</sup> (See Section 8 for community input about the 2018-2020 performance period).

### **2.3.1 New Construction Services**

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.

#### **Business New Construction**

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

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<sup>2</sup> EVT will not use EEC or TEPF funds to provide technical assistance or incentives to customers with respect to renewable generation, transportation measure saving fossil fuels, or storage measures. EVT'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.

International Code Council, and the New Buildings Institute, as well as Vermont trade organizations.

### **Residential New Construction**

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 2030 Home:** Homes meeting or exceeding specifications for air leakage levels, continuous insulation, and balanced ventilation.
- **Efficiency Vermont Certified Net-Zero-Ready High-Performance:** Homes meeting elevated criteria for comprehensive energy efficiency and suitability to achieve net-zero energy use with the incorporation of renewables.
- **Zero-Energy Modular Homes:** Vermont-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.

All other residential new construction program participants will also be entitled to technical support from Efficiency Vermont, but will be limited to three hours of labor; additional support may be requested by the customer on a fee-for-service basis.

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 2.3.3)
- 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.

### **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.

## **2.3.2 Retail Efficient Product Services**

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, appliances, air conditioners, dehumidifiers, pool pumps, heat pump water heaters, heat pump clothes dryers, smart thermostats, and electronics. 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, point-of-purchase information, advertising, and promotional and public information activities.

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 promotion of screw-based LED lighting. Efficiency Vermont's efforts with respect to 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 place an increased emphasis on other beneficial technologies, such as connected lighting, smart thermostats, and heat pump water heaters and will 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 2.1.2.

### 2.3.3 Services to Contractors and Equipment Suppliers

#### The Efficiency Excellence Network

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

- Contractors: Electrical, heating, ventilation, air conditioning, refrigeration, and heat pump
- Lighting designers
- Homebuilders (see Section 2.3.1 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 2.3.2 for a discussion of additional services to the retail product supply chain).

Efficiency Vermont will provide EEN 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 3.4.1)
  - 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.efficiencyvermont.com/>
- **Support for member businesses:**

- Extensive program promotion
- Consumer financial incentives, and third-party financing options for projects completed by EEN contractors
- Enhanced EEN member listings and an improved search tool, for consumers, at <https://www.encyvermont.com>
- Cooperative advertising opportunities.
- **Personal engagement**, in support of the commercial equipment supply chain, with:
  - Distributors, manufacturers, and suppliers 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.

### 2.3.4 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
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

### 2.3.5 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 the Vermont Agency of Commerce and Community Development to work

in additional communities to assist local businesses, municipalities, and residential property owners and occupants in saving energy.

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

### 2.3.6 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 / EEN Partnership:** Financing for heating system purchases and comprehensive thermal efficiency projects completed by Efficiency Vermont’s EEN members.

### **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.

### **Financial and Leveraged Product Development**

Efficiency Vermont will continue its efforts to: 1) increase financing opportunities for Vermonters engaged in energy efficiency projects, and 2) leverage public and private resources to draw new funding for energy efficiency efforts without additional ratepayer investment.

### **2.3.7 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 and coordination with electric distribution utilities across the state in support of efforts to meet specifications of the Renewable Energy Standard-Tier III, which authorizes distribution utilities to implement programs intended to achieve fossil fuel reduction targets. Efficiency Vermont will coordinate with distribution utilities to ensure alignment of new distribution utility-specific efficiency services with Efficiency Vermont’s statewide offerings, to maximize the value delivered to ratepayers.

### **2.3.8 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. In Vermont, partners will include the High Meadows Fund, the VHCB, 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.

### 2.3.9 Data Analytics Platform

Efficiency Vermont will continue to engage a contractor to maintain and host the data platform through which Efficiency Vermont accesses and analyzes 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.

## 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. 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.

### 2.4.1 Education and Training

#### **Codes and Standards Support—Residential and Commercial / Industrial**

To help Vermonters comply with or surpass state energy codes for new construction and renovation projects, Efficiency Vermont will provide the following:

- Energy Code Assistance Center
  - Technical assistance
  - Distribution of code materials
- Energy code training and market partner support
  - Training for building professionals, real estate professionals, and municipal staff
  - Advisory support for market groups and partners
  - Blower door training
- Supporting energy code updates
  - Energy modeling
  - Feedback to contractors and building operators on proposed efficiency levels, informed by experience in the field
  - Participation in stakeholder meetings
- As-needed assistance to Vermont agencies, town energy committees, and commercial and industrial Account Management customers.

#### **Energy Literacy Project**

In collaboration with Vermont's K-12 associations, 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
- 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.

### **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 them, Efficiency Vermont will provide information through:

- Print and electronic materials such as seasonal energy-saving tips and energy use guides for homes and businesses
- The e-mail newsletter *Watts New* and the web blog *Energy. Forward*
- Social media and <https://www.encyvermont.com>
- Participation in events such as home shows and energy fairs throughout the state
- Proactive efforts with the media to develop stories that highlight how Vermonters can participate in and benefit from Efficiency Vermont services
- 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, and 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, which will provide:

- Help for customers in understanding energy use and how to engage in energy management
- Information about Efficiency Vermont's services and about efficient buildings and equipment
- Referrals to resources aligning with customer needs
- Coordination distribution utilities for customer-related training and communications.

### **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
- Brief the Vermont General Assembly, other government officials, and other interested stakeholders on energy efficiency 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
- Engaging 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 focus on statewide energy labeling and commercial-building benchmarking activities designed to provide building owners and operators with information on energy performance and on building-improvement efficiency opportunities. Examples of activities include the following:

- Coordination of statewide implementation and delivery of home energy labeling, in collaboration with an advisory board of representatives from the Department, Vermont Gas Systems, Burlington Electric Department, Vermont’s weatherization agencies, and the real estate industry
- Coordination of the Vermont Home Energy Labeling Advisory Board
- Coordination with partners and stakeholders to support statewide labeling and benchmarking activity
- Outreach and education for real estate professionals, appraisers, and home inspectors
- Marketing and promotion of home energy labels
- Support, training, and quality assurance for qualified assessors delivering home energy labels
- Development and integration of information technology systems and tools for labeling and benchmarking buildings
- Evaluation of labeling activities and impacts.

### **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 resource acquisition 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 of emerging technologies and implementation strategies.

Healthcare Partnership: In alignment with customer interest and national trends, Efficiency Vermont will launch an effort to assess the impact of efficiency measures on resident health. Preliminary research outside of Vermont has proven that links exist between efficiency measures (such as air sealing, heating systems, ventilation, clothes dryers, and cook stoves), indoor air quality, and resident health. Efficiency Vermont will work with the Vermont Office of Economic Opportunity's Weatherization Assistance Program, and partners within the healthcare industry, with the goal to better understand which healthcare measures could be implemented at the time of energy efficiency upgrades, and to understand how these measures might work together to achieve better patient health and to 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.

Advanced Metering Infrastructure (AMI)-Based Efficiency Analysis: Using AMI data, Efficiency Vermont will determine hourly efficiency savings in homes and businesses with recently installed efficient electrical equipment. Efficiency Vermont will then analyze this time-linked information in the context of weather data. The aim of this research paper will be to determine which efficiency resources may be most valuable in addressing the grid-operator's need to absorb excess supply in times of renewable-energy generation and, conversely, to reduce demand when renewable energy is not being supplied.

Low-Cost Monitoring: Efficiency Vermont will test the ability of low-cost monitoring equipment to alert commercial-and-industrial facility managers to energy efficiency opportunities and maintenance issues in advance of equipment failure. Efficiency Vermont will build upon recent project experience with customers who operate commercial refrigeration equipment that might benefit from such monitoring. If this preliminary research proves promising, this project may include the implementation of data visualization and integration with existing energy management systems.

Demand Response Capability and Effectiveness Assessment: This project will involve coordinating with the Department and distribution utilities to review and finalize a catalog of demand response measures that has been commissioned by the Department as part of its recent Potential Study. The draft catalog is expected to be available by the end of January 2018 and a final version of the catalog by mid-2018. This will enable Efficiency Vermont, 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 will begin 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. Efficiency Vermont will assist with identification of efficient



consumer products, energy-management systems, and commercial equipment with demand-response capabilities and applicability in Vermont. Efficiency Vermont also will assist with assessing consumer informed-consent standards relevant to demand-response-capable equipment. Through this effort, Efficiency Vermont aims to identify and demonstrate where Efficiency Vermont can complement existing demand-response services while bringing new value to customers.

Section 6 presents a discussion of recent applied research-and-development projects impacting 2018-2020 plans<sup>3</sup>.

### 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 reporting requests
- Department monthly invoices

#### Demand Resources Plan

The Demand Resources Plan (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. In 2020, 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, Efficiency Vermont will engage in efforts regarding the following:

- The establishment of annual budgets and energy savings goals for electric and thermal energy and process fuel (TEPF) activities in the 2021-2023 performance period
- Quantifiable Performance Indicators to measure EEU results for the 2021–2023 performance period
- Plans and budgets for DSS activities

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<sup>3</sup> As noted in the OOA and according to precedent, Technology Demonstration project activity, including documentation of lessons learned and any changes to project scope, will be included in the Efficiency Vermont Quarterly Reports, and a final summary of findings will be included in the Efficiency Vermont Annual Report. Additionally, as noted in the P&A doc, Technology Demonstration projects will be updated annually in alignment with consequent Triennial Plan Updates.

- 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.

#### **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 3 provisions.

### **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<sup>4</sup>:

- 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 EEU’s, Burlington Electric Department, and other stakeholders. The Technical Advisory Group: 1) reviews and approves the methods and associated assumptions underlying measure savings

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<sup>4</sup> More detailed information about evaluation activities can be found in Section 7.

calculations contained in the Technical Reference Manual; 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 3 activities.

- Maintaining and updating the Technical Reference Manual, 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 this work is for Efficiency Vermont to assess its operations to continue to deliver services that maximize ratepayer value. This work includes defining all administrative costs, incentive and other costs. Efficiency Vermont will submit a proposal to the Department on how these costs will be tracked and reported, including a metric on the ratio of incentive costs to non-incentive costs and total administrative costs as a percent of total budget for the current performance period. Efficiency Vermont expects to initiate the development of these efforts in 2018.

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.

### Regulatory Affairs (Non-Demand Resources Plan)

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: Renewable Energy Standard proceedings for Energy Transformation, proceedings related to the Regional Greenhouse Gas Initiative (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 EEs 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.
- Developing and supporting policy instruments that can be useful for electricity and thermal energy savings through voluntary action or government adoption.
- 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 3), 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
- 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, explain it to customers, and use it in moving energy efficiency projects forward.

## **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 Quantifiable Performance Indicators and Minimum Performance Requirements; 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 Energy Efficiency Charge (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.

## 4. EFFICIENCY VERMONT BUDGETS

### 4.1 Budgets Overview

#### Electric Efficiency Budgets

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 15% of the state’s total energy demand. It has taken Efficiency Vermont 17 years to build its programs to the size they are today, and to support the scale of market transformation that ensures that over 90% of Vermonters are benefiting from Efficiency Vermont services.<sup>5</sup> Further, these resources have proven to be very reliable for grid operators and planners,<sup>6</sup> and generate significant energy savings for Vermonters.<sup>7</sup>

As Efficiency Vermont shows in its 2016 Annual Report, for each dollar Vermont invests in efficiency, two dollars accrue in realized electric-bill and cost savings. 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, 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 2017-2020 period.<sup>8</sup>

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<sup>5</sup> The Vermont Department of Public Service’s Response to Joint Energy Committee Questions Regarding Energy Efficiency Investments, January 8, 2016.

<sup>6</sup> February 5, 2014, memo from Hantz Pr sum  (VELCO): Energy Efficiency’s Role in Transmission Deferrals.

<sup>7</sup> Efficiency Vermont 2016 Savings Claim Summary,

<https://www.encyvermont.com/Media/Default/docs/plans-reports-highlights/2016/ency-vermont-savings-claim-summary-2016.pdf>.

<sup>8</sup> EEU 2016-03. State of Vermont Public Utility Commission, July 7, 2017. Resource Acquisition Budgets Order.

The electric efficiency resource acquisition budgets were developed with a sensitivity to the economic concerns of Vermonters; the budgets sought to lower, and then stabilize, the EEC rate. Efficiency Vermont's 2018-2020 budgets are expected to result in an EEC rate decrease of about 5% in the first year of the performance period, and to then flatten collections for the remainder of the performance period.<sup>9</sup>

To maintain a high level of resource acquisition 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 resource acquisition 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.

### **Thermal Energy and Process Fuel Budgets**

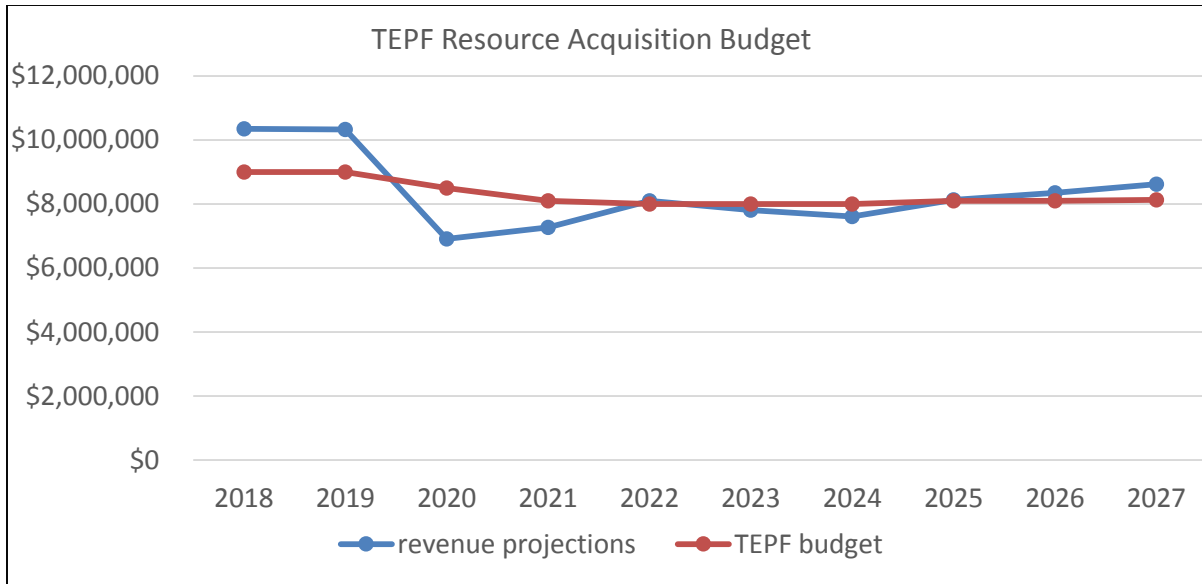
Efficiency Vermont's TEPF funding is composed of revenues from the RGGI and FCM auctions. There have been wide fluctuations in auction prices—and, therefore, auction revenues—in recent years. In developing early budget analysis, Efficiency Vermont discovered that assuming a one-for-one match of resource acquisition budgets and yearly estimated revenue jeopardized realistic modeling of customer, marketplace, and program implementation costs and benefits. That is, Efficiency Vermont has 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 assume level resource acquisition 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.

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<sup>9</sup> The EEC charge is also affected by over-collections and under-collections from unplanned variations in electricity sales. Efficiency Vermont is committed to working with the Department and the Commission to minimize these effects and stabilize EEC rates over the course of years.



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

### Development and Support Services Budgets

There are six categories of DSS that support resource acquisition 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, presented in the below table. 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. This final DSS proposal aligns with the revised structure shown in the following table.

### Comparison of 2015-2017 and 2018-2020 DSS categories

2015-2017 category structure	2018-2020 category structure
Education and Training <ul style="list-style-type: none"> <li>• Codes and standards support (residential)</li> <li>• Codes and standards support (commercial &amp; industrial)</li> <li>• Energy Literacy Project</li> </ul>	Education and Training <ul style="list-style-type: none"> <li>• Codes and standards support (residential)</li> <li>• Codes and standards support (commercial &amp; industrial)</li> <li>• Energy Literacy Project</li> </ul>



<ul style="list-style-type: none"> <li>• General public education</li> <li>• Better Buildings by Design conference</li> <li>• Customer support</li> <li>• Building labeling</li> </ul>	<ul style="list-style-type: none"> <li>• General public education (with public affairs component)</li> <li>• Better Buildings by Design conference</li> <li>• Customer support</li> <li>• Public affairs (stakeholder education)</li> <li>• Building labeling</li> </ul>
<b>Applied Research and Development</b> <ul style="list-style-type: none"> <li>• Emerging data services</li> <li>• Technology demonstrations</li> </ul>	<b>Applied Research and Development</b> <ul style="list-style-type: none"> <li>• Emerging data services</li> <li>• Technology demonstrations</li> </ul>
<b>Planning and Reporting</b> <ul style="list-style-type: none"> <li>• Annual Plan</li> <li>• Demand Resources Plan</li> <li>• VSPC participation</li> <li>• ISO-NE FCM administration</li> <li>• External reporting</li> <li>• Non-regulatory reporting</li> </ul>	<b>Planning and Reporting</b> <ul style="list-style-type: none"> <li>• Annual Plan</li> <li>• Demand Resources Plan</li> <li>• VSPC participation</li> <li>• ISO-NE FCM administration</li> <li>• External reporting</li> <li>• Non-regulatory reporting</li> </ul>
<b>Evaluation</b> <ul style="list-style-type: none"> <li>• Savings verification</li> <li>• Technical Advisory Group</li> <li>• Technical Reference Manual</li> <li>• ISO-NE FCM metering, monitoring, and evaluation</li> <li>• Quality management</li> </ul>	<b>Evaluation</b> <ul style="list-style-type: none"> <li>• Savings verification</li> <li>• Technical Advisory Group</li> <li>• Technical Reference Manual</li> <li>• ISO-NE FCM metering, monitoring, and evaluation</li> <li>• Quality management</li> </ul>
<b>Policy and Public Affairs</b> <ul style="list-style-type: none"> <li>• Public affairs</li> <li>• Regulatory affairs (non-DRP)</li> <li>• Financial and leveraged product development</li> </ul>	<b>Administration and Regulatory Affairs</b> <ul style="list-style-type: none"> <li>• General administration</li> <li>• Regulatory affairs (non-DRP)</li> <li>• Financial and leveraged product development</li> </ul>
<b>Information Technology</b> <ul style="list-style-type: none"> <li>• Strategic Technology Services</li> <li>• Analytics and reporting</li> <li>• Portfolio screening tool</li> </ul>	<b>Information Technology</b> <ul style="list-style-type: none"> <li>• Core business software applications</li> <li>• Utility data management</li> <li>• Reporting and business intelligence</li> </ul>
<b>Administration</b> <ul style="list-style-type: none"> <li>• General administration</li> </ul>	N/A

## 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 resource acquisition (“RA”) and Development and Support Services (DSS) activities;
- B. Performance compensation to be paid based on the attainment of quantifiable performance indicator (“QPI”) targets established under the Demand Resource Plan (DRP) proceeding, from funds collected through the electric efficiency charge (EEC) or other sources under the jurisdiction of the Commission and withheld from the budget for this purpose; and
- 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 Quantifiable Performance Indicators (QPIs) and minimum performance requirements (MPRs). The timeframe 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 operations fee helps to lower the operator’s cost of debt for its provision of services and thereby the cost for Efficiency Vermont services, which is directly beneficial to ratepayers. 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 remainder of this section presents a budget summary and more detailed budgets.

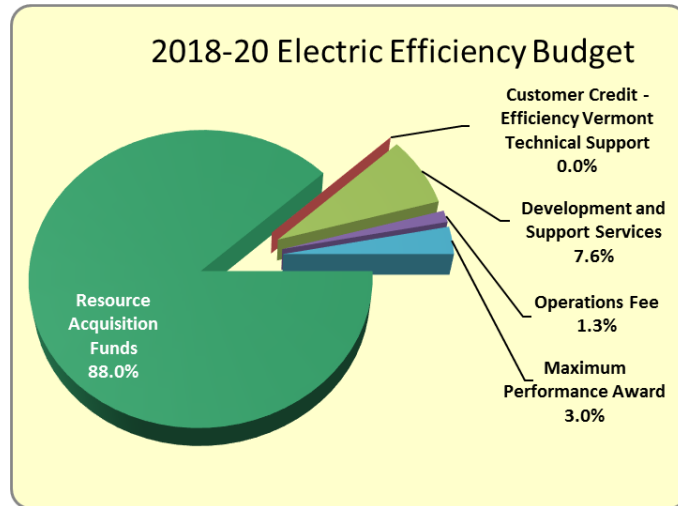
## 4.2 2018-2020 Resource Acquisition and Development and Support Services Budget Summary

<b>Resource Acquisition</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2018-2020</b>
Total Electric EEU Funds for Resource Acquisition	\$44,254,700	\$44,257,800	\$44,260,000	\$132,772,500
Total Customer Credit- Efficiency Vermont Technical Support	\$24,400	\$24,300	\$24,200	\$72,900
Total Thermal Energy and Process Fuels Funds	\$9,000,000	\$9,000,000	\$8,500,000	\$26,500,000
<b>Total Resource Acquisition Budget</b>	<b>\$53,279,100</b>	<b>\$53,282,100</b>	<b>\$52,784,200</b>	<b>\$159,345,400</b>
<b>Development and Support Services</b>				
Total Electric EEU Funds	\$3,841,200	\$3,838,200	\$3,785,500	\$11,464,900
Total Thermal Energy and Process Fuels Funds	\$786,800	\$786,100	\$775,300	\$2,348,200
<b>Total Development and Support Services Budget</b>	<b>\$4,628,000</b>	<b>\$4,624,300</b>	<b>\$4,560,800</b>	<b>\$13,813,100</b>
Operations Fee	\$781,700	\$781,700	\$774,200	\$2,337,600
<b>Subtotal</b>	<b>\$58,688,800</b>	<b>\$58,688,100</b>	<b>\$58,119,200</b>	<b>\$175,496,100</b>

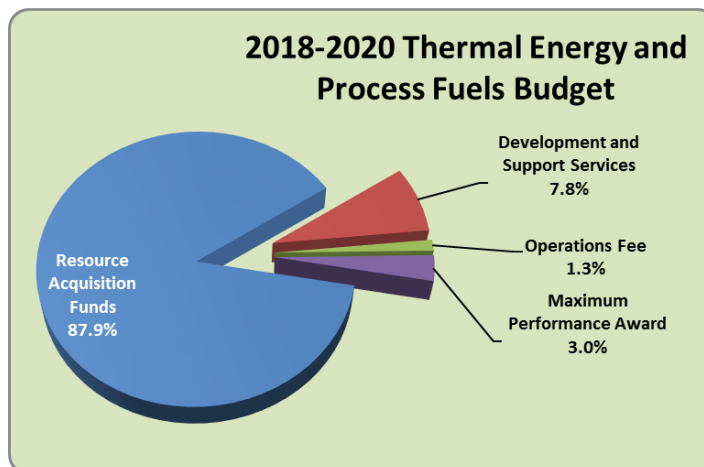
### 4.3 2018-2020 Budget by Market and Initiative

<b><u>RESOURCE ACQUISITION ACTIVITIES</u></b>				
<b><u>Electric Efficiency</u></b>				
<b><u>Business Sector</u></b>	<b><u>2018</u></b>	<b><u>2019</u></b>	<b><u>2020</u></b>	<b><u>2018-2020</u></b>
Business Existing Facilities	\$20,969,900	\$22,091,400	\$23,074,400	\$66,135,700
Customer Credit Technical Support	\$24,400	\$24,300	\$24,200	\$72,900
<b><u>Business New Construction</u></b>	<b><u>\$3,598,700</u></b>	<b><u>\$3,645,700</u></b>	<b><u>\$3,453,000</u></b>	<b><u>\$10,697,400</u></b>
<b>Subtotal Business Sector</b>	<b>\$24,593,000</b>	<b>\$25,761,400</b>	<b>\$26,551,600</b>	<b>\$76,906,000</b>
<b><u>Residential Sector</u></b>				
Efficient Products	\$11,786,200	\$10,009,000	\$8,692,500	\$30,487,700
Existing Homes	\$5,095,100	\$5,574,900	\$6,142,300	\$16,812,300
<b><u>Residential New Construction</u></b>	<b><u>\$2,804,800</u></b>	<b><u>\$2,936,800</u></b>	<b><u>\$2,897,800</u></b>	<b><u>\$8,639,400</u></b>
<b>Subtotal Residential Sector</b>	<b>\$19,686,100</b>	<b>\$18,520,700</b>	<b>\$17,732,600</b>	<b>\$55,939,400</b>
<b>Total Electric Efficiency</b>	<b>\$44,279,100</b>	<b>\$44,282,100</b>	<b>\$44,284,200</b>	<b>\$132,845,400</b>
<b><u>Thermal Energy and Process Fuels Efficiency</u></b>				
Business Sector	\$2,250,000	\$2,250,000	\$2,125,000	\$6,625,000
Residential Sector	<u>\$6,750,000</u>	<u>\$6,750,000</u>	<u>\$6,375,000</u>	<u>\$19,875,000</u>
<b>Total Thermal Energy and Process Fuels Efficiency</b>	<b>\$9,000,000</b>	<b>\$9,000,000</b>	<b>\$8,500,000</b>	<b>\$26,500,000</b>
<b>TOTAL RESOURCE ACQUISITION ACTIVITIES</b>	<b>\$53,279,100</b>	<b>\$53,282,100</b>	<b>\$52,784,200</b>	<b>\$159,345,400</b>
<b><u>DEVELOPMENT &amp; SUPPORT SERVICES</u></b>				
	<b><u>2018</u></b>	<b><u>2019</u></b>	<b><u>2020</u></b>	<b><u>2018-2020</u></b>
Education and Training	\$970,000	\$930,100	\$911,500	\$2,811,600
Applied Research and Development	\$425,000	\$396,500	\$368,100	\$1,189,600
Planning and Reporting	\$428,000	\$619,500	\$653,600	\$1,701,100
Evaluation, Measurement, and Verification	\$830,000	\$785,000	\$770,100	\$2,385,100
Administration and Regulatory Affairs	\$580,000	\$533,200	\$522,500	\$1,635,700
<b><u>Information Technology</u></b>	<b><u>\$1,395,000</u></b>	<b><u>\$1,360,000</u></b>	<b><u>\$1,335,000</u></b>	<b><u>\$4,090,000</u></b>
<b>TOTAL DEVELOPMENT &amp; SUPPORT SERVICES</b>	<b>\$4,628,000</b>	<b>\$4,624,300</b>	<b>\$4,560,800</b>	<b>\$13,813,100</b>
Operations Fee (1.35%)	\$781,700	\$781,700	\$774,200	\$2,337,600
Performance Award (3.15%)	<u>\$1,823,300</u>	<u>\$1,823,300</u>	<u>\$1,805,600</u>	<u>\$5,452,200</u>
<b>TOTAL BUDGET</b>	<b><u>\$60,512,100</u></b>	<b><u>\$60,511,400</u></b>	<b><u>\$59,924,800</u></b>	<b><u>\$180,948,300</u></b>

#### 4.4 2018-2020 Electric Efficiency Budget



#### 4.5 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 and MPRs.

## 5.1 2018-2020 Electric Efficiency Performance Goals and Minimum Performance Requirements

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 megawatt-hour (MWh) savings	357,400
3	Statewide Summer Peak Demand Savings	Cumulative net summer peak demand kilowatt (kW) savings	45,900
4	Statewide Winter Peak Demand Savings	Cumulative net winter net 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
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 for each geographic area is greater than values shown on geographic equity table	(See Section 5.2)
11	Administrative Efficiency—	To define and track all administrative costs associated with delivery of services	Meet milestone dates
12	Service Quality	Achieve 92 or more metric points	92
13	Resource Acquisition Performance Period Spending	Total spending for a three-year performance period (including applicable operations fees)	<\$135,906,528
14	Development and Support Services 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 <sup>1</sup>	Required TRB per Geographic Area <sup>2</sup>
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
<b>Total</b>	<b>\$169,179,844</b>

<sup>1</sup> All geographic names above refer to Vermont counties.

<sup>2</sup> 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 Million British thermal unit (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 Thermal Energy and Process Fuel 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 Thermal Energy and Process Fuel Fund expenditures	>17.0%
5	Resource Acquisition 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 regarding 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:** This study will continue to be undertaken, presented as an opportunity for qualifying facilities, market-wide, to save energy. Efficiency Vermont will continue to consider beneficial new approaches arising from this study for future inclusion in service offerings.

### 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 results from this study, as well as from an in-depth CCHP evaluation by the Department, to help inform savings measurement approaches and to understand how performance of new technology may differ from modeling assumptions. Such knowledge holds promise for both research and development efforts and customer-facing program efforts. Efficiency Vermont will provide educational information about CCHPs in order for customers to maximize benefits from this technology. (See the discussion of heating, ventilation, air conditioning, and refrigeration in Section 2.1.4.)

### **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 not determined 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, Efficiency Vermont launched financial incentives for high-efficiency condensing units and floating-head pressure controls, in 2017, 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, zero-energy modular homes in Waltham. Each home was a low-income rental unit equipped with a solar roof system. The batteries will be remotely accessible to Green Mountain



Power, which will manage battery usage as needed to lower peak demand. Efficiency Vermont will remotely monitor battery performance. This research proved its hypothesis. Additionally, this study revealed that the inclusion of storage increased interest in zero-energy modular homes among potential occupants concerned about reliable electricity availability.

In 2018-2020: At the time of the creation of this Plan, efforts were underway to secure funding to enable all new zero-energy modular homes built for installation in Green Mountain Power territory in 2018 to include the battery configuration used in the study.

## 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 customer database (KITT): 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 EEU's, and other stakeholders. It reviews and approves the methods and associated assumptions underlying measure savings calculations in the Technical Reference Manual (TRM). In addition, TAG has functioned as a general forum for technical issues related to EEU 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 seven 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. Evaluation Framework Potential Changes

At the time of development of this document, the Department had proposed a new evaluation framework for conducting evaluation, measurement, and verification for Efficiency Vermont. The framework was under review for possible implementation in the 2018-2020 performance period. This new framework would result in significant changes to the existing process and combine the annual savings verification and FCM evaluation activities into a single, coordinated effort. Support for the implementation of this new process would take place as part of TAG efforts.

## 7. 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 (TRM)**

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, and 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 annual updating of 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 onsite measurement and verification deployment
- Data analysis and report finalization.

### **ISO-New England Measurement & Verification**

VEIC operates as a New England Power Pool (NEPOOL) 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 practice 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"> <li>• What home attributes customers value most (such as comfort, durability, low purchase price, low operating costs, healthy indoor air)</li> <li>• How builders are currently marketing homes to customers</li> <li>• 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.</li> </ul> <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	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.
2018	Dairy Ventilation Variable Frequency Drive Controls	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.
2018	Maple High Brix Reverse Osmosis	Assess the savings claims associated with the latest in maple reverse osmosis technology, high brix reverse osmosis, which is claimed 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.
2018-2020	Commercial & Industrial	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.
2018-2020	Digital Engagement & Disaggregation	Assess different strategies for customer engagement using AMI disaggregation and other targeted digital engagement offerings.

### 7.3 Recent Evaluation Activities Impacting 2018-2020 Plans

#### 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: At the time of development of this document, Efficiency Vermont's Home Performance with ENERGY STAR efforts were undergoing a process-and-impact evaluation, carried out by an independent third-party evaluator through a contract with the Department. The evaluation scope focuses on:

- 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: Upon the study's completion in early 2018, Efficiency Vermont will review the findings and recommendations to make any necessary revisions to program savings estimates and methodologies, as well as program implementation and engagement strategies.

### **Cold Climate Heat Pumps**

Description: Efficiency Vermont supports the installation of CCHPs through a midstream incentive program. Electric savings are claimed using market opportunity assumptions for the incremental heating and cooling improvements over a market baseline heat pump. Thermal savings are claimed separately for the displacement of fossil fuels from existing heating systems.

Evaluation Activities: The Department contracted with third-party evaluator Cadmus to conduct a field study of heat pump performance in 63 Vermont homes and two small businesses. In addition to monitoring system performance and energy consumption, the study included collection of qualitative data to understand homeowner perspectives. The research was undertaken to determine the following:

- How residents use their equipment to heat and cool spaces in their homes
- Total heating and cooling output and equipment efficiency
- Power and energy consumption of the equipment at two-minute intervals from November 2015 through April 2017
- Heating-season electric and fossil fuel impacts and interactions with existing heating systems
- Cooling-season electric impacts
- Whether or not CCHP performance varies in correlation with planned usage strategy and such elements as installation location and building shell characteristics.

Evaluation Results: A final project report, including impact evaluation results and the qualitative survey data, was provided to Efficiency Vermont in August 2017. The report results showed a 48% realization rate for heating savings and 64% for cooling savings when compared with the current savings values included in the Vermont TRM. The study results pointed to several potential explanations for the fact that heat pump savings were lower than estimated, including homeowner operating behavior and system installation location. At the time of development of this document, Efficiency Vermont was engaged in work to update the savings values included in the TRM through the TAG process with the Department. In addition to updating those savings values, Efficiency Vermont planned to review the qualitative findings of the report to provide better information to both homeowners and contractors on best practices for heat pump installation and operation. These program updates will most likely continue into 2018.

## 8. COMMUNITY INPUT

As part of its planning for the 2018–2020 performance period, Efficiency Vermont sought opportunities for public engagement and input through in-person and online approaches. Efficiency Vermont scheduled a series of community forums, taking particular care to select locations that were accessible to every region of the state. Forums were conducted in Bennington, Brattleboro, Newport, Randolph, and Milton. For Vermonters not able to attend a forum, Efficiency Vermont developed an online survey through which members of the public could offer comments on Efficiency Vermont services and priorities, and provide rankings for issues to be considered.

Efficiency Vermont engaged in broad outreach to ensure that the public was aware of these feedback opportunities. This outreach included a letter-to-the-editor announcement of the forums, which appeared in multiple media outlets across the state from Efficiency Vermont Director Karen Glitman; advertising and promotion on social media, public radio, and Front Porch Forum; extensive direct outreach from Efficiency Vermont staff members to their customers, and communications via community groups and organizations to their respective memberships.

A total of 47 members of the public attended one of five forums and 144 individuals completed online surveys. The following input emerged as recurring themes:

- Transportation energy is the most costly energy burden, followed by electricity (expressed by more than half of participants).
- Efficiency Vermont should take a larger role in thermal efficiency and transportation efficiency.
- Efficiency Vermont’s rebates and incentives are valuable in helping to make efficiency services and efficient products more affordable and accessible.
- Innovations in the energy industry—particularly new efficient technologies and zero energy homes—are of high interest.
- Efficiency Vermont is already working to create a more affordable and equitable Vermont, but it can do more to increase equity in Vermont.
- Efficiency Vermont should focus on these areas: increasing the availability and affordability of efficient products and services; providing thermal efficiency and weatherization services; helping businesses reduce their costs and remain economically viable and competitive, and reducing the financial and environmental costs of transportation energy in Vermont.
- Efficiency Vermont’s partnership with Vermont trade partners is important and should remain a priority. There is also a need for more energy efficiency contractors in a number of regions across Vermont.





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