2017 update to the

Triennial Plan
2015 - 2017

Prepared for the Vermont
Public Service Board

November 1, 2016

by Vermont Energy
Investment Corporation
128 Lakeside Avenue
Burlington, VT 05401

Efficiency Vermont

This document is presented to the Vermont Public Service Board and to the Vermont Department of Public Service, in fulfillment of the regulatory requirement to submit a 2017 update to the overview of Efficiency Vermont's 2015–2017 performance period strategy for providing electric and thermal energy efficiency services.

Contents

1. Introduction 1
1.1 Empower Vermonters 1
1.1.1 Effectiveness in Dynamic Markets 2
1.1.2 Customer Empowerment Through Data 3
1.1.3 Collaboration to Benefit All Vermonters 3
1.2 Strengthen Vermont's Future 4
1.3 Ensure Operational Excellence 5
2. About this Plan 6
2.1 Plan Development 6
2.2 Plan Structure 6
3. Services for 2015–2017 7
3.1 Services to Existing Business Facilities 7
3.1.1 Vermont's Largest Energy Users 7
3.1.2 Small and Medium-Sized Businesses 8
3.1.3 Targeted Markets 9
3.1.4 Key Commercial Technologies 9
3.2 Services to Homes 11
3.2.1 Existing Market-Rate Homes 11
3.2.2 Existing and New Low-Income Housing 12
3.3 Activities in Service to Multiple Customer Sectors 13
3.3.1 New Construction Services 14
3.3.2 Retail Efficient Product Services 16
3.3.3 Services to Building Improvement Contractors 16
3.3.4 Services to Equipment Supply Chain Partners and Technicians 17
3.3.5 Trade Association Partnerships 18
3.3.6 Community-Based Activities 19
3.3.7 Financial Services 19
3.3.8 Coordination with Distribution Utilities 21
3.3.9 State, Regional, and National Partnerships 21
3.3.10 Resource Acquisition Research and Development 21
3.4 DEVELOPMENT AND SUPPORT SERVICES 22
3.4.1 Education and Training 22
3.4.2 Applied Research and Development 24

3.4.3 Planning and Reporting 24
3.4.4 Evaluation 26
3.4.5 Policy and Public Affairs 26
3.4.6 Information Technology 28
3.4.7 General Administration 28
4. Energy Efficiency Utility Funding 29
5. Appendix 30
5.1 Efficiency Vermont Budgets 30
5.1.1 2015–2017 Resource Acquisition and Development and Support Services Budget Summary 31
5.1.2 2015–2017 Budget by Market and Initiative 32
5.1.3 2015–2017 Electric Efficiency Budget 33
5.1.4 2015–2017 Thermal Efficiency Budget 33
5.1.5 2015–2017 Combined Efficiency Budget 33
5.2 Quantifiable Performance Indicators 34
5.2.1 2015–2017 Electric Efficiency Performance Goals and Minimum Performance Requirements (MPR) 34
5.2.2 2015-2017 Electric Minimum TRB per Geographic Area (QPI #12) 35
5.2.3 2015–2017 Thermal Energy and Process Fuels Performance Goals and Minimum Performance Requirements 35
5.3 Applied Research and Development Activities 36
5.3.1 2015–2017 Emerging Data Services 36
5.3.2 2015–2017 Technology Demonstrations 37
5.3.3 Recent Applied Research and Development Projects Impacting 2015–2017 Plans 42
5.4 Evaluation Activities 45
5.4.1 2015–2017 Portfolio-Wide Evaluation Activities 45
5.4.2 2015–2017 Initiative-Specific Evaluation Activities 49
5.4.3 Recent Evaluation Results Impacting 2015–2017 Plans 50
5.5 2015-2017 Resource Acquisition Research-and-Development Research Plan 52
5.6 Community Forums and Stakeholder Engagement 60
5.7 2017 Addendum 62
5.8 DSS Funds Transfer request 67

1. INTRODUCTION

Efficiency Vermont, the statewide energy efficiency utility, is dedicated to making it simple for Vermont households of all income levels, businesses, institutions, and communities to get the most out of their energy dollars. This document is an overview of Efficiency Vermont's 2015–2017 plan, designed to benefit Vermonters, our state's economy, and our environment through comprehensive energy efficiency services.

In 2015–2017, Efficiency Vermont will be driven by three fundamental aims:

1.1 Empower Vermonters
1.2 Strengthen Vermont's Future
1.3 Ensure Operational Excellence

1.1 EMPOWER VERMONTERS

Efficiency Vermont will design and deliver services that empower Vermonters to take control of their energy use. These services will help customers at critical decision-making moments—such as in new construction projects, during renovations, and in the purchase of efficient equipment—and as they engage in ongoing energy use management. Efficiency Vermont will serve Vermonters by:

- Gaining awareness of customers' needs and priorities, and the obstacles they face in taking energy-saving actions
- Engaging them at their current level of interest in energy efficiency and motivating them to increase their involvement
- Providing the technical information, analysis, and guidance they need to easily make independent, informed decisions about their immediate and ongoing energy use
- Ensuring their access to the resources they need to take cost-effective, energy-saving actions in their homes, businesses, institutions, and communities.

In this performance period, while continuing to work directly with customers to help them acquire savings across energy uses, Efficiency Vermont will increase its impact through strategic expansion of efforts in three areas of focus, as discussed in greater depth in this Plan: 1) Effectiveness in Dynamic Markets; 2) Customer Empowerment through Data; and 3) Collaboration to Benefit All Vermonters.

1.1.1 Effectiveness in Dynamic Markets

Vermont's residential and business markets are dynamic. Numerous factors—as broadly impactful as an economic downturn or as personal as a decision to expand a business—can alter a customer's level of interest in or ability to take energy-saving actions. Efficiency Vermont's ability to help Vermonters save energy in any market condition will continue to be based in its awareness of customers' changing challenges, priorities, and opportunities through:

- Long-term relationships with the state's largest energy users as well as with owners of medium-sized and small businesses, including farms
- Awareness of new efficient technologies with applicability in Vermont and of adoption levels of existing efficient technologies
- The application of data-based knowledge, as discussed in Section 1.1.2
- Partnerships as described in Section 1.1.3.

At Brace Farm in Ferrisburgh, energy-efficient upgrades are saving the Brace family $7,600 per year.

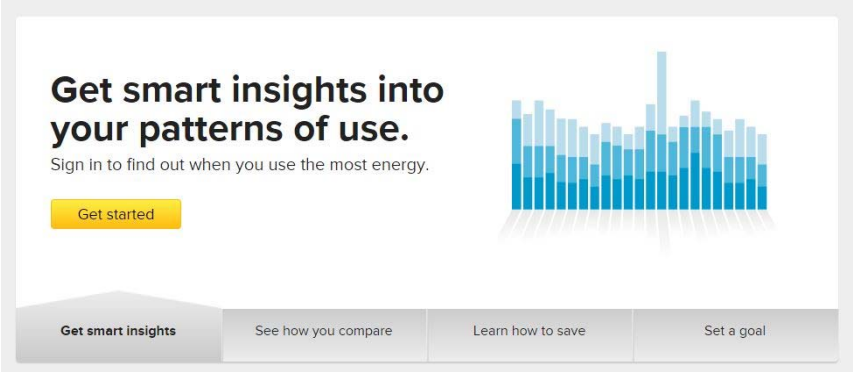
Due to its ongoing awareness of changing market opportunities, Efficiency Vermont will enter this performance period well-positioned to design and implement services that provide continued and deepened value to customers:

- **Increasing adoption of beneficial new technologies**, such as rapidly emerging innovations in efficient lighting and heating systems
- **Extending Account Management services to more Vermonters**, to enable more Vermont businesses to benefit from long-term energy management and to incorporate energy considerations into every level of operations
- **Focusing on the customer**; supporting the customer's realistic path toward effective, comprehensive building improvements, whether through incremental upgrades over time or a whole-building improvement project
- **Increasing access to financing**; working with financial institutions to bring efficiency within reach for more Vermonters and raising the profile of financing as a tool to bring projects to fruition
- **Leveraging Vermonters' existing professional and community connections**; reaching Vermonters through their trusted trade and community organizations, media, and events
- **Customer engagement**; motivating customers to increase action by providing opportunities for engagement, regardless of their past degree of involvement in energy efficiency.

1.1.2 Customer Empowerment Through Data

Through the analysis of increasingly available energy usage data, Efficiency Vermont will deepen its understanding of and engagement with customers and empower them with greater ability to manage their energy use:

- **Data analysis and custom analytics tools for businesses:** Through expert analysis of smart meter and / or submeter data—coupled with technical and financial services in support of optimal efficiency improvements—Efficiency Vermont will give commercial facility operators the ability to: 1) monitor electricity consumption of key equipment or of full facilities in order to identify new savings opportunities; 2) predict and reduce peak demand; and 3) aggressively cut power costs through improvements to procedures, control settings, and machinery.
- **Web-based data access:** Efficiency Vermont will explore the provision of a confidential online portal to enable customers to have easy access to their available energy usage data, along with analysis, guidance, and user-friendly tools, on www.efficiencyvermont.com.
- **Continual learning and innovation:** Efficiency Vermont will continue to identify and research new ways to apply the analysis of energy usage data and other data to deliver deeper energy savings.
- **Best practices:** Efficiency Vermont will protect confidential customer data through existing effective approaches and through continued vigilance in maintaining awareness and adoption of optimal practices as new methods, technologies, and threats emerge.



Efficiency Vermont's website empowers Vermonters to take control of their energy use through personalized reports and tools.

1.1.3 Collaboration to Benefit All Vermonters

- **Transforming the marketplace:** Benefiting Vermonters by partnering with efficient product and service providers:
  - **Supply chain engagement:** With strong relationships throughout the efficient product supply chain, Efficiency Vermont will begin the performance period well positioned to further tap this network's potential to deliver reduced-cost, high-efficiency products to the Vermont marketplace:
    - Efficiency Vermont will build upon its innovative approaches with equipment distributors and other supply chain partners to substantially increase the ability of commercial customers to purchase discounted, high-quality efficient equipment with applicability across markets.
    - Efficiency Vermont will partner with manufacturers, suppliers, retail chain stores at the corporate level, and local retailers throughout Vermont to reduce retail

purchase costs, ensure product quality and availability, and provide the public with knowledgeable salespeople.

- **Service-provider partnerships:** To enable more Vermonters to turn to their local building-improvement, construction, renovation, and equipment installation / repair contractors for expert help in improving the efficiency of their homes and businesses, Efficiency Vermont will expand its network of efficiency service providers receiving training and certification services and technical and promotional support.

- **Utility partnerships:** Efficiency Vermont will work closely with Vermont's distribution utilities to ensure coordination of services and identification of joint ventures in order to increase value to customers.
- **Support for Vermont's energy goals:** Efficiency Vermont will provide information and analysis to policy makers, state agencies, and other key stakeholders in support of energy forecasting, advancing the State's policy goals, and keeping all stakeholders and policy makers informed of Efficiency Vermont's activities.

1.2 STRENGTHEN VERMONT'S FUTURE

The energy savings acquired through Efficiency Vermont's services not only strengthen the financial outlook for individual customers but also strengthen the economic and environmental future of Vermont as a whole. In the coming performance period, Efficiency Vermont will strive to deepen Vermonters' energy savings, in alignment with the State's energy goals, in order to increase efficiency's positive impact: 1) as an economic driver for Vermont; 2) on Vermont's energy future; and 3) on Vermont's environment.

Tom Mehuron of Mehuron's Market in Waitsfield is saving $9,750 per year after making energy efficiency upgrades.

Efficiency's power as an economic driver for Vermont:

- Securing jobs and strengthening downtowns and local economies: Most dollars spent on energy leave the state, but the opposite is true for energy efficiency purchases. Energy efficiency investments benefit a range of local service and product providers, such as Efficiency Vermont's partner retailers and building improvement contractors. This business income strengthens bottom lines, provides a competitive edge, creates and protects jobs, and contributes to local tax bases. Every dollar spent on electric efficiency creates a net increase of nearly five dollars of cumulative gross state product.[1]
- Providing least-cost energy use: The cost of reducing the use of a given unit of energy through efficiency is less than the cost of obtaining and distributing that same unit of energy. The cheapest energy is energy that is not used.
- Increasing cash flow for all Vermonters: When Vermonters spend less on energy, they have more money to save, to invest for their future, or to introduce into the state's economy through local purchases.

[1] Source: Vermont Department of Public Service's *2016 Comprehensive Energy Plan*, page 208.

Efficiency's power to strengthen Vermont's energy future:
As Efficiency Vermont helps customers use energy efficiently, Vermonters not only reduce their own costs but also have a deeply beneficial impact on energy demand and management statewide. According to the Vermont Electric Power Company, aggressive energy efficiency in Vermont has resulted in $279 million of transmission and distribution projects being deferred across the region overseen by the Independent System Operator–New England (ISO-NE). These savings benefited all ratepayers, participant and non-participant alike. By lowering statewide energy demand, energy efficiency also plays an important role in Vermont's efforts to reach its goal of obtaining 90% of the state's energy from renewable sources by 2050, as defined in Vermont's *Comprehensive Energy Plan*.

Efficiency's power to protect Vermont's environment:
Through efficient energy use, Vermonters reduce power plant and heating system emissions that harm our state's environment. A clean environment protects the natural qualities of Vermont that strengthen such economic drivers as agriculture and tourism.

1.3 ENSURE OPERATIONAL EXCELLENCE

To bring maximum benefits to Vermonters, Efficiency Vermont will bring excellence to all aspects of its service efforts through a commitment to ongoing assessment of the efficiency and effectiveness of operational and service delivery systems.

Each year, thousands of customers call, e-mail, and chat online with the Customer Support team about how to reduce their energy usage.

- **Service optimization:** Continually evaluating services to maintain the optimal balance of technical and financial services to deliver maximum benefits to customers
- **Information technology:** Ensuring the security of confidential customer data, supporting optimal delivery of services to customers, ensuring accuracy in all activities, engaging in ongoing efforts to find new efficiencies, and maintaining the ease of use of systems
- **Quality management:** Engaging rigorous protocols for continuous assessment of operations and service delivery, optimizing administrative efficiencies, ensuring impact and effectiveness in markets and customer value, and engaging in key process improvements
- **Planning and reporting:** Maintaining accountability and providing accurate tracking of progress in order to enable performance monitoring and strategy adjustment to optimize service delivery and public benefits
- **New product development:** Introducing a standardized process to enable increased effectiveness, efficiency, and consistency in product design and delivery
- **Value stream mapping:** Continuing to leverage the value stream mapping process, which has resulted in Efficiency Vermont's receipt of a "Best in Class" award from a third-party audit
- **Consumer engagement studies and market assessments:** An in-depth effort to ensure the delivery of services and products that customers value most.

2. ABOUT THIS PLAN

2.1 PLAN DEVELOPMENT

This 2015–2017 Efficiency Vermont Triennial Plan was developed in alignment with:

- The goals of the 2008 Vermont Energy Efficiency and Affordability Act and Vermont's *Comprehensive Energy Plan*
- Efficiency Vermont's 2015–2017 Quantifiable Performance Indicators (QPIs) established with the Vermont Public Service Board (see Section 5.2)
- Vermont's Comprehensive Economic Development Strategy, as applicable.

Through the course of the performance period, Efficiency Vermont will refine and revise the services outlined in this Plan as needed to maintain responsible management of funds, to take advantage of changing technological and market opportunities, to utilize feedback gathered through ongoing customer and stakeholder input processes—including a community forum process (see Section 5.6)—and to maximize benefits to Vermonters.

2.2 PLAN STRUCTURE

The services discussed in this Plan are organized by the budget categories specified by the Vermont Public Service Board in its regulatory processes:

- Resource Acquisition (RA) Budgets: Associated services are discussed in Sections 3.1–3.3.
- RA Research and Development (R&D) Budgets: Associated services are discussed in Sections 3.3.10 and 5.5.
- Non-Resource Acquisition (NRA) Budgets: Associated services are discussed in Section 3.4.[2]

RA services are defined as those that directly achieve energy savings. NRA services include those with both an immediate and a long-term impact on Vermonters' ability to cut energy costs. NRA services include those providing necessary support for the operation of Efficiency Vermont. A purpose of this RA / NRA delineation is to provide a high level of transparency regarding Efficiency Vermont activities.

[2] Section 3.4 is titled "Development and Support Services."

3. SERVICES FOR 2015-2017

Efficiency Vermont will deliver objective, customer-focused technical, financial, and educational services to help Vermonters overcome barriers to improving the energy efficiency of their homes, businesses, institutions, and municipal facilities. Efficiency Vermont will design its approaches through an awareness of customers' priorities, including both energy benefits and such non-energy benefits as lower operating and maintenance costs, reduced water use, greater building occupant comfort, healthier indoor air, improved light quality, and improved working environments. These non-energy benefits are recognized by the Vermont Public Service Board as factors determining the cost-effectiveness of efficiency investments. Efficiency Vermont's informational and educational services will target Vermonters—regardless of their current involvement in efficiency activities—in order to empower and motivate them through greater awareness, knowledge, and ability to make informed decisions about optimizing their energy use.

3.1 SERVICES TO EXISTING BUSINESS FACILITIES

In the coming performance period, existing commercial, industrial, and institutional facilities will present significant potential for energy reductions.

3.1.1 Vermont's Largest Energy Users

In service to the state's largest energy users, defined by their use of more than 500 megawatt hours (MWh) of electricity per year, Efficiency Vermont will continue to take a customized approach, including:

- **Account Management:** Designated Efficiency Vermont staff will establish and maintain long-term, proactive professional relationships with individual businesses. Through this approach, Efficiency Vermont will gain an understanding of companies' particular priorities and be best able to design and deliver customized services. These services will include help in creating comprehensive 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. Such approaches will be designed to best position businesses to: 1) deepen savings; 2) complete multiple projects over time; 3) utilize best practices in energy use management; and 4) engage in continuous energy improvement, which helps customers look holistically at their energy use to obtain sustainable and verifiable energy savings.
- **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.[3] Efficiency Vermont will then identify and address barriers to greater savings, such as lack of capital, lack of perceived value of efficiency, 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.
- **Peak electricity use management:** Through smart meter and submeter data analysis, custom analytics tools, and support for optimal efficiency improvements, Efficiency Vermont will

[3] 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.

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. Through such approaches as focused promotions or upstream price negotiations, Efficiency Vermont will leverage resources for optimal benefit to customers.
- **System optimization:** In addition to providing support for equipment replacement, 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, 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.

3.1.2 Small and Medium-Sized Businesses

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

- **Medium-sized business Account Management**; providing the benefits of this approach (described in Section 3.1.1) to businesses using a maximum of 1,000 MWh per year
- **Technical guidance and education**; offering information about efficiency opportunities, technologies, and financial solutions through direct customer interaction and strategic outreach via numerous avenues, including business media placements, chambers of commerce, business and trade associations, planning commissions, economic development groups, and utility partners
- **Encouraging ongoing involvement**; identifying easy, effective initial measures and guidance on ensuing steps on a continuing path of improved efficiency
- **Thermal efficiency services**; providing financial incentives to qualifying small businesses and residential rental property owners completing efficiency improvements with members of Efficiency Vermont's network of local, certified Building Performance contractors

Jim Roche saves $580 yearly from upgraded lighting at his Sandy Pines Boarding Kennel in Essex Junction. In 2015, business owners worked with Efficiency Vermont to save a combined $4.9 million per year in energy costs.

- **Phone consultations**; helping businesses identify and prioritize savings opportunities and supporting owners through the project process
- **Data analysis and segmentation**; optimizing service to this sector by maintaining a deep understanding of such factors as customers' building types, measures that may provide the most benefit to customers, industry segments, and usage
- **Seamless delivery across Efficiency Vermont services**; easing business owners' ability to access Efficiency Vermont's technical and financial support regarding high-efficiency commercial equipment, retail efficient products, building improvements, new construction, and market-specific services, such as those described in Section 3.1.3.

3.1.3 Targeted Markets

Efficiency Vermont will continue to develop and deliver services to address the particular needs and challenges of distinct business markets. These markets will be: agriculture, colleges and universities, hospitals, K–12 schools, leased commercial real estate, lodging facilities, municipalities, restaurants, ski areas, small and medium-sized businesses (including convenience, grocery, and retail stores), state buildings, and water and wastewater facilities.

Jason Allbee, master electrician at Brattleboro Union High School, improves facility energy efficiency through Efficiency Vermont's services.

Through an understanding of the characteristics common within particular markets, Efficiency Vermont will shape effective approaches to acquire greater market penetration than would be achievable through services only at the individual project level. For example, two grocers—one in North Hero and another in Manchester—may have similar time and capital constraints, equipment, degrees of interest in energy efficiency, and connections to trusted service providers, suppliers, and information sources. Awareness of these similarities will enable Efficiency Vermont to design and deliver services that specifically address a market's particular barriers, motivations, and optimal approaches and technologies. Efficiency Vermont will maintain a focus on changing needs and the impact of evolving technologies, economic conditions, consumer demand, and a range of challenges and opportunities particular to specific sectors.

3.1.4 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. Descriptions of efforts in service to businesses and households that purchase efficient products at retail stores can be found in Section 3.3.2.

In this performance period, Efficiency Vermont will primarily target technologies that offer good opportunities for savings through energy efficiency upgrades. These will include lighting, refrigeration,

industrial process equipment, and HVAC (heating, ventilation, and air conditioning) systems—including heat pump technologies, which will be promoted for both commercial and residential use.

Efficiency Vermont will offer financial incentives for the purchase of recommended technologies. Discussion of financial services can be found in Section 3.3.7.

Commercial Lighting

Efficient lighting technologies and design will continue to offer significant savings opportunities owing to their broad applicability across commercial markets. To help Vermonters realize these opportunities, Efficiency Vermont will:

- Provide technical guidance and financial support to encourage the adoption of a range of efficient lighting equipment
- Increase efforts designed to deepen adoption of 1) light-emitting diode (LED) technologies; 2) interior and exterior lighting controls; 3) exterior efficient lighting; and 4) efficient street lighting on private sites in addition to municipal streets
- Expand the scope of product supply chain engagement to reduce purchase prices through upstream incentives and to improve targeted product availability
- Partner with lighting distributors, designers, and representatives to leverage their interactions with customers
- Provide efficient lighting technology training and support to lighting designers and service providers
- Monitor and evaluate emerging lighting technologies for possible inclusion in services
- Promote quality lighting products and initiatives in collaboration with the Consortium for Energy Efficiency (CEE), DesignLights Consortium, ENERGY STAR®, Northeast Energy Efficiency Partnerships (NEEP), and the U.S. Department of Energy.

Heating, Ventilation, and Air Conditioning (HVAC)

Efficiency Vermont's HVAC efforts will be designed to encourage:

- The installation of high-efficiency equipment, including heat pump technologies, hydronic circulator pumps, rooftop air-conditioning units, controls, and oil or liquefied petroleum boilers.
- Adoption of qualifying biomass boilers and solar hot water systems (small commercial and residential).
- The optimization of entire systems. This whole-building approach identifies whether or not systems are performing well as changes occur in building uses, in occupant needs, and in buildings and systems themselves. The energy savings associated with well-managed HVAC systems can be significant. Specific whole-building practices to be promoted will include ongoing system monitoring and management, monitoring-based commissioning, building retuning, retro-commissioning, benchmarking, and energy system optimization.

Toward these ends, Efficiency Vermont will:

- Expand successful partnership models with manufacturers, distributors, and other supply chain partners to increase the ability of customers to purchase discounted, high-quality efficient equipment with applicability across markets and to leverage relationships in the delivery of efficiency information to customers
- Extend supply chain efforts, including upstream incentives, to an expanded range of technologies

- Continue to evaluate emerging technologies for inclusion in services
- Maintain involvement with industry trade associations and marketing / buying groups.

Industrial Process Equipment

Efficiency Vermont will work with Vermont 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:

- Account Management of large customers
- 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
- Continued research and service development to deepen market knowledge, to further develop internal processes, and to increase customer engagement and savings.

Combined Heat & Power (CHP)

To promote the use of best practices and best-in-class CHP systems, Efficiency Vermont will 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 Vermont Public Service Board.

3.2 SERVICES TO HOMES

3.2.1 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 of existing residential buildings statewide. To help owners make efficient home improvements, Efficiency Vermont will continue to support a network of more than 70 Home Performance with ENERGY STAR contractors. These independent contractors are certified by the Building Performance Institute (BPI) to perform energy audits, diagnose such building problems as excess moisture and ice dams, identify potential health and safety issues, and make cost-effective thermal and electrical efficiency improvements. Efficiency Vermont will provide:

Efficient home improvements are saving Windham's Buddy and Lynn Behrendt $325 per year for heat. In 2015, Efficiency Vermont helped single-family-home owners save a combined $670 thousand in annual energy costs through home improvements.

- Skill-building training for the staff of BPI-certified contractors
- Software that enables the integration of multiple energy audit tools, which allows contractors to choose the best approach for their needs in conducting energy modeling and determining home energy scores

- Marketing and outreach campaigns promoting the benefits of working with Home Performance with ENERGY STAR contractors and informing homeowners about available incentives and financing options
- Tiered financial incentives, and financing through financial institutions, for homeowners who complete projects with certified contractors
- Online customer information about Home Performance with ENERGY STAR, easily searchable lists of local contractors, tips for working with contractors, information about thermal improvements and their benefits, and information about available technical and financial services
- Expanded support by phone to help customers understand and complete Home Performance with ENERGY STAR projects and to develop long-term plans to achieve comprehensive energy efficiency improvements.

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 the total energy performance of their homes and to make informed decisions according to their priorities and budgets. Activities will include:

- Development of services for homeowners—particularly in moderate-income households—who are unable to afford whole-house upgrades, in order to improve homes over time by motivating customers to take initial steps and providing a "road map" toward more comprehensive savings
- Addition of more heating contractors, fuel dealers, and hot water system installers to Efficiency Vermont's building improvement contractor network (see Section 3.3.3)
- Exploration of providing customer access to usage data through a confidential portal on www.efficiencyvermont.com, backed by Efficiency Vermont guidance and analysis
- Continued and expanded collaboration with home ownership centers to reach more homeowners
- Incorporation of new technologies, such as heat pumps and solar thermal systems, to displace fossil fuel–fired systems.

Multifamily Homes

Efficiency Vermont will help residential renters benefit from energy efficiency through services designed to motivate rental-property owners to take energy-saving action. Efficiency Vermont will provide owners with:

- Information and education by leveraging relationships with the Vermont Apartment Owners Association, the Vermont Rental Property Owners Association, large property developers, and construction professionals
- Technical and financial support for:
  - The installation of efficient equipment, including the addition of heat pump technologies
  - Thermal improvements completed by certified BPI contractors.

3.2.2 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 Vermont Foodbank and 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 2015–2017 will include:

- Installation of lighting, appliances, and—as applicable—heat pumps and cost-effective custom measures in high-use low-income households not served through Vermont's Weatherization Program
- Replacement of inefficient refrigerators with new, efficient units in partnership with the Vermont Department of Health's Women, Infants, and Children nutrition program
- Distribution of efficient lighting with multiple partners, including the Vermont Foodbank, Boys & Girls Club, Salvation Army, Habitat for Humanity ReStore, and other organizations that serve low-income Vermonters
- Improvement of the energy efficiency of multifamily and single-family buildings housing low-income Vermonters via such efforts as targeted electrical and thermal measures implemented through agencies of Vermont's Weatherization Program, including Capstone Community Action (formerly Central Vermont Community Action Council) in support of 3E Thermal (formerly the Vermont Fuel Efficiency Partnership)
- Increases in 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 high-performance option for modular home buyers in partnership with VHCB, the Champlain Valley Office of Economic Opportunity, the University of Vermont, the High Meadows Fund, the Vermont Community Foundation, and Vermod High Performance Modular Homes (a Vermont home manufacturer)
- 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.

3.3 ACTIVITIES IN SERVICE TO MULTIPLE CUSTOMER SECTORS

While serving specific markets, as described above in Sections 3.1 through 3.2, 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 partnering with the businesses that Vermonters turn to for efficient products and services. These partnerships, although not always evident to the general public, have a profound impact on Vermonters' ability to lower energy use in their homes and places of business. Efforts made with these providers will include coordinated planning, information exchange, training, quality assurance, financial incentives, and promotional activities. These partnerships will enable Vermont homes and businesses to have access to a valuable network of knowledgeable providers while strengthening these providers' bottom line.

3.3.1 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 in efforts targeting 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 in regard to construction undertaken by institutions, by government agencies, and by large businesses with multiple buildings. In addition, Efficiency Vermont will recognize and publicize exceptional achievement by design and construction practitioners through its annual *Best of the Best* awards for new high-performance buildings and homes.

Business New Construction

Efficiency Vermont will maintain its delivery of services to encourage a comprehensive approach to efficient design, integrating energy efficiency decisions into the process and including energy goals as part of the overall construction strategy from the earliest stages of a project. Efficiency Vermont will strive to provide custom services to more than 350 new construction projects during the performance period, including 10 to 15 per year that establish a net-zero or net-zero-ready building goal.

For a major expansion, King Arthur Flour in Norwich utilized Efficiency Vermont's services, resulting in a savings of $27,000 per year in energy costs.

Key aspects of ongoing efforts:

- Technical assistance throughout the design, construction, and post-construction phases
- Analytics to evaluate 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
- Leveraging of customer interest in green building, energy performance, and green rating systems such as Leadership in Energy and Environmental Design (LEED)
- 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 (ACEEE), CEE, the Construction Specifications Institute, the Institute for Market Transformation, the International Code Council, and the New Buildings Institute, as well as Vermont trade organizations, as specified in Section 3.3.5.

Residential New Construction

In support of the range of efficiency aims that Vermonters seek in their new homes, Efficiency Vermont will offer technical guidance, financial assistance, and energy rating services in alignment with ENERGY STAR, LEED, the National Green Building Standard, and net-zero-ready 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 specific levels of energy performance:

O'Hara & Gercke and Pill-Maharam Architects accept an award from Efficiency Vermont for excellence in efficient new construction for a home in Windsor County.

- **Efficiency Vermont Certified:** Homes exceeding Vermont code requirements and meeting Efficiency Vermont prescriptive requirements for energy efficiency. ENERGY STAR certification and home energy ratings will also be offered as options.
- **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. In the performance period, Efficiency Vermont will aim to support the annual completion of 30 homes at this tier, increasing to a rate of 40 in the final year of the period.
- **High-Performance Modular Homes:** Vermont-built modular homes meeting high-performance criteria for low energy use, durability, health, and safety. More information on this effort is provided in the discussion of low-income services in Section 3.2.2.

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
- Collaborate with builder partners to establish a Residential New Construction arm of the Efficiency Excellence Network
- 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.

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 3.4.1.

3.3.2 Retail Efficient Product Services[4]

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, including lighting—featuring increased emphasis on LEDs—appliances, air conditioners, dehumidifiers, pool pumps, heat pump water heaters, heat pump clothes dryers, 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 rebates, buy-downs, and markdowns at the manufacturer and retail level, point-of-purchase information, advertising, and promotional and public information activities.

A customer learns about efficient lighting at an Efficiency Vermont event at retail partner Home Depot's Williston location.

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. For example, Efficiency Vermont will seek to maintain partnerships with more than 100 lighting retailers, including hardware, grocery, "big box," and independent stores serving Vermonters at more than 350 locations statewide.

Efficiency Vermont will promote the adoption of heat pump technologies—for both residential and commercial use—through approaches discussed in Section 3.1.4.

3.3.3 Services to Building Improvement Contractors

Efficiency Vermont will work in affiliation with BPI in training Vermont building improvement contractors to identify and address a range of thermal and electric efficiency issues in buildings. With this training, contractors become certified to deliver comprehensive retrofit efficiency services to residences, through Efficiency Vermont's Home Performance with ENERGY STAR program, and / or to small businesses and rental properties, through Efficiency Vermont's Building Performance program.

Efficiency Vermont's efforts will continue to be designed to benefit both participating contractors and their customers:

- Participating contractors will gain a competitive edge by obtaining knowledge, resources, and credentials that enable them to deepen their service offerings and customer base.
- Vermont residential and commercial building owners will have access to a statewide network of skilled professionals who are committed to the health, safety, and energy performance of their properties.

[4] The Retail Efficient Products budget significantly increased between the time of the filing of the original Triennial Plan 2015–2017 and the drafting of this document. A discussion of this is included in Section 5.1, Efficiency Vermont Budgets.

- Efficiency Vermont will provide certified contractors with ongoing support through extensive program promotion, self-marketing and sales training, listings on www.efficiencyvermont.com, and consumer financial incentives and financing options for projects completed by BPI-certified contractors. Contractors will also receive education credits through Efficiency Vermont's annual Better Buildings by Design Conference (see Section 3.4.1), as well as recognition and publicity for exceptional achievement in efficient retrofit projects through Efficiency Vermont's annual *Best of the Best* awards.

Efficiency Vermont will also continue to coordinate the Efficiency Excellence Network (EEN) to enable contractors to identify and promote efficiency opportunities for their commercial and residential customers. Efficiency Vermont will provide technical training to electrical, HVAC (including biomass), refrigeration, Home Performance with ENERGY STAR, heat pump, and Residential New Construction contractors. In this performance period, Efficiency Vermont will expand the EEN to support a broader range of contractors to provide knowledgeable energy efficiency referrals or services to Vermont businesses and homes.

3.3.4 Services to Equipment Supply Chain Partners and Technicians

The ability of Vermonters to take energy-saving actions relies on the commitment and knowledge of individuals and companies at each stage of the product supply chain. In the 2015–2017 period, Efficiency Vermont will further strengthen the marketplace by building upon relationships with manufacturers, distributors, suppliers, retailers, installers, and service technicians through:

- Engagement with manufacturers, distributors, and suppliers to reduce equipment costs, ensure Vermont product availability to contractors and consumers, and reduce lead times for product ordering
- Collaboration with manufacturers regarding emerging and rapidly advancing efficiency technologies, such as lighting technologies
- Account Management of Vermont stores in retail chains, targeting store owners, managers, and staff to ensure implementation of promotional agreements established at the corporate level
- Assistance to independent and chain retailers, including merchandising support, guidance on efficient product differentiation on the sales floor, and product knowledge training

Efficiency Vermont works in partnership with equipment supplier Grundfos to make high-performance circulator pumps available and cost-effective for Vermont businesses.

- Training and support for installers, to help them increase the use of new, efficient technologies and approaches
- Promotional work focusing on targeted products, including efficient electronics and LEDs
- Leveraging of a relationship with Heating, Air-conditioning, and Refrigeration Distributors International, a trade association representing more than 475 distributors and close to 500 suppliers, manufacturers, and service vendors, to maintain awareness of the needs of the HVAC supply chain

- Education credits for HVAC system designers, equipment installers, and service technicians through Efficiency Vermont's Better Buildings by Design Conference (see Section 3.4.1), and recognition and publicity for exceptional achievement by HVAC system designers through Efficiency Vermont's annual *Best of the Best* awards for efficient new construction and major renovation projects.

3.3.5 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
- American Society of Heating, Refrigerating, and Air-Conditioning Engineers—VT Chapter
- Building Performance Professionals Association of VT
- Construction Specifications Institute
- Farm to Plate Network
- Green Mountain Water Environment Assoc.
- Heating, Air-conditioning, and Refrigeration Distributors International
- Home Builders & Remodelers Association of VT
- ICC Building Safety Association of VT
- Illuminating Engineering Society
- University of Vermont Extension
- Vermont Alliance of Independent Country Stores
- Vermont Apartment Owners Association
- Vermont Association of Hospitals & Health Systems
- Vermont Association of School Business Officials
- Vermont Convention Bureau
- Vermont Fuel Dealers Association
- Vermont Green Building Network
- Vermont Green Home Alliance
- Vermont Healthcare Engineers Society
- Vermont Hospitality Council
- Vermont Inn and Bed & Breakfast Association
- Vermont Maple Sugar Makers Association
- Vermont Rental Property Owners Association
- Vermont Retail & Grocers Association
- Vermont Rural Water Association
- Vermont Ski Areas Association
- Vermont Superintendents Association

3.3.6 Community-Based Activities

Throughout the state, Efficiency Vermont 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.

Members of the Randolph community learn about efficient technologies as part of Efficiency Vermont's 2016 efforts supporting residents and businesses in designated downtowns and villages.

In 2016–2017, Efficiency Vermont will deepen its efforts to engage targeted community areas across markets. In partnership with the Vermont Agency of Commerce and Community Development, Efficiency Vermont will undertake a pilot initiative in service to and in coordination with local businesses, municipalities, and residential property owners and occupants in four designated downtown areas and villages.

3.3.7 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 2015–2017.

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
- Thermal building upgrades made by Building Performance contractors in small commercial and multifamily properties
- Comprehensive 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 a range of financing vehicles, including:

- **Business Energy Loan:** Increasing businesses' opportunities to finance efficiency projects by factoring energy savings into loan qualification calculations. In this performance period, Efficiency Vermont will engage in efforts to expand this offering to additional Vermont lenders.
- **Municipal Tax-Exempt Leasing:** Opportunities for municipalities to make energy-saving upgrades, in facilities such as K–12 schools, without raising budgets or establishing bonds.
- **Property Assessed Clean Energy (PACE):** Home loans secured by a property lien. Borrowers will have access to recent improvements to this offering, including a 50% loan advance prior to project completion, lowered fees, elimination of a partial-payment penalty, and the ability to apply at any time.
- **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 through Efficiency Vermont's EEN and in partnership with the Vermont Department of Public Service and local credit unions.
- **Agricultural Energy Efficiency Loan:** Providing agricultural facilities with low-interest financing to enable easy access for efficiency projects.
- **Rural Utility Service Loan:** Low-interest, long-term loans for energy efficiency and renewable energy investments with an emphasis on: 1) projects with a high impact and 2) service to Vermonters who don't qualify for traditional financing options. Efficiency Vermont aims to deploy these loans in partnership with utilities, lenders, trade allies, economic development agencies, and community organizations. Deployment is estimated to begin in late 2016.

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.

In the 2015–2017 performance period, Efficiency Vermont will raise the profile of financing by:

- Providing BPI contractors with tools they can use to calculate and present options for their clients regarding financing
- Enhancing www.efficiencyvermont.com listings of financing options and lenders to better educate and guide customers
- Making the discussion of cost-effective financing a standard part of service to customers lacking capital who can benefit from certain technology upgrades
- Presenting 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. These efforts are discussed in Section 3.4.5.

3.3.8 Coordination with Distribution Utilities

Efficiency Vermont will continue its work with Vermont Gas Systems and Burlington Electric Department to ensure coordination in the implementation of efficiency services as well as in specific initiatives, such as those connected to the advanced metering infrastructure (AMI). Efficiency Vermont will also maintain its coordination with Green Mountain Power Corporation (GMP) in the implementation of services through the GMP Community Energy & Efficiency Development Fund. These efforts offer GMP customers unique services as well as shared services, through which GMP invests in existing Efficiency Vermont programs. Efficiency Vermont will engage in ongoing communications and coordination with Vermont Public Power Supply Authority and utilities across the state, including Vermont Electric Cooperative and Washington Electric Cooperative. In support of distribution utility efforts to meet specifications of Act 56 (authorizing distribution utilities to implement programs 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, in order to maximize the value delivered to ratepayers.

3.3.9 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 Vermont Housing and Conservation Board, the Regulatory Assistance Project, and many others. On a regional and national level, Efficiency Vermont will maintain ongoing partnerships with such organizations as NEEP, the New Buildings Institute, CEE, ENERGY STAR, and ACEEE, working to share information on best practices and to establish uniform product eligibility criteria and program designs.

3.3.10 Resource Acquisition Research and Development

In 2015–2017, Efficiency Vermont will engage in R&D efforts to determine the potential of behavior-based energy efficiency services to achieve verifiable, cost-effective energy savings. Behavior-based services are designed to motivate customers to reduce their energy use by empowering them with access to knowledge about:

- Their energy use and the benefits of energy use reduction
- The connection between their actions and their energy use
- Ongoing energy use management approaches and benefits.

Expanding upon behavior-based energy efficiency approaches begun in 2014, the efforts will determine the potential for savings from:

- Full-scale behavior-based energy efficiency
- Increased focus on energy management
- Expansion to diverse markets and customer types, including:
  - Households with high, above-average, and average energy use
  - Industrial businesses (a continuation of a 2014 pilot)
  - Exploration of expansion into new markets, including multifamily residential buildings and small and medium-sized businesses.

Waterbury resident Kelly Hackett, participant in the Home Energy Reports pilot.

Efforts will also be designed to demonstrate rigorous measurement and verification approaches for quantifying savings and determining cost-effectiveness for behavior-based energy efficiency, and to test data collection and analysis processes. Efficiency Vermont will also engage in research to obtain optimal customer benefits and to ensure verifiable results. Descriptions of specific planned efforts and research questions to be addressed are provided in Section 5.5.

3.4 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 2015–2017, the below activities—corresponding to NRA budget categories—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.

3.4.1 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 information to homeowners, building professionals, and towns on technical and compliance aspects of the State's Residential Building Energy Standards and Commercial Building Energy Standards through the Energy Code Assistance Center phone lines
- Provide support for codes as well as increased support for a stretch code for homes that is expected to prompt the need for assistance for owners, builders, and towns unfamiliar with new requirements and criteria
- Distribute code books and other code support materials by mail and at home shows, industry conferences, and other events
- Provide code development support, including analysis and consultation on potential code change impacts and processes
- Conduct outreach to local energy committees

- Provide energy code training for a range of constituencies, including:
  - Design and construction professionals and building tradespeople
  - Real estate professionals, mortgage lenders, appraisers, and attorneys
  - Town officials, regional planning commissions, and Act 250 district commissions.

Energy Literacy Project

Through greater awareness and understanding of energy, how it is used, and the consequences of energy consumption, Efficiency Vermont strives to inspire a lifelong commitment to energy efficiency, conservation, and environmental stewardship for generations of Vermonters. The primary goals of the Energy Literacy Project are to:

- Promote energy education and literacy in Vermont's K–12 schools
- Transform energy-related behaviors of students and staff at participating K–12 schools
- Encourage members of the K–12 community to apply their learning beyond the classroom through:
  - Making informed and responsible decisions regarding energy use at home
  - Participating in Efficiency Vermont and Burlington Electric Department's efficiency programs beyond school-specific offerings.

General Public Education

To motivate and empower the general public to take energy-saving actions, Efficiency Vermont will engage in activities designed to increase public awareness of: 1) energy efficiency and its benefits; 2) actions that lower energy use; and 3) Efficiency Vermont as a resource for comprehensive energy efficiency solutions. Methods will include:

- Provision of information and marketing and advertising promotions via print, broadcast, web-based, and social media
- Customer engagement through access, at www.efficiencyvermont.com, to recommendations on efficiency actions, online rebate applications, information about efficient technologies and approaches, identification of qualified local service providers, locations of retailers selling efficient products, and information on a range of other efficiency and energy topics
- Dissemination of information at home shows, community events, fairs, and trade shows
- Creation of advice columns and electronic newsletters that deliver information on energy efficiency and Efficiency Vermont's services.

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 1,000-plus construction and design professionals, and equipment installation and service contractors. The conference will focus on the latest techniques and technologies for building durability, superior performance, energy efficiency, and value for both residential and business new construction and retrofit projects. In

Efficiency Vermont's Better Buildings by Design Conference, the region's premier design and construction conference.

addition to 40 workshops and hands-on demonstrations given by industry leaders, the conference hosts a trade show of 50 exhibitors of efficient technologies.

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 commercial and residential customers in understanding their energy use and engaging in energy management
- Comprehensive information about Efficiency Vermont's services and about efficient buildings and equipment
- Referrals to resources such as Vermont's Weatherization Program, the Renewable Energy Resource Center, Vermont Gas Systems, and the Energy Code Assistance Center.

3.4.2 Applied Research and Development

Efficiency Vermont will undertake several R&D projects to gather information on areas with potential for inclusion in future service offerings. The projects will span a variety of technology applications and customer segments.

Emerging Data Services

As inexpensive, abundant, and reliable data begin to transform the way that energy services can be provided, Efficiency Vermont will continue to be strategic in planning optimal ways to use data analysis to deliver value to customers, systems planners, and policy makers. Efficiency Vermont will undertake research to identify data applications that increase the effectiveness of energy efficiency services. In the 2015–2017 period, Efficiency Vermont will:

- Continue to leverage the State's investment in AMI and other emerging data innovations
- Invest in information technology to manage complex data and to build systems that make it possible to use data analysis to help achieve energy savings goals
- Explore new strategies, techniques, and technologies that show promise for increasing energy savings, decreasing delivery costs, and increasing customer engagement and benefits
- Support other research and investigations that are likely to lead to greater market transformation. This work will use data from AMI, submeters, environmental and process sensors, building energy management systems, demographic and real estate databases, and historical efficiency program activities.

Technology Demonstrations

To bring the benefits of the next generation of energy-saving technologies and strategies to Vermonters, Efficiency Vermont will engage in research, development, and demonstration of emerging innovations. Efficiency Vermont will undertake these activities to advance the goals of sound product and service design over time through field testing, technology demonstrations, and research on emerging technologies and implementation strategies. Descriptions of specific planned efforts and recent results are provided in Section 5.3.

3.4.3 Planning and Reporting

Annual Plans and External Reporting

Efficiency Vermont will prepare and submit required documents to the Vermont Public Service Board, the Vermont Department of Public Service, 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 plans—presenting significant updates to the 2015–2017 triennial plan and, in 2017, the 2018–2020 triennial plan
- Annual savings claims and annual reports
- Annual highlights brochures
- Monthly and quarterly reports
- Quarterly and annual budget variance reports
- Service quality reports
- Quarterly customer complaint and feedback reports
- Ad hoc reporting requests
- Vermont Department of Public Service financial audits
- Vermont Department of Public Service monthly invoice reviews
- Financial component of overall performance assessment

Demand Resource Plan

In the 2015–2017 performance period, Efficiency Vermont will engage in efforts regarding:

- Yearly energy efficiency utility (EEU) demand-side electricity RA budgets and energy savings 20-year forecasts
- QPIs to measure EEU results for the 2018–2020 performance period
- Plans and budgets for Development and Support Services (DSS) activities
- The EEU compensation and performance award structure
- Yearly budgets and energy savings goals for thermal energy and process fuels (TEPF) activity for a 10-year period.

In 2017, Efficiency Vermont will provide the Vermont Public Service Board, the Vermont Department of Public Service, and Vermont's utilities with estimates from the 20-year projections of electric energy efficiency savings expected to be achieved from system-wide programs.

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, the Vermont Department of Public Service, and individuals representing the interests of ratepayers to address approaches to electric transmission system planning and management. In addition, Efficiency Vermont will participate in the VSPC's four subcommittees: Coordinating, Public Participation, Geographic Targeting, and Forecasting. Efficiency Vermont will also support the VSPC's reliability planning and forecasting, non-transmission alternatives, energy efficiency geographic targeting, and public engagement. In particular, this work will involve input to solution selection, cost allocation, and implementation planning of all identified reliability deficiencies.

ISO-New England Forward Capacity Market Administration

As the implementer of Efficiency Vermont, Vermont Energy Investment Corporation (VEIC) will continue to represent the interests of Vermont ratepayers by participating in the ISO-NE Forward Capacity Market (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 a 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 New England Power Pool member.

3.4.4 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[5]:

- Working with the Vermont Department of Public Service as it conducts its annual savings verification to review the initial savings claim.
- Participating in the Technical Advisory Group with the Vermont Department of Public Service, Burlington Electric Department, and other stakeholders to resolve any issues arising from the annual savings verification process, to track the implementation of any recommendations or continuous improvement activities identified via those evaluation activities, and to provide a proactive mechanism for developing energy characterization and savings calculations.
- Maintaining and updating the Technical Reference Manual (TRM), which characterizes energy-saving measures on the basis of 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. In this performance period, Efficiency Vermont anticipates undertaking increased activities designed to enhance TRM reliability.
- Performing metering, monitoring, and evaluation activities related to ISO-NE FCM participation.
- Observing rigorous, ongoing quality management protocols in alignment with Efficiency Vermont Program Implementation Efficiency QPIs (see Section 5.2) and with the Service Quality and Reliability Plan, which defines customer service performance standards in four service categories: General Customer Satisfaction; Project Customer Satisfaction; Incoming Call Responsiveness, and Complaint Rate and Resolution.

3.4.5 Policy and Public Affairs

Public Affairs

Efficiency Vermont will provide energy, financial, and economic information and analysis to policy makers, state agencies, utilities, and other key stakeholders. These efforts will be undertaken in ongoing support of Efficiency Vermont's statutory and regulatory mandates, the State's *2011 Comprehensive Energy Plan* goals, and other relevant energy policy goals, and will include:

- Working as a resource to policy makers, regulators, businesses, and community organizations
- Briefing the Legislature and state officials on energy efficiency issues
- Assisting legislators and state officials with review and development of policy proposals related to the Efficiency Vermont scope of work
- Providing expert testimony and input on pieces of legislation consistent with Efficiency Vermont's status as an appointed EEU

[5] More detailed information about evaluation activities can be found in Section 5.4.

- Making presentations at public forums and meetings.

Efficiency Vermont will also strategically disseminate information, aligned with Vermont energy policy priorities and Efficiency Vermont goals, to deepen knowledge of and engagement in energy efficiency actions among targeted populations. Efforts will include:

- Outreach to media to develop and publish stories that raise awareness of Efficiency Vermont program offerings, highlight the experiences of Efficiency Vermont customers, and educate the public on energy efficiency issues
- Response to media inquiries regarding Efficiency Vermont programs and operations, and general inquiries related to energy efficiency
- In-depth discussion of energy issues and their relation to Efficiency Vermont's work, through publication on www.efficiencyvermont.com of:
  - Efficiency Vermont's blog *Energy. Forward.*, providing timely discussion of efficiency activities under way throughout the state and presenting Efficiency Vermont research of value to Vermonters who want to deepen their involvement in their energy use
  - A library of white papers developed by Efficiency Vermont, sharing the latest thinking, analysis, and cutting-edge research on the future of energy efficiency.

Regulatory Affairs (Non-Demand Resource Plan)

Efficiency Vermont will continue to:

- Work with the Vermont Department of Public Service to write, revise, and maintain governing documents necessary for Efficiency Vermont to operate as a regulated utility
- Participate in Vermont Public Service Board proceedings that affect energy efficiency implementation in Vermont
- Review and provide advice on regulator-required, coordinated services and initiatives with Vermont's other EEUs and weatherization agencies to provide seamless, cost-effective, statewide energy efficiency programs
- Oversee Efficiency Vermont interactions in the ISO-NE FCM to ensure regulatory compliance and help secure financial benefits from energy efficiency in New England
- Work closely with the Regional Greenhouse Gas Initiative (RGGI) to help inform the Model Rule, report greenhouse gas reductions as a result of Vermont's RGGI-funded programs, and help maximize efficiency benefits from regional cap and trade
- Develop and support policy instruments that can serve as useful tools for electricity and thermal energy savings through voluntary action or government adoption
- Research regulatory policies to support best practices for efficiency programs to enable continuous improvement in Efficiency Vermont's services and to support Vermont's prominence as a national leader in energy efficiency ideas and practices
- Pursue 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
- Review and provide guidance on Efficiency Vermont internal policies to ensure regulatory compliance
- Participate as a party in the triennial review of distribution utilities' integrated resource plans, updating of avoided costs, and all other Vermont Public Service Board–ordered proceedings with potential impact on energy efficiency services
- Work with energy efficiency stakeholders to ensure that the State's related regulatory proceedings on clean energy development (e.g., the *Comprehensive Energy Plan* and the

Renewable Energy Standard) can leverage the expertise of Efficiency Vermont's team in a manner that is cost-effective for the state's ratepayers.

Financial and Leveraged Product Development

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

- Manage relationships 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 public and private resources for Vermonters undertaking efficiency projects in their homes and businesses. This approach multiplies the impact of ratepayer dollars by using a modest amount of funds to draw higher amounts of new resources without additional ratepayer investment.

3.4.6 Information Technology

Efficiency Vermont aligns technical and information technology staff in a Data and Technical Services division. This division combines the Strategic Technology Services; Reporting and Analytics; and Evaluation, Measurement, and Verification groups under a common management structure for the purpose of having end-to-end management of key data-related processes. Efforts will be focused in three areas:

1. **Reporting and Analytics:** maintaining a long-standing focus on database management, data warehousing, data quality, and business intelligence development and support to meet Efficiency Vermont's regulatory, operational, program, and financial reporting needs.
2. **Strategic Technology Services (STS):** deepening Efficiency Vermont's ability to serve Vermonters with software development, data analytic tools, data acquisition, and integration, as well as continuing best-practice data stewardship to ensure customer privacy, security, and alignment with customer data usage preferences.
3. **Portfolio Screening Tool:** development of a forecasting and screening tool application to replace the existing portfolio screening tool. This application will leverage other development efforts–including those connected to the new state screening tool, the TRM application, and the calculation engine–and to support future planning and forecasting needs as well as the Demand Resources Plan Proceeding (2016–2017).

In addition to ongoing IT activities, Efficiency Vermont aims to take on the following large STS development efforts in the 2015–2017 performance period:

- Migrating the KITT application to a web application architecture; KITT is Efficiency Vermont's primary tool for project management, customer relationship management, and energy savings tracking
- Developing web services for KITT and TRM applications for integration
- Increasing the efficiency of regulatory reporting tools by integrating financial and performance data
- Improving measure import and savings calculation tools.

3.4.7 General Administration

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

4. ENERGY EFFICIENCY UTILITY FUNDING

The Vermont Public Service Board 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, whereas TEPF services will be funded by Vermont's Regional Greenhouse Gas Initiative (RGGI) revenues and by revenues generated by Efficiency Vermont's bidding of electric 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.

5. APPENDIX

5.1 EFFICIENCY VERMONT BUDGETS

Efficiency Vermont begins the final year of the performance period with terrific momentum. Participation in its programs and services has been growing, and new initiatives to encourage greater participation have been or are soon to be launched. In considering the sum of benefits achieved in 2015 and forecasted results through the end of 2016, Efficiency Vermont expects to have accumulated results that are proportionally on pace with spending and to achieve the 2015–2017 QPIs. Recent program modifications are expected to continue to increase both electric and thermal RA spending and benefits. As of September 30, 2016, Efficiency Vermont was on track to achieve proportional progress for most of the seven electric QPIs by the end of 2016, and the project pipeline appeared to be on track to be strong through the end of 2016 and into 2017.

Each year, Efficiency Vermont strives both to optimize Vermonters' ability to benefit from energy efficiency and to be a responsible steward of the ratepayer dollars that fund Efficiency Vermont's work. The original Triennial Plan 2015–2017 budgets were extracted directly from the Demand Resources Plan (DRP) proceeding and were not adjusted to reflect the final performance targets negotiated with the Vermont Department of Public Service and established by the Vermont Public Service Board. Those DRP Scenario 2 budgets issued by the Vermont Public Service Board produced the modeled results that were stretched for the 100% and super-stretch targets. The Vermont Public Service Board allows EEUs flexibility in program design to achieve maximum RA results. In 2015 and again in 2016, Efficiency Vermont redirected funds within the electric RA budget to accommodate customer demand and maximize performance.

As noted in the 2016 update to this Plan, the most significant budget change is that the Retail Efficient Products budget has nearly doubled since the original Triennial Plan 2015–2017 was filed. This increase is due to a successful undertaking to increase the adoption of top-quality LEDs in Vermont. Increased funding was allocated to upstream incentives to bring down the purchase price of specified LEDs to a targeted level designed to motivate substantial new demand. As a widely used technology across all markets, lighting represents a significant opportunity for energy savings throughout Vermont. Efficiency Vermont recognized the growing residential and commercial consumer interest in LEDs and saw that it was essential to channel that interest toward quality products at a time when LEDs of varying quality were available for purchase. The strategic increase in the Retail Efficient Products budget brought LEDs to the effective, targeted price point three years earlier than projected, resulting in significant and lasting savings for individual Vermont homes, businesses, institutions, and municipalities.

The Retail Efficient Products budget adjustment highlights two major points: 1) Efficiency Vermont is adjusting to market demand as it occurs, to produce high levels of cost-effective RA savings for Vermont, and 2) in a performance model, Efficiency Vermont must take advantage of market peaks to ensure that it achieves its QPIs; this can result in major shifts in budget. Efficiency Vermont performance is based on three-year budgets, although year-by-year budgets are established by the Vermont Public Service Board.

Another update is reflected in TEPF budgets. Changes in RGGI revenue, FCM revenue, PACE loan loss reserve set-asides, the Heat Saver Loan program, and the TEPF Information Clearinghouse project[6] have necessitated an increase to the 2015–2017 TEPF budget.[7] The budget increase will support the ability of Efficiency Vermont to ramp up programs in anticipation of a significant increase in FCM funding beginning in 2018. The budget increase will be applied to RA activities. At least 21% of the incremental RA funds will be distributed to services for low-income customers. Efficiency Vermont also plans to expand existing services, including Home Performance with ENERGY STAR and custom commercial and industrial offerings.

In 2017, Efficiency Vermont will continue to engage and partner with distribution utilities in support of their efforts to meet specifications of Act 56. This act, created by the Vermont Legislature in 2015, authorizes distribution utilities to implement programs to achieve fossil fuel reduction targets. The primary 2017 focus of Efficiency Vermont's Act 56–related engagement will be coordination efforts designed to ensure alignment of new distribution utility-specific efficiency services with Efficiency Vermont's statewide offerings, in order to maximize the value delivered to ratepayers. Efficiency Vermont will also endeavor to continue working with distribution utilities to determine if funding created through Act 56 activities will expand existing thermal efficiency programs, administered through Efficiency Vermont, in support of targets set forth in Vermont's Comprehensive Energy Plan.

In a December 17, 2015, Vermont Public Service Board Order, the EEUs were granted increased flexibility to manage DSS budgets by allowing funds to be transferred across DSS budget categories as well as between RA and DSS budgets under certain conditions. Section 5.8 is a request to transfer funds across DSS categories. If approved by the Vermont Public Service Board, the proposed DSS budget would enable Efficiency Vermont to address unanticipated changes in work flows and to ensure that DSS spending is on budget at the close of the performance period.

5.1.1 2015-2017 Resource Acquisition and Development and Support Services Budget Summary

Resource Acquisition	2015	Est. 2016	2017 Budget	2015-2017
Total *Electric EEU Funds for Resource Acquisition*	$41,971,401	$39,500,000	$45,895,449	**$127,366,850**
Total *Electric EEU Funds for Research & Development*	$1,076,609	$2,300,000	$1,627,458	**$5,004,067**
Total *Customer Credit*	$502,319	$500,000	$2,025,641	**$3,027,960**
Total *Thermal Energy and Process Fuels Funds*	$5,298,056	$5,600,000	$9,304,627	**$20,202,683**
Total Resource Acquisition Budget	**$48,848,385**	**$47,900,000**	**$58,853,175**	**$155,601,560**
Development and Support Services				
Total *Electric EEU Funds*	$4,048,595	$4,200,000	$4,406,157	**$12,654,752**
Total *Thermal Energy and Process Fuels Funds*	$536,208	$550,000	$639,440	**$1,725,648**
Total Development and Support Services Budget	**$4,584,803**	**$4,750,000**	**$5,045,597**	**$14,380,400**
Smart Grid (2014 Carryover)	**$18,652**	**$0**	**$0**	**$18,652**
Operations Fee	$956,088	$947,700	$1,150,178	**$3,060,142**
Sub-Total Prior to Performance Based Fee	**$54,407,928**	**$53,597,700**	**$65,048,950**	**$173,060,754**

[6] A website providing Vermonters with information on thermal efficiency services. This website is managed by the Vermont Department of Public Service and funded through EEU budgets.

[7] The increased TEPF budget was approved by the Vermont Public Service Board in a board order dated October 10, 2016 in EEU-2013-01.

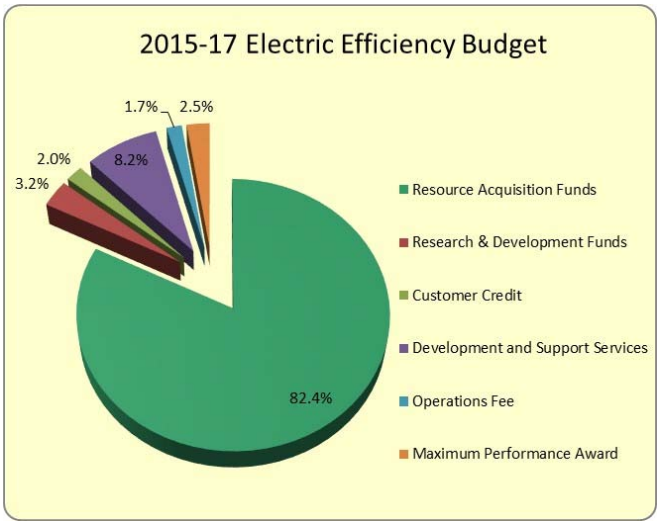
5.1.2 2015-2017 Budget by Market and Initiative

	2015	2016	2017	2015-2017
Electric Efficiency				
Business Sector				
Business Existing Facilities	$ 18,292,826	$ 18,000,000	$ 22,395,449	**$ 58,688,275**
Customer Credit	$ 502,319	$ 500,000	$ 2,025,641	**$ 3,027,960**
Business New Construction	$ 3,414,445	$ 2,500,000	$ 3,500,000	**$ 9,414,445**
Sub-Total Business Sector	**$ 22,209,590**	**$ 21,000,000**	**$ 27,921,090**	**$ 71,130,680**
Residential Sector				
Efficient Products	$ 13,221,093	$ 13,000,000	$ 14,000,000	**$ 40,221,093**
Existing Homes	$ 4,076,828	$ 3,100,000	$ 3,000,000	**$ 10,176,828**
Residential New Construction	$ 2,966,208	$ 2,900,000	$ 3,000,000	**$ 8,866,208**
Sub-Total Residential Sector	**$ 20,264,130**	**$ 19,000,000**	**$ 20,000,000**	**$ 59,264,130**
Research & Development	**$ 1,076,609**	**$ 2,300,000**	**$ 1,627,458**	**$ 5,004,067**
Total Electric Efficiency	**$ 43,550,329**	**$ 42,300,000**	**$ 49,548,548**	**$ 135,398,877**
Thermal Energy and Process Fuels Efficiency				
Business Sector	$ 554,689	$ 1,120,000	$ 2,326,157	**$ 4,000,846**
Residential Sector	$ 4,743,367	$ 4,480,000	$ 6,978,470	**$ 16,201,838**
Total Thermal Energy and Process Fuels Efficiency	**$ 5,298,056**	**$ 5,600,000**	**$ 9,304,627**	**$ 20,202,683**
TOTAL RESOURCE ACQUISITION ACTIVITIES	**$ 48,848,385**	**$ 47,900,000**	**$ 58,853,175**	**$ 155,601,560**

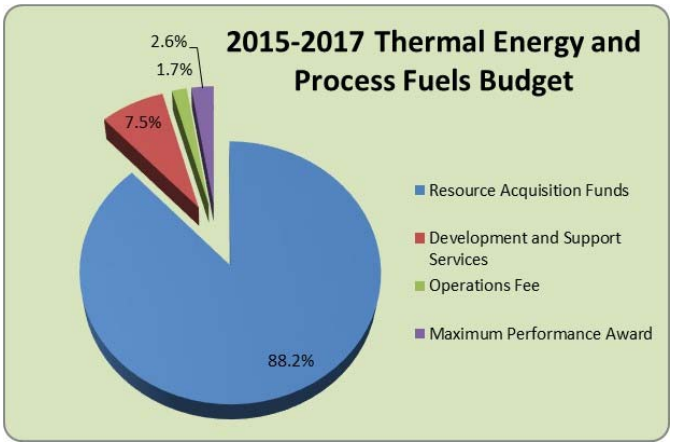
	2015	2016	2017	2015-2017
Education and Training	$ 624,876	$ 688,000	$ 684,000	**$ 1,996,880**
Applied Research and Development	$ 362,913	$ 418,000	$ 436,090	**$ 1,217,000**
Planning and Reporting	$ 350,986	$ 569,000	$ 615,700	**$ 1,535,690**
Evaluation, Measurement and Verification	$ 807,555	$ 813,000	$ 871,450	**$ 2,492,000**
Policy and Public Affairs	$ 853,592	$ 566,000	$ 578,410	**$ 1,998,000**
Information Technology	$ 1,327,031	$ 1,628,000	$ 1,412,970	**$ 4,368,000**
General Administration	$ 257,851	$ 257,000	$ 257,980	**$ 772,830**
TOTAL DEVELOPMENT & SUPPORT SERVICES	**$ 4,584,803**	**$ 4,939,000**	**$ 4,856,600**	**$ 14,380,400**
Smart Grid (2014 Carryover)	**$ 18,652**	**$ -**	**$ -**	**$ 18,652**
Operations Fee[1]	$ 956,088	$ 951,102	$ 1,146,776	$ 3,060,142
Sub-Total Prior to Performance-Based Fee	**$ 54,407,928**	**$ 53,790,102**	**$ 64,856,551**	**$ 173,060,753**
Performance-Based Fee (set-aside)	$ 1,429,133	$ 1,413,153	$ 1,665,477	**$ 4,507,761**
TOTAL BUDGET INCLUDING PERFORMANCE-BASED FEE	**$ 55,837,061**	**$ 55,203,255**	**$ 66,522,028**	**$177,568,514**

[1] Development and Support Services totals have been rounded

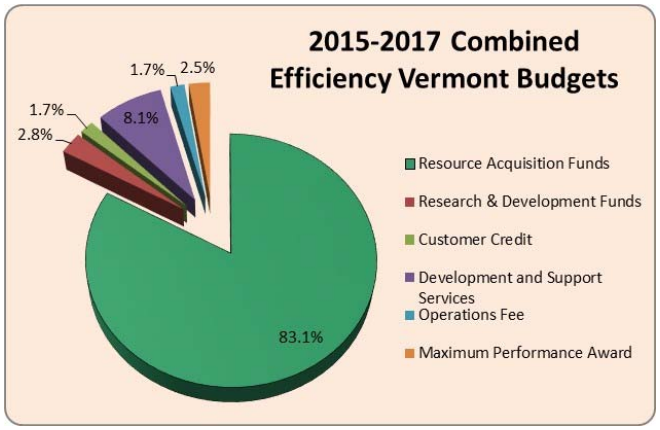
5.1.3 2015-2017 Electric Efficiency Budget



5.1.4 2015-2017 Thermal Efficiency Budget



5.1.5 2015-2017 Combined Efficiency Budget



5.2 QUANTIFIABLE PERFORMANCE INDICATORS

5.2.1 2015-2017 Electric Efficiency Performance Goals and Minimum Performance Requirements (MPR)

QPI#	Title	Performance Indicator / Milestone	Target
1	Electricity Savings	Annual incremental net MWh savings	321,800
2	Total Resource Benefits	Present worth of lifetime electric, fossil, and water benefits	$336,300,000
3	Statewide Summer Peak Demand Savings	Cumulative net summer peak demand kilowatt (kW) savings	41,300
4	Statewide Winter Peak Demand Savings	Cumulative net winter net peak demand kW savings	53,700
5	Business Comprehensiveness	Savings as % of baseline year usage for companies that complete efficiency projects in existing business facilities	11.0%
6	Market Transformation Residential	Vermont one- to four-unit Residential New Construction project completions with substantial energy savings in 2015–2017 as % of total one- to four-unit building permits in 2014–2016	42%
7	Market Transformation Business	Number of energy efficiency measure supply chain partners linked to at least three (completed) projects	500

MPR#	Title	Minimum Requirement	Minimum
8	Minimum Electric Benefits	Total electric benefits divided by total costs	1.2
9	Threshold (or minimum acceptable) Level of Participation by Residential Customers	Total residential sector spending	$32,500,000
10	Threshold (or minimum acceptable) Level of Participation by Low-Income Households	Total low-income single and multifamily services spending	$10,500,000
11	Threshold (or minimum acceptable) Level of Participation by Small Business Customers	Number of total non-residential premises with annual electric use of 40,000 kilowatt-hour (kWh)/year or less that acquire kWh savings	2,000
12	Geographic Equity	Total Resource Benefits (TRB) for each geographic area is greater than values shown on Geo-Equity Table	14
13	Administrative Efficiency—Key Process Improvements	Meet all predetermined milestones on schedule	6
14	Service Quality	Achieve 92 or more metric points	92
15	Resource Acquisition Performance Period Spending	Total spending for a three-year performance period (including applicable operations fees) is less than $136,181,694	$136,181,694
16	Development and Support Services Performance Period Spending	Total spending for a three-year performance period (including applicable operations fees) is less than $14,788,290	$14,788,290

5.2.2 2015-2017 Electric Minimum TRB per Geographic Area (QPI #12)

Geographic Area[1]	Required TRB per Geographic Area[2]
Addison	$9,569,786
Bennington	$11,755,268
Caledonia	$7,381,188
Chittenden	$34,376,179
Essex/Orleans	$8,700,557
Franklin	$14,422,521
Grand Isle/Lamoille	$9,155,602
Orange	$5,985,825
Rutland	$19,819,855
Washington	$16,412,881
Windham	$16,951,229
Windsor	$16,433,720
Total	**$170,964,610**

[1] All geographic names above refer to Vermont counties.

[2] Required TRB targets have been adjusted for Customer Credit.

5.2.3 2015-2017 Thermal Energy and Process Fuels Performance Goals and Minimum Performance Requirements

QPI#	Title	Performance Indicator / Milestone	Target
1	Thermal & Mechanical Energy Efficiency Savings	Annual incremental net Million British Thermal Unit (MMBtu) savings	279,000
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) with both shell measures and heating system measures installed, within contiguous calendar years	16%

MPR#	Title	Minimum Requirement	Minimum
3	Threshold (or minimum acceptable) Level of Participation by Residential Customers	Total residential sector spending is greater than 62.5% of the 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 is greater than 17% of the 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) is less than $20,818,062	$20,818,062

5.3 APPLIED RESEARCH AND DEVELOPMENT ACTIVITIES

Efficiency Vermont will engage in a range of projects during the performance period as part of its Applied R&D efforts. The projects shown below will undergo ongoing assessment to ensure alignment with the goals and priorities outlined in this Plan.

5.3.1 2015-2017 Emerging Data Services

Inexpensive, abundant, and reliable data are transforming the way energy services and research are provided. Therefore, Efficiency Vermont must strategically plan how to use these data to deliver high value to internal and external customers, systems planners, and policy makers in changing energy markets and in the regulatory landscape. The associated benefits will increase the effectiveness of all energy efficiency services through resourceful approaches for obtaining business intelligence, analytics, and customer engagement that use multiple and varied data.

The Emerging Data Services category explores new strategies, techniques, and technologies that show promise for increasing energy savings, facilitating targeted segmentation, decreasing delivery costs, and increasing customer engagement and satisfaction. Efficiency Vermont particularly explores not-yet-proven approaches, given the custom nature and maturity of the programming in Vermont. Efficiency Vermont also supports other research and investigations that show promise of leading to greater market transformation. Although this work will often use AMI data, it also will involve data from energy submeters, environmental and process sensors, building energy management systems, demographic and real estate databases, and historical efficiency program activities.

The work of the Emerging Data Services category is ongoing, but it targets a specific outcome: Determining the value of an emerging data service. This exploration is currently a DSS activity. Efficiency Vermont expects, however, that future work within this category will relate directly to RA programs and contribute to achieving energy savings. There are three basic conditions under which such a transition might occur:

1. **Investigating novel data applications for which no prior research exists:** Occasionally, Efficiency Vermont considers an idea—involving software, hardware, or a combination—that promises to lead to successful implementation of cost-effective data services. Efficiency Vermont will research such ideas in order to assess their application to efficiency programming. The study design for this kind of investigation, developed under the DSS budget, will enable the promotion of effective technologies to scale, under other (presumably RA) budget categories.
2. **Analyzing an emerging data application for which prior research does exist:** From time to time, Efficiency Vermont recognizes that a promising data product or service can lead to more successful implementation of cost-effective program services. Efficiency Vermont will analyze existing research to determine the extent to which the approach should move directly into RA or other DSS categories. This condition does not involve in-house research.
3. **Identifying applications that can be supported by an RA budget:** Efficiency Vermont will use the DSS category for investigation, development, and testing of new technology and approaches. It will use the RA category for the purchase of the validated technology platform, hardware, or

software. Resulting data services that prove successful will then be implemented at scale, using RA budgets.

5.3.2 2015-2017 Technology Demonstrations

2015 Activities

Mapping Total Energy Burden: Energy burden can be described as the amount that households pay each month or year for electricity, heating, and transportation, and the hypothesis is that this varies widely among households and communities in Vermont. This project will map total household energy use in the state to identify areas that are "hotspots" of high usage. Identifying communities with substantially higher overall energy use will enable recommendations of how spatial patterns in energy burdens can inform future Efficiency Vermont initiative planning and provide the potential to develop programs and marketing for specific areas in Vermont.

Deep Commercial and Industrial Energy Retrofits: There is general sentiment in the engineering community that the technology exists to conduct deep energy retrofits achieving up to a 60% energy reduction in commercial and industrial buildings, resulting in very low energy use intensity or being net-zero ready; however, significant challenges exist. Efficiency Vermont will identify specific customers who are interested in this level of retrofit and will investigate ways to address the additional design costs and the 30-year payback associated with this level of deep energy retrofit. This effort will enable Efficiency Vermont to gain a greater understanding of the barriers, challenges, and related efficiency opportunities of this market, and help determine whether deep commercial and industrial retrofits are feasible and scalable in Vermont.

Pump Up the Savings: Heat pumps are growing in popularity thanks to their promise of lower energy bills, and they could provide even greater savings if they are proven to produce a load shape that could qualify them for a lower electric utility rate. Some Vermont utilities have recently asked Efficiency Vermont to help gather more information about heat pumps in order to consider such opportunities. This project will focus on conducting, sharing, and applying the results of analysis on data sets (both existing and new) to reduce the uncertainty of savings claims for HVAC measures, and to improve the customer economics and systems benefit of heat pumps. One goal of this research is to provide a detailed report suitable for citing in TRM development.

Evaluation of Combined Heat Pump Water Heater and Residential Solar Water Heating: This project will compare the energy use of conventional (electric or gas) and heat pump water heaters, each using solar thermal technology to preheat water. The aim of this effort will be to determine if heat pump water heaters offer measurable advantages due to their efficiency as backup during non-solar (cloudy or nighttime) periods as well as the degree of control that they offer in changing the rate of temperature recovery. This will be the second phase of a 2014 R&D project that focused on low-cost, remote metering for solar thermal installations.

Residential New Construction HVAC Design Study and Training: HVAC designs in residential homes are among the longest standing and most low-tech parts of a house, and these systems are frequently specified by outdated "rules of thumb." This project will build on Efficiency Vermont's knowledge of HVAC systems and help educate Vermont installers about the latest best practices in design. One of the country's leading HVAC design groups will be engaged to design a complete HVAC system (from scratch) in tandem with a Vermont builder and HVAC partner. All parties will be involved from early

in the design phase, making this a true R&D project, with the added benefit of follow-through to completion. On-site training will include Efficiency Vermont staff, builders, HVAC contractors, and others. This project will provide valuable training and enable monitoring of the prototype system's performance.

Maple Sugaring Electric Consumption: Maple sugaring technologies have been expanding rapidly in recent years. Some reverse osmosis equipment that once used fractional horsepower pumps has recently been upgraded to include larger pumping mechanism with much greater horsepower to control the flow of sap through the machine. Many sugar houses are in remote areas, and access to adequate electric supply to run these pumps is a challenge. Because the operating efficiencies of these reverse osmosis systems are not readily available, Efficiency Vermont will work with industry experts to explore electric efficiency opportunities. Insights gained through this project are expected to inform the evolution of the Maple Reverse Osmosis Program due to launch in early 2015.

Dairy Farm Refrigeration System Assessment: Due to increasing interest in new, energy-intensive refrigeration systems on larger dairy farms, Efficiency Vermont will engage farmers and dairy equipment vendors in an assessment of chiller refrigeration systems on larger dairy operations. Efficiency Vermont will use this opportunity to identify baselines and other potential efficiency opportunities, as well as to create a consistent approach for this type of refrigeration system. This project also will assess the cost-effectiveness of "up-sizing" smaller refrigeration equipment as an alternative to the installation of new chiller systems.

Low-e Storm Window Pilot: Windows are among the weakest thermal barriers in existing residential buildings. Unfortunately, energy-efficient replacement windows are not a cost-effective energy-saving measure because of high product and installation costs. This project will investigate the potential of energy-efficient storm windows and interior panels to cost-effectively reduce building energy consumption. Through upstream discounting and promotions, in collaboration with a manufacturer and one or more retail vendors, Efficiency Vermont will have the opportunity to evaluate the actual energy savings and customer satisfaction of these products in a sample of Vermont homes.

Home Energy Management System Baseline Assessment: Home energy management system technologies are drawing considerable interest and involvement from both established manufacturers and small innovators. At this early stage of these systems' emergence in the marketplace, products and services vary widely. Through this project, Efficiency Vermont will assess the baseline energy usage of these systems and will determine if insights gained may be of use in the design of software and hardware for energy efficiency purposes.

2016 Activities

Energy Management Systems for Dairy Farms: Vermont is one of many states with a dairy industry in a trend of consolidation; fewer farmers are managing more facilities and more cows. As these operations grow, energy and building management systems increasingly show potential as tools that herd managers can use to manage their facilities' energy costs and other core business functions. energy management systems in particular have typically been utilized in processing and manufacturing facilities; the applicability of the technologies for the dairy industry are not well understood, especially from an energy cost-effectiveness standpoint. In this study, Efficiency Vermont will explore how energy management systems may be integrated with herd management systems and other monitoring equipment for optimal energy performance and herd health.

Horticultural Energy Systems Study: In some horticultural operations, energy can account for 50% of the cost of production. Effective heating and ventilation is often complicated by the moisture levels required in spaces where plants grow. Additionally, supplemental lighting with LEDs is becoming more popular, yet baselines for these technologies have not been standardized. As the indoor growing of plants becomes more utilized in Vermont commercial operations, Efficiency Vermont will keep abreast of the industry changes by: 1) engaging with the Design Lights Consortium to understand the lighting component of these operations; 2) benchmarking a few of the existing indoor growing facilities in Vermont; and 3) creating a best practices guide to enable an integrated energy efficient design.

Greenhouse Alternative Heating Study: Many Vermont farmers are interested both in growing fresh produce through the winter and in heating their greenhouses with non-fossil fuels. Local universities have recently conducted studies of biomass boilers and furnaces in greenhouses, for air-to-water heat pumps and with hot water storage, among others. Efficiency Vermont will work with a local greenhouse grower to consider the cost-effectiveness and savings potential of these heating options, in different configurations, as compared to more traditional heating methods.

Pump Efficiency Testing: Centrifugal pumps, as a group, have been identified as wasteful users of electrical energy. Over time, pumps lose structural material and experience corrosion, resulting in reduced capacity and efficiencies. These pump issues may be addressed and largely avoided through the application of ARC ceramic epoxy coatings. Conservative estimates have repeatedly shown that pump efficiency can be acquired through these applications. Efficiency Vermont's experience with this, however, is limited. Efficiency Vermont will conduct field assessments of selected equipment to quantify performance and efficiency degradation, determine potential savings and payback, implement a plan for improvement, and validate proposed measures.

Green Home Pilot: This effort is designed to create a low-cost, simplified pathway to a Vermont-specific green building standard for home construction. Efficiency Vermont's current Residential New Construction program does not incentivize strategies targeting embodied energy, water consumption, or indoor air quality. Current barriers include cost and the significant logistical challenges of navigating and documenting the web of requirements and options for existing programs. Efficiency Vermont will engage with external partners and communities to identify the top sustainability issues and challenges. With this information, Efficiency Vermont will design and launch a pilot initiative serving five or more projects—in geographically diverse areas—with a simplified prescriptive package of 10 to 12 items. At least one project will serve a low-income population.

Integrated Lighting Controls Study: Lighting controls are becoming more pervasive in the commercial lighting market. While Efficiency Vermont encourages the adoption of these technologies because of their savings potential, there is little third-party testing of manufacturers' claims about the savings, ease of use, ease of commissioning, and customer satisfaction related to integrated lighting controls. This study aims to determine the validity of these claims in Vermont market conditions through a comprehensive survey and metering effort. Efficiency Vermont will survey customers and will meter light output before and after installation to determine accurate savings. Efficiency Vermont will also engage with contractors in order to understand their confidence in installing the technologies.

Aligning Modern Wood Heating and Strategic Electrification with Geographic Realities: Successful promotion of energy efficiency and renewable energy is fundamentally dependent on and interactive

with the geographic nuances of the grid. Current program approaches may not adequately reflect and utilize those nuances, leading to missed opportunities for supporting a reliable total-energy system. This study will explore whether or not the integration of a sustainable biomass strategy into broader strategic energy planning might help address the costs incurred from rapid thermal and vehicle electrification in areas without adequate grid structure. This project will pioneer the use of GIS methodologies and data visualization to geographically target efficiency and renewable energy opportunities to address load constraints and maximize use of renewable heating fuels. This geospatial analysis will provide insights on the thermal and electric delivery systems (the grid and the delivered fuels equivalent) and guide implementation to maximize the impact of program funds.

Predictive Control Strategies for Building Management Systems: This R&D project will create and implement energy-saving control sequences using capabilities that already exist in building management systems. For example, an algorithm could use forecasted (rather than current) outdoor temperatures to determine when a heating system comes on. This would reduce heating and ensuing cooling loads when outdoor temperatures are forecasted to climb. Efficiency Vermont will work with a few building owners with existing control systems and will engage a control contractor to program the new control logic and set up appropriate trending to verify savings. As part of the research, Efficiency Vermont will estimate savings to determine which strategies have the most impact. Efficiency Vermont will document the lessons learned, which can be shared with external partners.

Electric Transportation Efficiency Study: This research is a logical extension of a 2013 project that investigated the efficiency of electric vehicle charging at different voltage levels. This project will further develop a foundation for electrified transportation efficiency in anticipation of robust growth in electric vehicle use in Vermont. This study will: create a baseline of electrified transportation energy usage in Vermont; develop forecast scenarios of electrified transportation over the next 10 years; monitor the development of ENERGY STAR products associated with electrified transportation; generate a prioritized list of transportation efficiency program measures, with initial savings estimates; and provide a venue for discussion and development of electrified transportation efficiency programs. This research will support understanding of the most efficient charging and vehicle technologies as well as consider reductions in electric transportation energy use through reduced travel needs via demand management measures. This work will also help to establish a baseline and forecast estimates of electric vehicle use in Vermont, assist in measuring the potential size of the market for transportation efficiency programs, and provide Efficiency Vermont planners with data that can be updated as the market continues to develop in coming years.

Air-to-Water Heat Pump Evaluation: The aim of this effort will be to explore the feasibility of air-to-water heat pumps in HVAC and hot water applications for high-performance modular homes. The heat pump technology will be compared and monitored alongside a home's current HVAC approach, which includes a separate, ductless mini-split and heat pump water heater. This evaluation will be a partnership with Mitsubishi (maker of the air-to-water heat pump equipment to be used) and Vermod (a high-performance modular home manufacturer), and will determine whether it is possible to eliminate a stand-alone heat pump water heater in the main living space and the parasitic load on the house. This research has the potential to be a step in assessing options for homeowners looking to achieve net-zero energy.

Thermal Envelope Monitoring in High-Performance Modular Homes: This project will evaluate the performance of four high-performance modular homes to determine if superinsulated assemblies accumulate moisture over time. Efficiency Vermont will track the temperature, relative humidity, and

moisture content at the exterior sheathing to identify how the thermal envelope assemblies perform in the same model of home at different locations, with different occupant behavior, and from season to season. Findings will help guide program design.

2017 Activities

Exploring the Water-Energy Nexus in Vermont

Electricity savings stemming from water savings have become increasingly critical as the western United States has experienced multi-year droughts. Electricity used for water pumping can be wasted either at the utility level, resulting in lost revenues, or at the customer level, resulting in the over use of pumps for well and septic systems. Efficiency Vermont will work with selected communities that either were recently affected by drought or that have identified water pumping as a significant municipal expense. The aim of this work will be to characterize opportunities and to determine the electric efficiency benefit of addressing water leaks at the community level. Water-leak detection efforts will be done in coordination with the Vermont Rural Water Association.

Zero Energy Homes Data Study--Phase II

Building on Efficiency Vermont's recent R&D efforts, this study will be undertaken to determine the extent of building-envelope improvements necessary to enable renewable sources to supply all energy needs in a home. The study will monitor homes that have had substantial energy improvements. Monitoring will be used to determine how well the combination of building efficiency improvements and point-source heat can satisfy comfort needs, maintain healthy indoor air, and reduce energy use. Understanding and helping to reduce the costs of such projects through optimizing building efficiency improvements will help to support adoption of deeper efficiency projects in homes.

Testing the Value of Energy Efficiency in the Renewable Ramp Challenge

As the electricity grid increasingly accommodate solar electricity, a problem is emerging: At sunset, non-solar sources of electricity must quickly ramp up. This limits choices for power plants providing the post-sunset electricity and is difficult for traditional power grids to accommodate. Energy efficiency measures, used to reduce electricity needs, are key to countering the problem. In this study, Efficiency Vermont will analyze the effectiveness of specific energy efficiency measures in flattening the loads of Vermont businesses and residences.

Existing Homes Non-Energy Benefit Study

Anecdotal evidence suggests that many participants in energy efficiency programs value the non-energy benefits more than the energy savings associated with their efficiency retrofits. These benefits can include greater comfort, safety, noise reduction, and healthcare savings. Currently, Efficiency Vermont's program cost-effectiveness calculation does not count some non-energy benefits because these benefits are difficult to quantify and monetize. Efficiency Vermont will survey a statistically significant sample of the 5,000 Vermont homes that have completed Home Performance with ENERGY STAR projects. This effort will be undertaken to identify non-energy benefits resulting from efficiency improvements and will measure the value of those benefits.

Demonstrating Electric Transit Vehicles in Vermont

Efficiency Vermont will analyze the costs and fuel use resulting from the deployment of an electric public-transit vehicle to determine the impact of this technology in Vermont. Efficiency Vermont will work with a transit-vehicle manufacturer to deploy an electric model through a local transit

authority for a period of time, giving operators a chance to experiment with the technology. Data will be collected on operating costs, electricity use, fossil fuel displacement, energy efficiency gains (expressed in British Thermal Units) and costs savings. Qualitative data will also be collected from drivers and mechanics to evaluate their perceptions and experience. This study has the potential to benefit a variety of Vermonters over the long-term, including low-income individuals, older adults, students, and people with disabilities, who are the primary demographic of people who use public transportation.

Leveraging Modeling Software to Implement Efficient HVAC and Refrigreation Systems
This project will use building-energy modeling software tools to evaluate variable refrigerant flow (VRF) and refrigeration technologies. VRF is an energy-saving technology that enables heating and cooling equipment motors to move refrigerant at varying speeds by responding to need rather than being run constantly. The VRF analysis will utilize prototypes for medium-sized office buildings and mid-rise multifamily buildings, and the refrigeration research will focus on multiple refrigeration-efficiency measures in supermarkets. The software will be OpenStudio®, a free, flexible energy modeling interface developed and supported by U.S. Department of Energy and the National Renewable Energy Labs. Efficiency Vermont will work in coordination with staff from these two entities. This project aims to achieve more accurate and customizable analysis while providing consistent, repeatable processes for Efficiency Vermont.

Testing Electric Bikes as an Energy Efficiency Measure
In partnership with local bike-advocacy organizations, Efficiency Vermont will evaluate and quantify vehicle miles reduced by way of commuting via electric bikes. This effort will help Efficiency Vermont gain experience with and collect data on the feasibility of this transportation as an energy efficiency opportunity. Outreach may be conducted through an existing downtown initiative, through an employee-engagement strategy of a larger company, or through existing networks of the bike advocacy groups.

Paying Energy Arrearage through Savings
This study will focus on the concept of using energy savings to pay overdue energy bills, to prevent utility shut offs, and to lower the energy burden for low-income households. To determine the feasibility of including this approach in future program offerings, Efficiency Vermont will work with utilities and fuel dealers to engage customers with arrearages to participate in energy saving efforts. Efficiency Vermont also will research existing arrearage and savings programs, research consumer protection laws around this topic, and if promising, explore data needs for potential future program offerings.

Predictive Control Strategies for Building Management Systems – Phase II
In 2016, Efficiency Vermont engaged in research to validate the energy-saving potential of predictive control strategies in building-management systems. This research is described above, in this section, under “2016 Activities”. In 2017, Efficiency Vermont will use the most promising strategies identified in its 2016 research to launch a pilot initiative to test for cost effectiveness. The buildings tested during the first phase are likely to be utilized for the pilot initiative.

5.3.3 Recent Applied Research and Development Projects Impacting 2015-2017 Plans

Efficiency Vermont Data Strategy and Analytics (Smart Grid / AMI)

Description: The growing amount of available data, such as AMI interval data, provides an opportunity to develop and implement a cost-effective approach for broader consumer-side energy efficiency services. An integrated data storage and analytics platform will allow Efficiency Vermont to develop and implement streamlined processes to deliver recommendations and savings estimates and to verify results to customers more effectively. In addition, robust storage of statewide usage and other data with analytical capabilities will allow Efficiency Vermont to perform deeper market analysis for planning and verification purposes while ensuring confidentiality, privacy, and security.

Plans for 2015–2017: Work will continue in this area through the implementation of Efficiency Vermont's energy efficiency data platform to secure transfer of AMI data from Vermont distribution utilities. This implementation process will address privacy and cybersecurity considerations, project management, and development of infrastructure to enable customers to access their data. Efficiency Vermont will develop a set of analytical tools to help staff and customers take advantage of AMI data for identifying and verifying savings opportunities.

Classroom Lighting: Balancing Optimal Energy Efficiency and Illumination

Description: An effort to research and publish a practical guide for achieving high-efficiency and high-quality classroom lighting in Vermont K–12 schools, in partnership with lighting designers, the School Energy Management Program, and the Vermont Department of Education.

Plans for 2015–2017: "The K–12 School Lighting Guide" will continue to be a valuable resource for those designing classroom lighting systems for years to come.

Assessing the Ability of Smart Thermostats to Estimate Thermal Efficiency

Description: An investigation of smart thermostats, or programmable communicating thermostats, as tools to understand whole-house thermal performance. The study focused on estimating whole-building heat flux and disaggregating the heating energy usage due to behavior (turning temperature up and down) relative to the performance of the building envelope. The results of this 2012 project led to two expanded studies in 2013 and 2014. These studies measured the energy savings from installing smart thermostats in Vermont single-family and multifamily homes.

Plans for 2015–2017: The information gathered with the 2013 and 2014 expanded pilots will inform full implementation, expected in 2015–2016.

High-Performance (Low-Load) Homes

Description: Research exploring the design, construction, operation, and maintenance of high-performance, low-load residential buildings with the goal of implementing an initiative in support of such buildings. The whole-house monitoring performed as part of this study proved to be valuable. A 2013 High-Performance Home pilot became a viable Efficiency Vermont tier offering in 2014. Through continued monitoring of energy use and indoor air quality, Efficiency Vermont advances cost-effective energy efficiency upgrades while supporting a healthy living environment. Seven homes were completed in 2013 under the pilot and an estimated 15 homes were expected to be completed in 2014, including net-zero modular homes designed to offer Vermont homeowners an alternative to inefficient mobile homes.

Plans for 2015–2017: This initiative was expected to expand in 2015 and beyond.

Ductless Heat Pumps for Existing Homes

Description: Research to develop a methodology for quantifying energy savings from the installation of inverter-driven ductless heat pumps as a supplemental heat source in existing single-family homes

with varying levels of shell efficiency. A ductless heat pump metering R&D project conducted in 2013 provided a foundation for current and future heat pump initiatives.

Plans for 2015–2017: Efficiency Vermont launched two heat pump pilot initiatives based on the 2013 project. These pilots led to the development of a large-scale, statewide heat pump initiative.

Continuous Energy Improvement (CEI) Dashboard

Description: Research to investigate the use of a graphical display "dashboard" of energy per unit production as a tool to allow employees in a manufacturing setting to better understand what impacts energy use and to encourage more active energy management through CEI efforts.

Plans for 2015–2017: Early results of this study indicate that an expanded use of dashboards is expected to be an important tool as Efficiency Vermont expands CEI efforts.

Path to Net-Zero Energy Homes

Description: In alignment with Vermont's goal of achieving "90% of Vermont's energy from renewable sources by 2050" as stated in the *2011 Comprehensive Energy Plan*, this effort aims to:

- Develop and apply solutions to achieve comprehensive deep energy retrofits and net-zero energy in at least 10 existing homes across Vermont
- Create a road map to inform program enhancements for a larger statewide approach toward achieving deep energy savings (50% or greater) in the residential market.

As part of this study, eight public presentations on the path to net zero for existing homes occurred throughout 2014, with close to 40 consultations and five active zero-energy projects.

Plans for 2015–2017: Insights into the challenges in existing homes, as well as monitoring of several zero-energy home remodeling projects, continue to inform program design. Going forward, Efficiency Vermont will leverage this learning and continue to collaborate with partners to advance net-zero energy projects in both the residential and commercial sectors.

Low-Cost, Residential-Scale Remote Metering to Support Solar Thermal Heating Systems

Description: Research to identify and evaluate reliable, low-cost remote metering solutions for monitoring the performance of solar thermal systems. In partnership with solar contractors and other stakeholders in the industry, this effort aims to install meters in existing solar thermal homes and monitor them to ensure long-term performance of these systems, validate energy savings estimates, and establish metrics for "pay-for-performance" financing options for solar thermal.

Plans for 2015–2017: Although this project is still under way, its early results informed the design and development of the Solar Hot Water Initiative, which launched in 2014 and will continue in the 2015–2017 performance period.

Remote Savings Assessment with Internet-Connected Submeters

Description: Research to investigate whether inexpensive networked power meters could be installed by customers' electricians so that Efficiency Vermont staff could remotely analyze energy use and provide customized recommendations. The study identified several challenges involving coordination and communication during meter installations and developed a set of installation instructions and documentation forms to reduce costs and errors.

Plans for 2015–2017: A meter loan offering is currently under development, and is expected to launch in 2015. The goal is to provide data-driven recommendations about the most energy-intensive equipment in small and medium-sized businesses. Based on the results of R&D, the focus will be on streamlining system configuration, documenting installations, and providing real-time feedback to prevent common installation errors.

Deep Commercial and Industrial Energy Retrofits

Description: A study designed to help determine the feasibility and scalability of 50% energy reduction retrofits in Vermont commercial facilities. Through the provision of custom assistance to decision makers in business facilities of diverse uses, sizes, and energy performance, Efficiency Vermont gained insights about costs and optimal conditions for success. The results showed that cost-effective 50% energy reduction can be achieved in a range of businesses that have a motivated and empowered energy champion. Efficiency Vermont used these results to inform approach adjustments.

Plans for 2015-2017: In late 2016, continuing into 2017, Efficiency Vermont will issue a call for applicants to participate in a deep energy retrofit initiative. Efficiency Vermont will explore incentive and project-support structures to make the initiative more sustainable while working to motivate and empower customers toward successful achievement of deep energy use reductions.

Dairy Farm Refrigeration System Assessment

Description: An effort undertaken to deepen knowledge about the savings potential associated with efficient milk chiller projects. Efficiency Vermont discovered variations in savings claim methodologies among analysts, and found that most chiller projects are determined not to be cost-effective by the Vermont State screening tool. Efficiency Vermont investigated ways to support this technology from a market opportunity standpoint. Insights gained through this research informed Efficiency Vermont's decision to focus on energy-saving opportunities related to advanced controls for dairy refrigeration systems.

Plans for 2017: Building off the lessons learned, Efficiency Vermont will address new refrigeration efficiency opportunities for dairy farms. Promotion of and support for the installation of advanced controls began in 2016 and is expected to scale up in 2017 as more customers are made aware of this offering.

5.4 EVALUATION ACTIVITIES

5.4.1 2015-2017 Portfolio-Wide Evaluation Activities

Annual Savings Verification

The budget is based solely on Efficiency Vermont resources and does not include the annual savings verification activities of the Vermont Department of Public Service. The budget is broken down into three categories:

1. Savings Preparation Budget

Savings preparation includes the initial conference between the Vermont Department of Public Service and Efficiency Vermont, and several steps involving the Efficiency Vermont customer database (KITT): Reconciliation, freezing, and providing the Vermont Department of Public Service with a snapshot of the savings database. The Vermont Department of Public Service generates the savings sample plan and provides Efficiency Vermont with a detailed list of projects it wishes to review. Preliminary project reports are provided by the Vermont Department of Public Service to Efficiency Vermont.

2. Savings Review Budget

Upon receiving the preliminary project report results from the Vermont Department of Public Service, Efficiency Vermont develops preliminary responses for each project and provides the Vermont

Department of Public Service and its subcontractor, West Hill Energy & Computing, with any additional data and engineering assumptions used to calculate energy savings. The scope of the savings review can range widely, 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 Budget

Efficiency Vermont and the Vermont Department of Public Service 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 begins developing the "realization" spreadsheets to be applied to its KITT database. Data tools for future custom projects are modified where appropriate, and prescriptive screening tables are updated and revised to reflect the savings verification outcomes.

Technical Advisory Group (TAG)

The Technical Advisory Group (TAG) includes the Vermont Department of Public Service, members of Vermont's Energy Efficiency Utilities, and other stakeholders. TAG focuses on reviewing and approving the methodology and associated assumptions underlying measure savings calculations that are included in the TRM. In addition, TAG functions as a general forum for technical issues related to Energy Efficiency Utility savings claims and methodologies. TAG also resolves issues that arise from annual savings verification and serves as a proactive mechanism to develop energy characterization and savings calculations. Development of the TAG budget was based on 2014 activities and is broken down into the following five categories:

1. TAG Coordination

Efficiency Vermont plays a coordination role for the TAG process, scheduling monthly meetings, updating the TAG tracker, and coordinating communications related to proposals and responses. TAG discussion topics and action items are maintained in the TAG Tracker document.

2. Measure Characterization Proposal Preparation

Efficiency Vermont submits proposals for new measure characterizations via TAG, bundling multiple characterizations into a measure portfolio. These characterization drafts are reviewed by the Vermont Department of Public Service and other stakeholders, and agreements are made on measure assumptions and savings estimates before new measure characterizations are incorporated into the TRM.

3. Proposal Review

For measures or programs that require a more comprehensive view of savings delivery methodology, Efficiency Vermont develops detailed program implementation procedures, which include an explanation of inputs and methods used to calculate savings. These documents can be used by external evaluators and other stakeholders to help them understand how a program or measure works so they can evaluate a savings claim accordingly.

4. Proposal Discussions

Proposal discussions are carried out after Efficiency Vermont receives an official response from the Vermont Department of Public Service. Discussions involve small workshops to determine problem-solving steps for addressing substantive issues.

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 agreement has been reached between the Vermont Department of Public Service and Efficiency Vermont. This activity is a collaboration among Efficiency Vermont information technology, operations, and technical staff.

Technical Reference Manual (TRM)

The TRM budget is based on an assumption that there will be more frequent and rigorous annual TRM review across the three-year budget period. This review is the result of a TAG agreement in 2010 to enhance TRM reliability. The TRM budget is broken down into the following five categories:

1. TRM Management

This activity involves managing portfolio submissions and updating the TRM tracker. TRM management also includes the recharacterization of measures and savings methods to be applied to Efficiency Vermont's prescriptive tools for savings upload and calculation purposes. In addition, this activity includes the annual release of the updated Efficiency Vermont TRM.

2. TRM Development and Research

TRM development is based on research of new technologies and changing market conditions. All measure characterizations require considerable research, ensuring that all characterizations accurately reflect the most current savings determination methods incorporating efficiency evaluation findings from other states and those at the national level.

3. TRM Updating

This activity includes the annual updating of existing measure characterizations, based on findings during savings verification. It also includes changes to baselines or potential market transformation as a result of new evaluations.

4. TRM Review Budget

Efficiency Vermont internally reviews all updated TRM measure characterizations prior to submitting them to the Vermont Department of Public Service for comment and approval. This effort is undertaken by technical staff, planning and development managers, and subcontractors. In addition, this activity includes 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 staff and Vermont Department of Public Service staff, are convened as needed. The budget is based on historical experience.

ISO-NE Measurement & Verification

VEIC operates as a New England Power Pool market participant on behalf of Efficiency Vermont's performance in the ISO-NE FCM, which is measured via an annual sampling plan for small, medium, and large custom business projects. This budget was developed using historical costs incurred for required FCM evaluation activities. The ISO-NE measurement and evaluation budget is broken down into the following four activities:

1. Measurement and Verification (M&V) Implementation

M&V 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. The budget

includes costs incurred as a result of 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 also undertaken when required.

3. M&V 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 M&V plan.

4. Equipment and Calibration

To meter projects identified in the sampling plan, Efficiency Vermont routinely purchases metering equipment to conduct testing and analysis. 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. This budget reflects the costs associated with both meter calibration and the scheduling of meters for selected projects.

5.4.2 2015-2017 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. The estimated budget for each individual activity below is between $2,000 and $10,000, and some activities may be funded outside the DSS evaluation budget.

Year	Activities	Description/Intent
2015 2016	**Residential New Construction**	Efficiency Vermont plans to conduct a series of 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: • What home attributes customers value most (such as comfort, durability, low purchase price, low operating costs, healthy indoor air, etc.) • How builders are currently marketing homes to customers • What resources and training Efficiency Vermont could provide to help builders promote the value of the Residential New Construction program (and energy efficiency in general) to customers. The goal is to work more collaboratively with builder partners as an extended sales force for energy-efficient homes.
2015 2016	**Weatherization Program**	Evaluation of core low-income initiatives, primarily implemented through the Weatherization Program: • Low-income Electrical Efficiency Program Partnership • Targeted High Use • Vermont Fuel Efficiency Partnership. Evaluation activities will be focused at the measure level to ensure that savings per project are maximized and that the associated value for customers
2015 2016	**Vermont Ski Areas and Lodging Markets**	2015 Activities: Efficiency Vermont hosted the second annual Ski Area Best Practices Exchange for the Vermont ski industry operators with tracks focused on mountain operations and resort experience. This forum allows Efficiency Vermont to survey industry members as to their needs, motivations, and expectations for programs in 2015 and beyond. 2016 Activities: Efficiency Vermont will assess how it can motivate lodging operators to engage in lighting upgrades for common spaces and other areas that typically operate 24 hours per day, year-round.
2015	**Farm Ventilation**	Assess the savings calculations currently being utilized for the agricultural custom ventilation projects. Efficiency Vermont will conduct metering at approximately 10 customer sites. In order to get meaningful results, metering will be conducted during the cooling season. These results will help inform future program changes. Analysis of results will be undertaken by Efficiency Vermont and submitted to the Vermont Department of Public Service for review.

2015 2016	**Reverse Osmosis for Maple Sugaring**	Metering will be conducted to verify the calculations that will be developed for this program. Although metering plans will be in place in 2015, the actual metering will not take place until sugaring season in the spring of 2016, hopefully in time for verification. Metering will be used to verify the rating and effectiveness of reverse osmosis in removing water from the sap. This will determine the amount of water that does not need to be boiled. Verification may also be conducted by assessing the amount of fuel (wood, oil) used to create a given amount of syrup.
2016	**Agricultural Customer Feedback**	Soliciting feedback from two customer segments: • Dairy equipment vendors, regarding existing services and feedback for future program design. These in-person meetings will take place in conjunction with the Vermont Farm Show. • Vegetable growers; Efficiency Vermont will help update a University of Vermont Extension survey about on-farm cold storage. Energy efficiency will be one aspect of this survey.
2016	**In-Store Intercept Study for Efficient Lighting**	This effort is a collaboration between Efficiency Vermont and Burlington Electric Department, seeking to inform the allocation of efficiency lighting savings and costs between the two utilities. The effort will survey stores in Chittenden county to determine the installation location of lighting products and provide a breakdown of lighting sales.

5.4.3 Recent Evaluation Results Impacting 2015-2017 Plans

SMARTLIGHT Lighting Initiative

Description: Efficiency Vermont and Burlington Electric Department have partnered with electrical distributors to offer contractors and customers the most efficient replacement lamps on the market at a cost comparable to that of conventional products.

Evaluation Activities: As part of its continuous improvement efforts, Efficiency Vermont has undertaken program evaluation activities focused on the following:

- In-service rate(s) of products purchased and site inspections
- Distribution of LED products between customer type (commercial / residential)
- Commercial customer inventory preferences and product stocking practices
- General awareness of the discounts applied through SMARTLIGHT at the customer level
- Why the products were purchased.

Evaluation Results: As a result of lessons learned from the SMARTLIGHT program evaluation activities, Efficiency Vermont has implemented the following changes:

- Distributors must provide the following information for all transactions:
  - Customer phone number
  - Customer type (residential / commercial).
- Measure savings are calculated and uploaded according to the actual customer classification (residential / commercial) as opposed to being allocated according to a calculated split.
- The in-service rate is being applied according to the actual customer classification rather than a blended value.
- Residential transactions are limited to a total of 12.
- Clarifying language is now included within the Participating Distributor Agreement stating that all products must be installed at the end user's location.

- A brochure was developed to increase customer awareness of the program.
- Ongoing annual quality assurance activities were developed in alignment with Efficiency Vermont prescriptive offerings.

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 comprehensive, whole-house approach to energy efficiency and to maximize long-term savings for homeowners.

Evaluation Activities: Efficiency Vermont's Home Performance with ENERGY STAR efforts have undergone several process and impact evaluations, carried out by independent third-party evaluators. Full reports and results can be found here:

- www.publicservice.vermont.gov—If you're reading a non-electronic document, go to this web address and search for "Energy Efficiency Utility Performance Evaluation." Then click the link of that name, and scroll down to the link "Impact Evaluation—Efficiency Vermont Home Performance with ENERGY STAR."
- www.efficiencyvermont.com—If you're reading a non-electronic document, go to this web address and search for "Home Performance report."

Evaluation Results: As a result of the evaluation efforts, changes being considered or put in place by Efficiency Vermont are as follows:

- Allowing customers to "stage" their projects by setting priorities with their contractor that meet their budget over several years, while maintaining their eligibility for incentives.
- Continuing follow-up with "stalled" customers who have completed audits, but have not yet followed through on retrofit projects. This tactic proved effective in 2013 as a means of notifying customers of the limited-time bonus incentive.
- Seeking more opportunities to integrate promotion of Home Performance with ENERGY STAR into other Efficiency Vermont program offerings, particularly those for efficient consumer products.
- Making system and process improvements to streamline the customer and contractor experience.

In addition, Efficiency Vermont has taken the following steps to improve the existing HERO audit tool and overall savings estimates for ongoing programs:

- Set the minimum pre-retrofit R-value for foundation walls to R-3 (present minimum is R-0).
- Set the "n-factor" used in air-sealing savings calculations rather than allowing the contractor to vary this number according to the height and exposure of the building.
- Set the minimum value for heating system efficiency (e.g., 60%) and changed at least one default efficiency to a higher value (wood to 60% from 45%).

Energy Savings Kit

This offering was available to residential customers from 2013 through 2015. As of 2016, the budget for this offering was reallocated to more cost-effective technology with greater long-term impact on the market.

Description: Participating customers received kits that contained products to help them reduce their electrical usage and provided tips on actions they could take to save energy and money.

Evaluation Activities: Upon completion of the trial phase of the program, Efficiency Vermont undertook program evaluation efforts focused on:

- Telephone surveys of participating customers to determine in-service rate of products delivered
- Customer feedback on energy savings kit product preferences
- Review of customer mail-in feedback cards and follow-up on additional energy efficiency opportunities.

Evaluation Results: As a result of the evaluation efforts, changes considered or put in place by Efficiency Vermont were to:

- Support products with a high in-service rate, as they demonstrated customer need and satisfaction with products
- Add more products indicated by customer feedback cards (for example, adding an LED screw-base bulb)
- Modify customer feedback cards to track additional feedback.

Agricultural Engine Block Heater Timer

Description: Engine block heaters are typically used during cold weather to warm an engine prior to start. A timer allows a user to preset the heater to come on for only the amount of time necessary to warm the engine block, reducing the time that the heater is needed, thereby reducing electricity use. Efficiency Vermont offers financial incentives for these timers in agricultural applications.

Evaluation Activities: Efficiency Vermont undertook the following program quality assurance activities:

- Site inspections
- Customer telephone surveys.

Evaluation Results: As a result of the evaluation efforts, Efficiency Vermont:

- Increased its efforts to collect appropriate wattage data on engine block heaters
- Discontinued the prescriptive implementation of the engine block heater timers for agricultural equipment because evaluation results demonstrated significant variability in prescriptive savings
- Identified opportunities to deliver an improved program for commercial vehicle fleets.

5.5 2015-2017 RESOURCE ACQUISITION RESEARCH-AND-DEVELOPMENT RESEARCH PLAN

These activities will support research, pilot projects, and other efforts designed to meet high-level Efficiency Vermont goals to promote increased customer engagement, comprehensiveness, program innovation, and, ultimately, increased savings through behavior-based initiatives. These efforts will be guided by clearly defined research objectives and measurable outcomes, developed in collaboration with the Vermont Department of Public Service and other relevant stakeholders. The primary objective of these investigations is the determination of a program's ability to achieve verifiable savings, and whether those savings can be delivered cost-effectively.

Savings will not be claimed from the efforts directly funded through this budget. The expectation is that once all parties are in agreement that the approaches developed through these efforts result in robust, reliable, verifiable, and cost-effective savings, programs or activities will then be funded from Efficiency Vermont RA program funds.

The final year of the three-year research plan for these R&D activities is outlined in the sections below. Overall objectives for this effort include:

- Continuing and enhancing behavior initiatives begun in 2014 to result in stable, effectively delivered programs—with appropriate evaluation and research to support recognition of savings and subsequent transfer of activities to RA program funding
- Designing and piloting additional initiatives to:
    - Demonstrate the potential for specific engagement strategies and M&V approaches to achieve significant behavioral savings when taken to scale as full programs
    - Serve additional sectors beyond the proposed residential and large commercial and industrial pilot programs described here
- Learning more about how to achieve the greatest amount of aggregate savings and ratepayer value from behavioral programs, including savings from energy management and conservation and savings from increased customer participation in programs or the adoption of technology, including how to identify and apportion these savings.

2015–2017 Research Plan for RA R&D

The following table summarizes the initiatives and budgets for the 2017 research plan. This budget category includes labor costs and data infrastructure costs as well as other program delivery and administrative costs.

	2017
Residential Initiatives	
Home Energy Reports	$0
Behavioral Demand Response (Close Out)	$0
Commercial & Industrial Initiatives	
Continuous Energy Improvement	$490,322
New Research	
New Market Initiatives	$687,621
Data Analytics	$357,515
Other	$92,000
Total	**$1,627,458**

Details of the 2017 initiatives are provided below, with descriptions, proposed research questions,[8] and an outline of year three of the three-year plan given for each.

Home Energy Reports Pilot

Description: Launched in November 2014, the Home Energy Reports (HERs) pilot provided individualized, comparative electric usage information and energy-saving tips to residential customers through mailed and e-mailed reports. The pilot provided each participant with a private, secure web portal.

[8] Investigation of some research questions may be funded by the Vermont Department of Public Service's 2015–2017 EEU evaluation budget.

The R&D plan included support for this pilot for 2015 and 2016 only. A process-and-impact evaluation of 2015 efforts—conducted in 2016 by Cadmus, an independent third-party evaluator—showed that savings from HERs were viable and robust. In the fourth quarter of 2016, Efficiency Vermont engaged in an assessment of these results to determine whether HERs will be offered as an RA initiative.

Residential Behavioral Demand Response Pilot
A Behavioral Demand Response pilot was implemented in 2014. The decision was made early in 2015 not to pursue this initiative further.

Continuous Energy Improvement Pilot
Description: CEI is an approach designed to reduce energy intensity over time for large commercial and industrial customers. The target market for this initiative is made up of approximately 50 of the state's largest energy users. Designed appropriately, this type of program can benefit not only industrial customers but also large institutional and commercial customers. The approach is characterized by demonstrated customer commitment, assessment and planning, increased levels of real-time energy management, and systematic measurement. The initiative is facilitated by extensive customer engagement through Efficiency Vermont Account Management outreach. Efficiency Vermont provides participants with a set of group-focused trainings and peer interactions; individual, on-site trainings (Kaizen); support for assessment and development of energy and procurement plans; and software tools (Sensei) and metering equipment for real-time energy usage feedback and management.

In 2014, Efficiency Vermont launched the CEI pilot with eight industrial customers and one health-care facility (all under active Account Management). Activities with this group will continue in 2017 as Efficiency Vermont determines the feasibility of sustained savings and customer satisfaction. The pilot expanded in late 2015 to include a second CEI cohort of five commercial and industrial customers with a technology focus (ammonia refrigeration). This technology-specific focus differentiates the cohorts and will allow for specialization of technical assistance as well as enhanced cohort interactions. However, the overall program will remain focused on group trainings, peer interactions, individual guidance from Efficiency Vermont account managers, and energy management tools such as software and metering equipment. Efficiency Vermont will generate annual reports of savings and CEI activities for each participating customer.

Plans for 2017 are to continue working with both cohorts while adopting changes according to the recommendations of a 2016 independent third-party evaluation. Efficiency Vermont wil use protocols outlined in the *Superior Energy Performance: Measurement and Verification Protocol for Industry* (SEP) approach for monitoring, tracking, and reporting performance. During 2015–2017, work will include research and evaluation activities to confirm the validity of this approach—as used to calculate and verify savings acquired via energy management and conservation behaviors—and to confirm that savings are attributable to specific Efficiency Vermont and customer activities.

Research Objectives

- Test and establish an effective means for motivating industrial customers in Vermont to undertake energy management and conservation behaviors to reduce energy usage.
- Demonstrate an M&V approach to quantify savings from behavioral changes; quantify the relative magnitude of project-based savings and behavior-based energy savings from energy management and conservation.

- Provide opportunities for enhanced engagement with those customers who are looking to improve their energy management and for Efficiency Vermont staff to engage more fully with these customers.
- Test the ability for Efficiency Vermont's Account Management staff to cost-effectively affect customers' energy management strategies. This includes developing processes to assess and track costs related to the pilot.
- Increase the identification of additional capital projects from each customer through CEI on-site activities, workshops, and trainings; assess the incremental effect of this outreach on projects and other program participation (program lift).
- Determine the pilot's ability to enhance customer relationships by increasing the number of company contacts Efficiency Vermont works with in each customer facility.
- Inform the type and cost of system enhancements—such as improved data reporting or permanent submetering—required to undertake a successful CEI program with customers.
- Test the ability of Efficiency Vermont engineering staff to collect customer energy usage data, generate reliable baseline models, track deviation of actual usage from the model, and estimate savings.
- Develop a system to capture program-related costs, including customer as well as program costs.
- Gain experience applying analysis concepts outlined in the SEP M&V protocol.
- Increase per-customer value commensurate with the Energy Efficiency Charge investment made by this customer group.
- Establish effective metrics to deliver the CEI approach to non-industrial commercial customers, such as large institutions or commercial buildings; share these protocols with other program administrators across the country.
- Establish an effective approach to engaging commercial and industrial customers with commonalities, such as technology, market, or industry.

Plans for 2015-2017: The efforts for this pilot will be to refine this CEI approach with the prospect of capturing significant savings from behavior change as well as motivating increased efficiency project investment. Efforts targeting a third group of customers are planned, with recruitment starting in 2016 followed by service provision through 2017. Efforts in 2017 will keep cohorts one and two engaged while focusing more intensely on the third manufacturing cohort. To provide insights into satisfaction and savings persistence, an evaluation of year-two activities will take place, with the objective of implementing the CEI approach across a broader segment of the Vermont commercial and industrial market in future years as an RA program.

Research into Behavior Savings in New Markets

Description: The program design and M&V approaches discussed in the initiatives above reflect the best practices for behavior programs when either: 1) very large populations of fairly uniform customers can be identified, reached, tracked, and evaluated through randomized controlled trial (RCT) methods, or 2) single customers have available real-time data and substantial energy usage that, together, allow intensive customer interaction to be a cost-effective way to motivate and assess behavioral savings. It is not readily apparent that either of these approaches addresses the characteristics of some other important Vermont markets—for example, low-income customers, small and medium-sized businesses, or community-based outreach approaches. Because of the value of finding effective means of motivating such customer types to undertake comprehensive energy efficiency actions, Efficiency Vermont will explore strategies to effectively motivate and capture

behavioral savings. There are three steps necessary to be able to capture such savings: 1) identifying and engaging the customer; 2) providing appropriate interventions that lead customers to undertake changes in energy usage behaviors; and 3) being able to measure and track the information that allows verification of the resulting savings. Research will be undertaken to assess the potential for each of these steps, with results informing the design and implementation of pilot programs to test in the field.

Activities in 2015 and 2016 included research into non-traditional behavioral approaches and an internal call for ideas that generated 19 ideas for evaluation. The guidance provided for these ideas was based upon research into behavioral programs and key stakeholder interviews. The ideas generated were evaluated on these key objectives: potential for behavior change; measurability; and emergence into new or underserved markets. Five ideas were moved forward for further review. From this, three ideas were selected for continued research and product development.

The resulting current product list for concept development and further research/review is proposed to meet these research objectives:

- Deliver valuable research results that demonstrate the potential for specific engagement strategies and M&V approaches to achieve significant behavioral savings when taken to scale as full programs.
- Serve additional sectors beyond the proposed residential and large commercial and industrial pilot programs described above.
- Identify different engagement strategies and their impact on customer response, conversion, and savings.

Efficiency Vermont began implementation of the following initiatives in 2016, with plans to evaluate them in 2017.

- CEI Lite—The key research question framed by this idea is whether lower-cost approaches for engagement and measurement can satisfactorily deliver credible and cost-effective savings from accounts too small to be served with the more proven, but costly, strategic energy management services that CEI efforts offer to the state's largest customers. This idea will look at:
    - Tools and techniques for fostering effective engagement at scale, including benchmarking, segmentation, and targeted messaging tools
    - Simplified and sustainable behavioral M&V (regression modeling or an optimized version using methods identified through research for tracking QPIs and program participation)
    - Use of feedback devices such as metering or software
    - Gatherings of similar organizations for Kaizen-like events.
- Digital Engagement—The key research question framed by this idea is whether significant improvements in savings yield could be achieved with more effective digital engagement channels and tools. There are compelling findings from other jurisdictions indicating that significantly improved rates of digital participation and of energy savings are possible. To the extent that this can be demonstrated, the results could hold the potential to lower the costs and overcome the limitations of conventional behavioral programs that depend almost exclusively upon mailed Home Energy Reports. This project will explore these options, leverage existing investments in AMI-linked capabilities and the data warehouse, and bring focused research attention to the potential power of online portals for behavioral savings, program uplift, and other non-energy benefits.

- Realizing Behavior Changes in Multifamily Buildings—The key research question framed by this idea is whether behavioral savings strategies can provide a new tool to serve this challenging and underserved market. Better understanding of this market's behavioral savings potential will be achieved through well-designed tests of engagement strategies that have shown promising results in other parts of the country. This project will serve a new sector, be informed by the latest findings nationally, and be tailored to the specifics of a customer group in Vermont that faces significant barriers to savings realization through conventional programs.

Research Objectives

- Inventory and evaluate the potential of data analysis to drive behavioral actions; in particular, assess whether data are sufficient to identify and target these market segments. Obtain additional data if needed and available.
- Inventory behavioral approaches to these markets undertaken by other program administrators.
- Assess products on the market or research in support of methods designed to engage these particular market segments effectively.
- Inventory and evaluate data analysis potential for driving behavioral actions.
- Develop requirements for new or modified M&V approaches that could be applied to categories of customers or program delivery schemes other than those currently widely used.
- Design pilot studies to test approaches, with implementation targeted for 2016 and 2017.

Plans for 2015–2017: In 2016, ideas generated and researched in 2015 were further developed to identify potential new initiatives to meet these objectives. In 2017, funds will be used to implement these developed pilots and to continue research and investigation to test customer identification, customer engagement, and M&V methodologies in new and adjacent markets. CEI Lite will engage 5,000 small and medium-sized businesses, providing three levels of interaction and measuring savings at each level. The digital engagement initiative will test the messaging to engage residential and commercial customers and work to identify the savings impact for those who become digitally engaged. The multifamily initiative will continue work with the five housing organization partners and explore ways to expand to include all multifamily housing organizations.

Data Analytics

Description: The growing amount of available customer data, such as AMI interval data, provides an opportunity to educate and engage customers more fully with respect to their energy usage, and to develop and implement cost-effective approaches for broader consumer-side energy efficiency services to customers. In addition, Efficiency Vermont's new integrated data storage and analytics platform incorporates a broader set of customer data (beyond usage alone) that will allow insights into customer characteristics not previously available. The plan for the R&D period is to develop and implement streamlined processes to deliver recommendations and savings estimates, and to verify results to customers more effectively. In addition, this robust storage of statewide usage and other data with analytical capabilities allows deeper market analysis for planning and verification purposes. Over the R&D period, Efficiency Vermont will be investigating the power of this information, and tools developed to understand it, for enhancing customer engagement, motivating customer action, and capturing energy savings. Research projects may also be developed to test methods to best realize the value of the state's smart grid investments and higher-resolution meter data.

The scope of the Data Analytics project will include:

- Operations and Maintenance—There is significant effort required in ensuring that the data warehouse is available and all data elements are up to date. An essential component of this has resulted in the unique relationship among the EEU, the distribution utility, and the vendor hosting the data warehouse. Efficiency Vermont serves as the conduit between the distribution utility and vendor while coordinating in a project management role.
- Reporting and use of the data—While data analytics and the application of the data are managed in the Emerging Data Services program, the Data Analytics component is used to serve up the data in formats providing opportunity for fulfillment of the Emerging Data Services objectives. Refining the elements of the warehouse and pulling data upon request is within the scope of the Reporting and Analytics team in the Data Analytics project.
- Leveraging KITT data—Essentials will include answering research questions with regard to program participation and uplift, as well as attribution, and a focus on a data source that combines usage data via smart meter reads and Efficiency Vermont program data. The Efficiency Vermont programming data, maintained in the KITT database, combined with AMI data from the warehouse will provide additional consumer and market insights.
    - Targeted Marketing Initiatives—Using analysis provided by the Emerging Data Services project, in the Data Analytics project, Efficiency Vermont will run pilots to evaluate segmentation and marketing using data-driven techniques and messaging.
- Integration of data statewide—Efficiency Vermont will: 1) work with distribution utilities not currently providing AMI data (Stowe Electric Department, Washington Electric Cooperative, Vermont Electric Cooperative) regarding initiating such transfers and 2) update data transfer methods to integrate data from the distribution utilities that do not have smart meter data feeds, which will allow for a more comprehensive approach for delivery of Efficiency Vermont's programs and services.
- Integration of parcel data—In 2016 Efficiency Vermont began to acquire statewide parcel data. This procurement is under way and will require the Data Analytics team to modify existing routines to incorporate the new data set into existing data reporting. The acquisition of data will also provide new opportunities for higher-level analytics across Efficiency Vermont's programming, benefiting both residential and commercial programs.
- Integration of data analytics tools—In 2016, Efficiency Vermont added tools to the warehouse, including: 1) a residential Business Intelligence tool, which has an easy-to-use interface for "non-technical" staff, and 2) a package allowing for the identification of data archetypes to further enhance targeting capabilities and provide information from the data in the AMI warehouse.

Research Objectives

The overarching objective is to provide the platform and tools to allow for emerging data services. Examples of possible inquiry and tool development include:

- Develop tools that engineering staff can use to uncover savings that would not be visible during a traditional site survey, demonstrating to customers that the value proposition—above and beyond incentives—is technical assistance to support them in the energy decision-making process.
- Develop methods and tools for targeted marketing and to identify customers who may require assistance before they initiate contact with Efficiency Vermont.
- Determine the potential for custom data-driven interfaces to account holders through planned web interfaces.

- Determine the data and analysis needed for customer segmentation and reporting for small and medium-sized businesses to begin addressing the requirements for delivering scalable, differentiated services to this market.
- Determine the data and analysis needed for better identification of low-income customers to begin addressing the requirements for delivering better scalable, cost-effective services to this market.

Plans for 2015–2017: The tools developed and the insights obtained through this work will be used to inform Efficiency Vermont programs and processes going forward. Efficiency Vermont expects that, over time, much of what is learned from this work will become integrated into ongoing program and customer support processes within traditional programs and initiatives. The level of R&D support needed for this initiative will fall over the three-year period as specific programs and initiatives revise their customer engagement and program planning, delivery processes, and budgets to include this information and analysis. Levels of spending for this work will not be likely to decrease in 2017 from 2016 levels. The budgets for this initiative for 2017 reflect the portion of that spending expected to still be classified as R&D. It is expected that funding will be required from outside the RA R&D budget for the purpose of continuing to license the data warehouse and data analytics tools necessary for continued program delivery.

Other Behavior Research

Description: As part of the three-year research plan for this initiative, additional fundamental or cross-cutting questions will arise that do not directly lead to program implementation. Rather, they will investigate fundamentals of behaviorally related savings calculations, address barriers that exist because of lack of information, better identify savings beyond those acquired through program participation and equipment measures, better understand energy demand, and lead to creative ways to engage customers. These additional research questions will be identified as the work progresses toward the initiatives outlined above, and through the coordination and discussion with the Vermont Department of Public Service. Efficiency Vermont has also provided some funding for participation in conferences and other forums related to innovation and best practices in behavioral efficiency.

Research Objectives

Original, and retained, areas of possible inquiry include:

- Developing M&V approaches that the ISO-NE will accept for claiming behavioral peak savings for the FCM.
- Assessing challenges with traditional behavioral savings M&V and proposing and testing alternatives (such as attribution of product baseline savings within behavior savings calculations).
- Outlining the opportunities and challenges of tracking energy efficiency performance through assessments of impact on total usage.

These additional areas of inquiry (identified through the call-for-ideas process described above) relate to the general question of how to evaluate engagement. This question explores whether the savings from initiatives—that neither pay an incentive nor rely upon a large-scale randomized controlled trial—could be determined through an emerging methodology that has demonstrated effectiveness in academic and international findings. Though not suitable for all engagement activities, demonstrating and extending this approach to measurement has the potential to improve the quality and value of initiatives that serve:

- Larger, opt-in populations such as communities
- Smaller populations such as employees or housing complex residents.

Plans for 2015–2017: The behavioral energy field is growing. To maintain awareness of best thinking and best practices among peers, Efficiency Vermont has found great value in participating in industry conferences while maintaining relationships with key organizations, such as ACEEE and CEE. In 2017, Efficiency Vermont plans to increase such in-person interactions, which have proven to save time and money by increasing the speed at which knowledge and capabilities are gained. The information obtained will be used to inform programs and processes going forward. Additional questions—not directly related to individual programs or initiatives—are expected to arise as part of the development of other work within this plan. Therefore, Efficiency Vermont has allowed for ongoing opportunities for basic research and analysis.

5.6 COMMUNITY FORUMS AND STAKEHOLDER ENGAGEMENT

As Efficiency Vermont's operations and scope have grown in recent years, public interest in its work has also increased. In the autumn of 2014, as part of its planning for the 2015–2017 performance period, Efficiency Vermont held a series of community forums and other approaches to increase public awareness of its work, and to gather public input regarding priorities going forward.

The opportunities for public engagement included both in-person and online approaches. For in-person events, Efficiency Vermont scheduled a series of community forums throughout the state, taking particular care to select locations that were accessible to every region of the state. Forums were conducted in St. Albans, Barre, Lyndonville, Bennington, Brattleboro, Brandon, Richmond, and Fairlee.

For Vermonters not able to take part in an in-person 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 significant outreach to ensure that the public was aware of these feedback opportunities. This outreach included an appearance by the Efficiency Vermont director on Vermont Public Radio's "Vermont Edition" statewide public affairs program; an opinion column that ran in 12 newspapers around the state, and extensive direct outreach from Efficiency Vermont staff members to their customers and via community groups and organizations to their respective memberships.

The level of public interest was notable. A total of 142 members of the public attended one of eight community forums and 185 individuals completed online surveys. Here are a few key themes that emerged consistently:

- Vermonters are interested in "total energy" approaches. In particular, there is a strong interest in Efficiency Vermont taking a larger role in thermal efficiency.
- The contractors and partners who Efficiency Vermont works with are independent, but they are also a reflection on Efficiency Vermont itself. Several commenters at multiple meetings discussed the need for Efficiency Vermont to more closely monitor issues such as contractor quality and training to ensure that services are being effectively delivered.

- There was a widespread view that the value of Efficiency Vermont is more than just the sum of the specific programs it operates. A sentiment expressed at many meetings was support for Efficiency Vermont being a partner in helping Vermonters make good energy choices and aligning with broad state energy policy goals.
- Efficient heating technologies, such as heat pumps and biomass, were of significant interest. There was a recurring interest in Efficiency Vermont playing a larger role in explaining, promoting, and incentivizing the use of heating systems that were low-cost and low-carbon.

5.7 2017 ADDENDUM

This Plan, as a 2017 update to the Efficiency Vermont Triennial Plan 2015–2017, includes numerous changes to the 2016 version of the document. This addendum shows those changes, with information provided under section headings where changes occur.

3.1.1 Vermont's Largest Energy Users

Peak electricity use management

In the first sentence, the words "identify and mitigate" were inserted in place of "anticipate and prevent" regarding energy use that results in peak demand charges. This change was made to more accurately describe the nature of energy-use control that Efficiency Vermont will continue to help businesses gain.

Custom system optimization

This subsection, now deleted, was included in the 2016 update to the Triennial Plan to alert readers to the use of TEPF funds for custom HVAC controls and system optimization incentives. Beginning in late 2016, custom system optimization services expanded to include both TEPF and electric measures and budgets. As a result, a separate description for custom system optimization became redundant with the "system optimization" subsection.

3.1.2 Small and Medium-Sized Businesses

Medium-sized business Account Management

A correction was made to the annual energy use figure that defines medium-sized businesses served through this approach.

3.2.1 Existing Market-Rate Homes

Single-Family Homes

The first bulleted item has been updated.

Original wording: "Efficiency Vermont will provide support for contractor training through Efficiency Vermont's affiliation with BPI"

New wording: "Efficiency Vermont will provide skill-building training for the staff of BPI-certified contractors"

Explanation for this change: Through its support for BPI certification training, Efficiency Vermont created a network of BPI-certified contractors throughout Vermont. In 2016, network contractors expressed an interest in deepening their non-certified employees' skills in such areas as air sealing and insulation. In 2017, Efficiency Vermont will support this skill-building training. While BPI certification training will not be supported by Efficiency Vermont, it will continue to be available to Vermont contractors and will be provided directly by BPI.

3.3.1 New Construction Services

Residential New Construction

The description of "Efficiency Vermont Certified" was updated to reflect the fact that as of 2017, a home energy rating will be provided for interested customers only rather than being a part of every

project in this tier. This change was made to optimize resource use in projects for customers who are uninterested in a home energy rating.

3.3.2 Retail Efficient Product Services

Reference to the targeted provision of "efficiency kits," introducing customers to specific efficient products, was removed from the first paragraph. As of 2016, these kits were no longer made available. The budget was reallocated to more cost-effective technology with greater long-term impact on the market.

3.3.3 Services to Building Improvement Contractors

In the third paragraph, the description of the Efficiency Excellence Network (EEN) was updated to reflect two changes:

1. The EEN expanded in 2016 to support a larger range of contractor types, beyond HVAC.
2. In 2017, the EEN will expand to include biomass and residential new construction contractors.

3.3.7 Financial Services

Financing for Energy Efficiency Projects

Reference to the Green Mountain Power EverGreen Fund was removed. This program was retired in 2016 owing to the fact that other financing products, including tax-exempt lease purchasing, better met customer needs.

In the discussion of Property Assessed Clean Energy (PACE), reference to "a low-income interest rate buy-down funded through the Vermont Department of Public Service" was removed because this buy-down was halted upon 2016 expiration of a grant, through the Vermont Department of Public Service, that provided funds for the offering.

The following sentence was removed from the Rural Utility Service Loan discussion because final confirmation and approval took place: "Subject to final confirmation by the U.S. Department of Agriculture's Rural Utility Service and approval by the Vermont Public Service Board."

3.3.8 Coordination with Distribution Utilities

The final sentence of this section is new, discussing Efficiency Vermont's coordination with electric distribution utilities (DUs) to ensure alignment of new DU-specific efficiency services with Efficiency Vermont's statewide offerings.

3.3.10 Resource Acquisition Research and Development

A bulleted item was removed from the second paragraph. The deleted language described a 2015 pilot through which Efficiency Vermont alerted households to impending summer peak energy usage days. This pilot was not reinstated in 2016, as stated in an associated footnote that was also removed, and will not be conducted in 2017.

3.4 Development and Support Services

The title of this section was changed from "Market Advancement Activities."

3.4.3 Planning and Reporting

Annual Plans and External Reporting
In the first bulleted item, a reference was added to the planned 2017 development of the 2018–2020 triennial plan.

3.4.5 Policy and Public Affairs

Financial and Leveraged Product Development
The below paragraph was moved from the end of this section to Section 5.1 Efficiency Vermont Budgets to be included in a discussion of collaboration with DUs. The paragraph was updated to reflect the fact that the primary 2017 focus of Efficiency Vermont's Act 56–related engagement with DUs will be coordination to ensure alignment of new DU-specific efficiency services with Efficiency Vermont's statewide offerings, in order to maximize the value delivered to ratepayers.

The original paragraph:
"In 2016–2017, for example, Efficiency Vermont aims to engage and partner with electric distribution utilities (DUs) in support of their efforts to meet specifications of Act 56. This act, created by the Vermont Legislature in 2015, authorizes distribution utilities to implement programs to achieve fossil fuel reduction targets. Efficiency Vermont will endeavor to work with DUs to determine if funding created through Act 56 activities will expand existing thermal efficiency programs, administered through Efficiency Vermont, in support of targets set forth in Vermont's *Comprehensive Energy Plan*."

3.4.6 Information Technology

Reporting and Analytics
This subsection was updated to better describe the work specific to this group. The nature and scope of the information technology work delivered by Efficiency Vermont is unchanged.

5.1 Efficiency Vermont Budgets

This section has been fully updated to reflect the status of budgets for 2017.

5.2.1 2015–2017 Electric Efficiency Performance Goals and Minimum Performance Requirements

For MPR #15 and #16, the definitions and target amounts were changed per a June 17, 2016, VEIC filing approved by the Vermont Public Service Board. The title of MPR #16 was updated from "Non-Resource Acquisition Performance Period Spending" to "Development and Support Services Performance Period Spending" to reflect the updated title of that category.

5.2.2 2015–2017 Electric Minimum TRB per Geographic Area (QPI #12)

Dollar figures that had been rounded in the 2016 version of this Plan are provided as exact figures in this document. The actual required TRB per geographic area is unchanged.

5.2.3 2015–2017 Thermal Energy and Process Fuels Performance Goals and Minimum Performance Requirements

The target for QPI #1 and the definition for MPRs #3, #4, and #5 were changed per a June 17, 2016, VEIC filing, approved by the Vermont Public Service Board.

5.3.2 2015–2017 Technology Demonstrations

The "2017 Activities" section is new.

5.3.3 Recent Applied Research and Development Projects Impacting 2015–2017 Plans

Two additions were made to this section:

1. Deep Commercial and Industrial Energy Retrofits
2. Dairy Farm Refrigeration System Assessment

5.4.2 2015–2017 Initiative-Specific Evaluation Activities

2016 In-Store Intercept Study for Efficient Lighting

The words "big box" were removed, owing to the inclusion of three smaller hardware stores in the discussed survey.

5.4.3 Recent Evaluation Results Impacting 2015-2017 Plans

Home Performance with ENERGY STAR

Evaluation Results

In the fourth bulleted item, a description of new software was deleted because the decision was made, in 2016, to instead use the existing HERO audit tool.

Energy Savings Kit

Language was updated to note that this offering ended in 2016.

5.5 2015–2017 Resource Acquisition Research-and-Development Research Plan

Three elements that appeared in this section of the 2016 update to this Plan are not included in this document. They are:

- A table-based view of RA R&D budgets, omitted to eliminate redundancy, owing to the fact that RA R&D budget figures appear in the table in Section 5.1.2, 2015–2017 Budget by Market and Initiative
- A budget discussion, omitted to restrict detailed discussion of budget figures to Section 5.1, Efficiency Vermont Budgets
- A budget variance discussion, omitted because there were no significant budget variance items for 2016 within RA R&D.

Full or substantial updates were made to the following elements of this section:

- Home Energy Reports Pilot; updated to discuss pilot outcomes.

- The Plans for 2015–2017 paragraph of Continuous Energy Improvement Pilot; explaining that the pilot will include two cohorts and a 2016 evaluation will influence 2017 changes.
- The below areas of Research into Behavior Savings in New Markets:
    - A new research objective: "Identify different engagement strategies and their impact on customer response, conversion, and savings."
    - The ensuing sentence; updated with mention of a planned 2017 evaluation.
    - The two ensuing initiative titles:
        - "CEI Lite" corrects "CEI Light."
        - "Digital Engagement" updates "On Line Portal Bake Off."
    - Under Realizing Behavior Changes in Multifamily Buildings:
        - A new final sentence of the initiative description; mention of five new partners to add energy efficiency services to their offerings.
        - The deletion of this paragraph: "In addition to the three ideas described above are two ideas described in the 'Other Behavior Research' section below. These are focused on understanding a novel way to measure the effectiveness and impact of customer engagement activities that existing M&V tools are ill-equipped to address." The reason for this deletion was that the application of the described research will no longer be limited to "Other Behavior Research" efforts; it will also be a focus of the three initiatives in the Research into Behavior Savings in New Markets section: CEI Lite, Digital Engagement, and Realizing Behavior Changes in Multifamily Buildings.
        - The Plans for 2015–2017 paragraph; updated substantially to discuss 2017 plans.
- The below areas of Data Analytics:
    - A new bulleted item, in the discussion of project scope, regarding the integration of data analytics tools.
    - The final sentences of the Plans for 2015–2017 paragraph, discussing expected 2017 spending levels.
- The Plans for 2015–2017 paragraph of Other Behavior Research; updated to include discussion of plans to increase in-person industry interactions.

5.8 DSS FUNDS TRANSFER REQUEST

VEIC submits a request to transfer funds across eligible Development and Support Services (DSS) categories in the 2015-2017 period. In accordance with proceeding EEU-2015-01, the Public Service Board (Board) ordered on December 17, 2015:

> 3. The EEUs shall provide notice to the Board and the Vermont Department of Public Service (Department") of any intra-NRA[9] transfers up to 10% of each NRA category cumulatively within a three-year performance period. Such budget transfers may occur at any time and shall be documented in EEU annual plans submitted for years two and three of an EEU performance period. Such notice to the Board and the Department must be made in writing in advance of the transfer, and shall include an explanation of why the proposed transfer is required.
>
> 4. The EEUs shall request Board approval of all intra-NRA transfers that, individually or cumulatively, exceed 10% of an individual NRA budget category. Such requests for approval must be made in writing to the Board no less than 60 days in advance of a proposed transfer, and shall include an explanation of why the proposed transfer is required.

VEIC is submitting a request to transfer funds across DSS categories as illustrated below. A more detailed analysis by initiative follows the narrative.

Category	Original 2015-2017 Budget	Proposed 2015-2017 Budget	Change
Education and Training	**$2,564,000**	**$1,997,000**	**($567,000)**
Applied R & D	**$1,236,000**	**$1,217,000**	**($18,000)**
Planning & Reporting	**$1,656,000**	**$1,536,000**	**($120,000)**
Evaluation	**$2,693,000**	**$2,492,000**	**($200,000)**
Policy & Public Affairs	**$1,509,000**	**$1,998,000**	**$490,000**
Information Technology	**$3,922,000**	**$4,368,000**	**$445,000**
Administration	**$800,000**	**$772,800**	**($30,000)**
Total	**$14,380,400**	**$14,380,400**	**$0**

Explanations for the fund transfers, by category, are described in detail as:

VEIC is proposing moving $567,000 out of the **Education and Training DSS category.** The reasons for underspending in this category are:

Initiatives:

> In **Codes and Standards**, VEIC received two $20,000 grants from the Department in 2015 and 2016 to conduct energy code outreach and deliver energy code and blower door trainings. These grants offset a portion of costs originally allocated to DSS for code-related work.

[9] DSS was formerly named “Non-Resource Acquisition” (NRA) activities.

In **General Public Education**, as a result of repurposing materials across platforms such as blogs, newsletters, and marketing contents, costs were lower than expected.

In **Better Buildings by Design**, beginning in 2015, Efficiency Vermont tightened the complimentary registration process by more accurately capturing registration fees for complimentary registrants. Also, a reduction in Efficiency Vermont labor costs, particularly in program and marketing related activities (billed as RA activities) and a reduction in subcontractor expenses related to marketing activities led to cost savings. At the same time, annual conference revenues increased in 2015 due to an increase in the total number of exhibitors and sponsors attending the conference, an increase in exhibitor fees to better match demand with supply and, the aforementioned increase in registration fees through accurately accounting for complimentary registrants.

In **Customer Support**, staff time at events has been more frequently billed to appropriate Resource Acquisition (RA) codes as these activities have been increasingly RA-related due to a new event strategy plan. Community group presentations involving Customer Support staff are less frequent than previously expected due to different strategies for fostering community engagement. Meter loan activity has decreased as a result of improved use of AMI data to educate customers on electrical usage. New offers and services continue to drive RA-related inquiries through the end of 2017, shifting billed labor costs out of this initiative.

_____

VEIC is proposing moving $18,000 out of the **Applied Research and Development DSS category.** The reasons for underspending are:

Initiatives:

In **Technology Demonstrations**, underspending occurred primarily in 2015 when three of nine projects did not materialize due to extenuating circumstances such as a project partner going out of business and a project being deferred into 2016 because of capacity constraints on the Efficiency Vermont project team.

_____

VEIC is proposing moving $120,000 out of the **Planning and Reporting DSS category.** The reasons for underspending are:

Initiatives:

In **Annual Plan**, spending is forecasted to be lower than budget due to efficiencies gained from Efficiency Vermont Triennial Plan development work utilized for the Annual Plan process.

In **Demand Resources Plan**, VEIC completed the known scope of work to date at a savings relative to estimated cost, and there were no new work scopes of significance.

In the **Vermont System Planning Committee,** underspending was due to fewer than expected regularly scheduled subcommittee meetings in 2015 and 2016.

In **External Reporting,** internal process efficiencies have reduced staff time for reporting quarterly and annual report highlights. In addition, efficiencies were gained from consolidation of the narrative for the Savings Claim Summary and the Annual Report which had previously been two separate documents.

_____

VEIC is proposing moving $200,000 out of the **Evaluation DSS category.** The reasons for underspending are:

Initiatives:

In **Technical Advisory Group (TAG),** there were fewer issues to address in the TAG forum.

In **Technical Reference Manual (TRM),** the launch and use of the new TRM Application has resulted in significant operational efficiency improvements related to measure characterizations and management. VEIC has begun to demonstrate the value of leveraging across other VEIC EEU contracts to minimize costs associated with TRM management, development and maintenance.

In **Quality Management (QM),** unforeseen increased needs of QM staff from other Efficiency Vermont divisions resulting in staff being unavailable for Program Implementation Efficiency component of the QM budget and lower costs.

_____

VEIC is proposing adding $490,000 to the **Policy and Public Affairs DSS category**. The reasons for requesting additional funds are:

Initiatives:

In **Public Affairs,** additional funds were needed to address an increased focus on community engagement by Efficiency Vermont leadership, such as the targeted downtown pilot and "community visits" to help connect Efficiency Vermont's new Director with key stakeholders throughout the state in 2015. The unpredictable nature of policy work related to engaging in policy and regulatory discussions resulting from finalized energy legislation (Act 56, Act 199, Act 174, etc.) and an uptick in media, government and stakeholder requests also resulted in higher costs in this initiative.

In **Regulatory Affairs,** the majority of additional spending is attributed to incremental expenses that have arisen from events beyond VEIC's control, resulting from new laws developed by the Legislature, and activities at the Public Service Board. These events

necessitated VEIC's participation in major regulatory proceedings that were unforeseeable when setting the original budget in 2014. Examples of these events are:

1) Docket 8550, which opened as a result of Act 56 of 2015 being passed. Act 56 and D. 8550 establishes the initial rules of the Renewable Energy Standard. VEIC's participation in the portion of the proceeding addressing the Tier III Energy Transformation rules was critical to ensure the coordination and partnership of EEUs with the Distribution Utilities, who are responsible for meeting Tier III requirements. This proceeding was not anticipated, and could not have been predicted when the Regulatory DSS budget was approved in 2014.

2) Increased legal assistance and representation required for several major cases than had been anticipated:
   - D.8550, Renewable Energy Standard,
   - D. 7676 Investigation into the Appointment of an entity to provide natural-gas efficiency services,
   - D. 8311 Investigation into the use of electric energy efficiency charge funds to reduce the use of fossil fuels for space heating, and
   - D. 8486 Petition of VEIC for approval of collateral and security arrangement to be implemented in connection with Efficiency Vermont's participation in energy efficiency and conservation loans.

_____

VEIC is proposing adding $445,000 to the **Information Technology DSS category**. The reasons for requesting additional funds are:

Initiatives:

In **Strategic Technology Services (STS),** spending drivers for 2015 and 2016 beyond the original plan were the development work to support improvements (better data quality, more efficient data import, more efficient matching to sites) to upstream programs and additional development needs to support portfolio screening application. From November 2016 through December 2017, expected drivers of increased spending are the support of the Efficiency Vermont loan program, support for Tier III activity, development and integration of KITT Customer Relationship Management (CRM) functions, increased support for analytics applications and infrastructure, support for portfolio level analysis and increased development support as trends toward data automation and integration continue in all facets of Efficiency Vermont operations.

In **Reporting and Analytics Services (R&A),** spending drivers include increased development of new ISO Forward Capacity Market reporting and transfer requirements, a focus on new development and on-going maintenance of quarterly reporting for the Georgetown University Energy Prize enrolled communities and increased support for targeted community and town level reporting and data analysis. A number of R&A projects were planned where the amount of work was underestimated or the initial "scope of the work" was expanded. Examples are: managing and processing of utility data from VT electric utility

providers; managing the process of AMI data acquisition, secure data transfer and data import with vendor and Green Mountain Power; technical support associated with AMI Data Warehouse; project management and database support for sub-metering analytics tool and platform support.

In 2017, additional R&A projects beyond the original scope of work will support the EVT Loan Program, additional Act 174 regional and municipal energy planning needs, Tier 3 Energy Transformation, further improvements to existing management and processing of Vermont electric utility data, continued AMI Data Warehouse support and AMI data acquisition for remaining Vermont AMI utilities.

_____

VEIC is proposing moving $30,000 out of the **General Administration DSS category.** The reasons for underspending are:

Initiative:

General Administration costs are expected to remain flat during 2015-2017 as senior management has focused more on RA activities to benefit customers and has been working on other DSS activities.

As a courtesy, VEIC has shared a draft of the proposal with the Department.

DSS 2015-2017 BUDGETS BY CATEGORY

	Original 2015-2017 Budget	Proposed 2015-2017 Budget	Variance	Transfer Amount	% of Category Budget
Education & Training					
Codes & Stds - Res	$149,960	$118,532	($31,428)		
Codes & Stds - CI	$59,984	$53,591	($6,393)		
Energy Literacy Project	$658,751	$686,120	$27,369		
General Public Education	$412,083	$291,253	($120,830)		
BBD Conference	$518,585	$241,728	($276,856)		
Customer Support	$765,100	$605,655	($159,445)		
Sub-Total	**$2,564,462**	**$1,996,880**	**($567,582)**	**($567,000)**	**-22%**
Applied Research & Development					
Emerging Data Services	$699,990	$699,570	($420)		
Technology Demonstrations	$535,570	$517,430	($18,140)		
Sub-Total	**$1,235,560**	**$1,217,000**	**($18,560)**	**($18,000)**	**-1%**
Planning and Reporting					
Annual Plan	$153,020	$144,905	($8,115)		
Demand Resources Plan	$600,000	$577,216	($22,784)		
VSPC Participation	$137,718	$69,642	($68,076)		
ISO NE FCM Administration	$397,852	$406,607	$8,755		
External Reporting	$367,248	$337,321	($29,927)		
Sub-Total	**$1,655,838**	**$1,535,690**	**($120,147)**	**($120,000)**	**-7%**
Evaluation					
Annual Savings Verification	$153,020	$175,536	$22,516		
Technical Advisory Group	$419,275	$267,251	($152,024)		
Technical Resource Manual	$1,009,932	$949,575	($60,357)		
ISO-NE FCM Metering & M&E	$811,006	$822,699	$11,693		
Quality Mgmt Program	$299,919	$276,940	($22,979)		
Sub-Total	**$2,693,152**	**$2,492,000**	**($201,152)**	**($200,000)**	**-7%**
Policy and Public Affairs					
Public Affairs	$612,080	$811,484	$199,404		
Regulatory Affairs (non-DRPP)	$596,778	$886,743	$289,965		
Fin & Leveraged Prod Dev	$299,996	$299,773	($222)		
Sub-Total	**$1,508,854**	**$1,998,000**	**$489,146**	**$490,000**	**32%**
Information Technology					
STS	$2,606,665	$2,935,126	$328,461		
Analytics & Reporting	$915,855	$1,037,444	$121,589		
Portfolio Screening Tool	$400,000	$395,431	($4,569)		
Sub-Total	**$3,922,520**	**$4,368,000**	**$445,480**	**$445,000**	**11%**
Administration					
General Administration	$800,015	$772,830	($27,185)		
Sub-Total	**$800,015**	**$772,830**	**($27,185)**	**($30,000)**	**-4%**
TOTAL DSS BUDGET	**$14,380,400**	**$14,380,400**	**($1)**	**$0**	

128 Lakeside Avenue, Suite 401
Burlington, Vermont 05401
(888) 921-5990

www.efficiencyvermont.com