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TRIENNIAL PLAN
FOR FISCAL YEARS 2017–2019

BY THE
EFFICIENCY MAINE TRUST

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1. The Efficiency Maine Trust

1.1 Maine's Independent Administrator for Energy Efficiency and Alternative Energy Resources

The Efficiency Maine Trust (the Trust) is the independent administrator for energy efficiency and alternative energy resources programs in Maine.

The purpose of the Trust is to help Maine's consumers meet their energy needs at the lowest cost by actively promoting investment in cost-effective energy and energy efficiency measures and systems that reduce overall energy costs for consumers in the State. As directed by Maine statute, the Trust also seeks to secure additional benefits from the procurement of these cost-effective resources, including:

- Reducing economic insecurity from overdependence on price-volatile fossil fuels;
- Increasing new jobs and business development to deliver affordable energy and energy efficiency products and services;
- Enhancing heating improvements for households that will increase comfort, improve indoor air quality, and reduce energy costs and the need for future fuel assistance; and
- Reducing greenhouse gas (GHG) emissions.

Since it assumed responsibility for administering programs on July 1, 2010, the Trust has achieved these benefits principally by providing financial incentives for the purchase of high-efficiency lights and equipment to help Maine customers save electricity, natural gas, and heating fuels. In addition to providing financial support, the Trust delivers information, technical assistance, and quality assurance related to energy costs, efficient or alternative energy equipment, and installation.

Electric utilities and natural gas utilities are the primary source of Efficiency Maine's funding. Maine law requires that those utilities procure as much energy efficiency as possible so long as the project meets the standard of being "cost-effective." The utilities fund the Trust to develop and deliver that resource. Additional funding comes from the sale of Maine's carbon allowances under the Regional Greenhouse Gas Initiative (RGGI), from ISO-New England, and from the occasional receipt of grants and voluntary payments.

1.2 Stakeholder Board of Trustees

The Trust is governed by a nine-member Board of Trustees, comprising:

1. The director of the Governor's Energy Office (ex officio);
2. The director of the Maine State Housing Authority (ex officio); and
3. Seven other members appointed by the Governor, who "adequately represent the interests of commercial energy consumers, industrial energy consumers, small business energy consumers, residential energy consumers and low-income energy consumers" and among whom there is knowledge of and experience in financial matters, consumer advocacy, management, conservation fund programs, carbon reduction programs, or relevant policy.

Appointment nominees to the Board are reviewed by the joint standing committee of the Legislature having jurisdiction over energy matters and confirmed by the Senate.

Appointed Trustees serve three-year terms. The terms are staggered so that approximately one-third of the appointed positions are appointed annually

The Board generally meets monthly in Augusta in meetings that are open to the public.

1.3 Staff

Day-to-day operations of the Trust are managed by a staff of approximately 15 full-time employees. Staff handles program design and program management, financial accounting and reporting, competitive solicitations and procurement, grant compliance, and various marketing and information sharing tasks. Staff also manages teams of contractors who may assist the Trust in implementing (or "delivering") elements of programs. Elements of the Trust's work that may be subcontracted out include market research, marketing, providing technical training to other contractors and suppliers, providing technical support and engineering analysis on specific energy projects, handling in-bound calls, processing applications, calculating and paying financial incentives, underwriting and servicing loans, checking program compliance, and evaluating energy savings.

2. The Triennial Plan

2.1 Purposes and Requirements

The main purposes of having a strategic plan for the Trust's programs are to:

- Serve as a guide for Staff working to implement the programs;
- Help Trustees in tracking the progress of Staff's program implementation;
- Indicate the direction the Trust's programs are taking to customers, vendors, and contractors in the marketplace, and also to advocates and policymakers; and
- Satisfy the statutory requirement to present a document containing targets, objectives, performance metrics, strategies, and budget allocations for the Board and the Public Utilities Commission (Commission or PUC) to review.

The Efficiency Maine Trust Act specifies that, every three years, the Trust should prepare a strategic plan and that the Trust's programs should be administered by the Trust consistent with that plan. Pursuant to the statute, this plan, referred to as the "Triennial Plan," must:

- Be a detailed, triennial, energy efficiency, alternative energy resources and conservation plan;
- Identify all achievable cost-effective energy efficiency savings and related programs that could be implemented, the costs and benefits of such programs, and the basis and support for such identified costs and benefits;
- Include efficiency and conservation program budget allocations, objectives, targets, measures of performance, program designs, program implementation strategies, timelines and other relevant information;
- Provide integrated planning, program design and implementation strategies for all energy efficiency, alternative energy resources and conservation programs administered by the Trust;
- Include provisions for the application of appropriate program funds to support workforce development efforts; and
- Be consistent with the comprehensive state energy plan.[1]

2.2 Process and Timeline

The process for the Triennial Plan culminates with review and approval or rejection by the Commission through an adjudicatory proceeding. The statute provides that the standard of review for Commission approval is whether the Triennial Plan reasonably explains how its proposed use of funds would achieve the:

- Objectives and the implementation requirements of each statutory fund described herein; and

[1] 35-A MRS §10104(4).

- Measures of performance (or "metrics") for each program funded by those funds.[2]

According to the statute, the Commission is to approve all elements of the Triennial Plan that it determines to be cost-effective, reliable, and achievable. The Commission will also incorporate into gas and electricity utility rates sufficient revenue to provide for the procurement of energy efficiency resources that are identified in the plan as being cost-effective, reliable, and achievable, provided, however, that the Commission will not include in electricity rates an amount that exceeds a statutorily established cap.

Before the Plan gets to the Commission, however, it undergoes several steps. In the development of the Triennial Plan III, the Staff started in January 2015 reviewing recent past performance, worked on a basic outline of priorities, identified issues needing further analysis, and laid out a process and timeline. Trustees provided input during periodic program updates, budget discussions, and workshops on Triennial Plan issues. During this period, Staff requested and received data from the utilities and market research from outside experts to help formulate program targets and strategies. Staff also commissioned an update to a 2012 economic analysis of the maximum achievable potential for harvesting cost-effective electric efficiency in Maine, which helped Staff assign estimates of budgets that would be necessary to capture all efficiency resources that are reliable, achievable, and meet the standard for cost-effectiveness.

In addition, Staff conducted an extensive stakeholder engagement process, involving group forums, individual meetings, as well as a dozen webinars providing detailed program reviews and guiding questions for input. All materials and webinar recordings were made available on a dedicated website that provided an ongoing means for stakeholders to submit questions, comments and recommendations, and supporting materials for the Trust to consider. The Staff then prepared and posted a draft plan for public comment online and at a final stakeholder forum prior to review by the Trustees. The Trust also offered a detailed briefing on the Plan to the Legislature's Committee of jurisdiction to provide an opportunity for input. All written comments received by the Trust can be found on this website at http://emtplan.com/stakeholder-comments/.

After considering input from stakeholders and policymakers, the process entails the Staff's presentation of a final draft of the Triennial Plan at a meeting of the Board of Trustees. Once satisfied that the document comports with the objectives, targets, and requirements of the statute and provides a suitable explanation of the program strategies, the Board may approve the Plan by a two-thirds vote.

Finally, the prescribed process contemplates that the Trust Staff will submit to the Board of Trustees an update to the Triennial Plan when there are significant changes contemplated. Significant changes require approval by the Board before they may be put into effect. In the event these changes relate to the use of funds "generated by assessments" on utility ratepayers, the changes also require approval by the Commission "using the same standard as for the triennial plan."[3]

[2] Ibid, Subsection (4)(D).

[3] 35-A MRS §10104(6).

2.3 Program Implementation Priorities

In addition to best practices of administration and implementation, the Trust is guided by certain priorities that are reflected in the choices made in the Triennial Plan regarding budget allocation and program design. Chief among these priorities are: resource acquisition, market transformation, fairness, leveraging the private sector, and reducing environmental impacts of energy.

2.3.1 Resource Acquisition

The strongest selling point for the Trust's programs is that they deliver energy resources that cost less than conventional supply and, therefore, lower energy costs. In the case of electricity, the low-cost energy resource acquisition also suppresses the rise of energy and capacity charges, and improves grid reliability. These benefits are essential if the Maine economy is to remain competitive with neighboring states and provinces and if it is to grow. By investing in energy efficiency projects that satisfy the stringent cost-effectiveness test of its Chapter 380 rule, the Trust is acquiring an energy resource for the benefit of the participating customer and the ratepayers on the system.

As a general rule, the budget allocations and program designs in this Triennial Plan reflect the Trust's top priority, which is reducing energy costs in Maine by the "maximum amount possible" through acquisition of demand-side energy resources that are cost-effective, achievable, and reliable. For several years, lighting upgrades — using compact fluorescent lights (CFLs) and light emitting diode (LED) bulbs in residential and commercial settings — have offered among the greatest energy savings for the lowest cost. As such, a consistently large fraction of the budgets has been, and continues to be in this Triennial Plan, targeting lighting upgrades. Given the low transaction costs to manage these projects and the large and long-lived savings that result, the cost-effectiveness of the Consumer Products and Commercial and Industrial Prescriptive Programs, in particular, has been very high.

By contrast, certain measures that have been promoted in the past are being discontinued because they are generally not cost-effective. For example, weatherizing certain apartments in large, affordable housing complexes has been discontinued. Many apartment complexes that were built with public subsidies were required at the time of construction to insulate the attics. Many of them do not have drafty basements, and have only one or two exterior walls per unit. Recent experience indicates that adding more air sealing and insulation to these specific kinds of buildings returns only marginal incremental energy savings and tends not to be cost-effective. Also, in the past, Staff determined that providing comprehensive energy audits to small businesses at no cost was expensive and yielded very little savings because there was no co-investment motivating customers to move ahead with efficiency projects. When the Trust altered the program design to require a small co-payment from participating businesses, there was insufficient interest. For this reason, the free energy audit program was discontinued.

2.3.2 Market Transformation

A second priority of the Trust, as reflected in the Triennial Plan, is to help transform the marketplace with regard to energy efficiency and cost-effective renewable energy resources. Market transformation in the Trust's programs takes several forms.

One example is building economies of scale for newer, high-efficiency products such that they are stocked on store shelves, sales people and technicians are familiar with and promote the products, and the retail price is driven down. An emerging example of this effect is occurring with the ductless, mini-split heat pump that efficiently delivers heat in cold climates. The Trust set a high standard on the minimum efficiency requirements for heat pumps to receive a financial rebate. It also supported training at the local community colleges for contractors to learn proper installation and maintenance techniques. And it developed videos — one explaining how heat pumps work, even in cold weather, another describing the successful results of an actual heat pump installation in a typical home in Aroostook County — that were posted and circulated on the internet. As the volume of heat pumps sold in Maine has grown from a few dozen installed by a handful of contractors in 2012 to more than 6,500 installed in FY2015, the prices have begun to drop and the product is now available in all corners of the state.

Another example of market transformation comes through workforce development. The Triennial Plan put forward here intends to expand on past success of promoting training for key players in the energy efficiency supply chain. In past years, Trust programs paid for and organized training for: home energy auditors to learn sales skills when pitching their services to homeowners; contractors to learn about new mini-split heat pumps; sales staff at big box stores responsible for promoting ENERGY STAR™ lights and appliances; large commercial contractors to learn about advances in variable frequency drives (VFDs); and for facility managers to become certified in best practices of operation and maintenance for the energy systems in their buildings. In the Second Triennial Plan, the Trust continued that trend with an expectation of offerings to help architects and engineers learn about best practices when planning new commercial construction projects, and to make energy efficiency training more broadly available for facility managers. For the Third Triennial Plan, the Trust will emphasize the certification and licensing requirements for trade allies affiliated with Efficiency Maine; online and in-store training opportunities; and scholarship and other support for existing programs run by community colleges.

A third area of activity that advances the priority of market transformation is the Trust's promotion of general energy education and awareness. The Trust maintains a website that helps both residential and business customers access information about available programs (including technical support and financial incentives), and has expanded the offerings to include more generic information about energy efficiency and the options available to consumers considering a purchase of new lighting, heating or cooling systems, water heaters, electronics, appliances, motors, or controls. This Triennial Plan continues to leverage these increasingly important website resources and expands the Trust's use of social media and digital advertising to effectively reach more customers.

Finally, market transformation includes activities to encourage the entry of new high-efficiency products and alternative energy products into the marketplace. Because the cost effectiveness of new products or practices can be hard to demonstrate or predict, and because making such products or practices available on a broad scale, while maintaining quality control, may be challenging, the Trust often seeks to "walk before it runs." In this Triennial Plan, the Trust will continue to use the Innovation Program to pilot new products, or new applications of established products, as well as new approaches to running programs. The Trust also will retain its practice of funding Custom Projects in residential, commercial,

and industrial settings, where appropriate. This element of the programs enables contractors and their customers to take advantage of energy saving opportunities even if the product has not yet achieved sufficiently wide use to make it onto a "Prescriptive List" for the most commonly used efficient products. It also enables the Program to support best practices in building design, industrial processes, and building operation so that, over time, these will become standard industry practice.

2.3.3 Fairness

The Triennial Plan also reflects the priority of maintaining fairness in the way that budgets are allocated and programs are designed and implemented. At a minimum, a degree of fairness is achieved by ensuring that statutory minimum funding levels are allocated to low income customers (the greater of $2.6 million or 10% of the Electric Efficiency Procurement and a similar percentage from the Natural Gas Conservation Fund) and to small business customers (the greater of $2.6 million or 10% of the Electric Efficiency Procurement). Beyond these statutory requirements for budget allocations, the Triennial Plan reflects the goal of promoting broad participation among customers and a reasonable distribution of project benefits throughout the state.

Whereas in the past the Trust allocated funds from electric customers (from the system benefit charge [SBC] and RGGI) and gas utility customers according to the percentage of total load represented by each customer class (e.g., approximately 40% for residential customers and 60% for business/institutional customers of electric utilities), in this Triennial Plan the Trust intends to allocate funds on the basis of cost-effective energy savings opportunity. This approach will continue to entail administering a blend of programs targeted to the needs of different customer types and the channels through which they access energy efficiency and conservation. Some programs will result in a small number of very large projects acquiring extensive energy savings; others will result in tens of thousands of small, low-cost product upgrades that make small energy savings accessible to homeowners and businesses everywhere, even in more remote areas of the state. By contrast, there will also be initiatives, such as the Small Business Initiative, where the Trust understands it will save less energy and incur greater cost. While these undertakings may run counter to the principle of maximizing resource acquisition, the Trust pursues them nonetheless because they are cost-effective, achievable and reliable, and because it is critical that customers from every sub-sector and every region of Maine have a reasonable opportunity to access the benefits of cost-effective energy efficiency and conservation programs.

2.3.4 Leveraging the Private Sector

As noted above, an overarching purpose of the Trust and the Triennial Plan is to reduce the energy costs of Maine's residential and non-residential customers to the maximum extent, consistent with the requirements of cost-effectiveness. A core priority of the Trust in pursuing that purpose is that its programs should leverage private sector activities in the free market. This means that, as much as possible, the Trust will design its programs so that marketing and installation of efficiency, conservation and alternative energy measures are incorporated into the normal, day-to-day activities of the existing supply chain comprising manufacturers, suppliers, vendors, architects and engineers, contractors (electricians, plumbers, heating technicians, builders), and retail stores. Leveraging the private sector entails taking maximum advantage of competition in the marketplace to push down prices of equipment

and services. This approach has the added benefit of removing the Trust from "picking winners" in technology, fuel type, or service providers, leaving the outcome to the efforts of market players and the choices of customers.

This market-based approach also means that in most cases, the homeowner or business owner will bear ultimate responsibility for deciding what upgrades to install and which contractor to use, and for executing and paying for the transaction. Except for the case of improvements made in certain low-income homes, the Trust's financial contribution takes the form of an incentive designed to move the customer from the status quo, or from purchasing the standard-efficiency model, to upgrading to a high-efficiency model. The incentive is designed to cover a portion of the cost of the energy upgrade, and the balance of the project cost must be borne by the customer. Without this significant financial investment from the customers, the Trust's costs for harvesting cost-effective energy resources would be greatly increased, the overall cost of delivering energy through utility systems would be considerably higher, and emissions of carbon and other air pollutants would rise.

Leveraging the private sector further involves full deployment of financing tools to put private capitol toward investments in energy upgrades. This includes facilitating the use of loans and loan loss reserves, both of which the Trust currently employs. Looking forward, the Trust intends to explore how leasing can be used to help maximize the use of private capital.

2.3.5 Reducing the Environmental Impacts of Energy

Traditionally, the production and consumption of energy have been among the largest contributors to air pollution, including GHGs that cause climate change. Energy is also closely associated with other environmental and land use issues including, but not limited to, water quality, solid and hazardous waste, wildlife impacts, scenic impacts, and sustainable use of finite resources. Energy efficiency, conservation and clean alternative energy resources have the potential to not only reduce or mitigate harmful environmental impacts, but to do so more cost-effectively than other options.

Throughout the design and implementation of this Triennial Plan, the Trust's top priority, as noted above, is to ensure that energy efficiency, conservation and alternative energy resources maximize cost-effective energy savings and economic benefits to ratepayers and the local economy. A close corollary to this priority is to make the most of the opportunity to deploy these energy resources in a way that will also advance state environmental policies.

2.4 Study of the Market Potential for Electricity Efficiency and Conservation

This section describes the methodology used by the Trust, employing the technical services of GDS Associates, Inc. (GDS), to update its statewide electricity energy efficiency market potential study (the "Market Potential Study" or "the study") in Maine. The main objective of the study was to estimate the technical, economic, and maximum achievable cost-effective (MACE) potential for electricity efficiency statewide for 10 years beginning July 1, 2016. The potential savings is estimated in kilowatt-hours of

energy delivered annually and kilowatts of capacity reduction during summer peak.[4] The assessment did not examine potential peak load reduction or energy reductions that could result from demand response programs.

2.4.1 Overview of Approach

The Market Potential Study used a bottom-up approach to estimate energy efficiency potential in the residential sector. A bottom-up approach begins by characterizing the eligible equipment stock, estimating savings, and screening for cost-effectiveness at the measure level; savings are summed at the end-use and service area levels.

In the commercial and industrial (C&I) sectors, the study employed a modified top-down modeling approach. This approach estimates measure-level savings, costs, and cost-effectiveness, and then applies cost-effective measure savings to all applicable shares of the forecasted disaggregation of energy load by customer segment. Details of the market research and modeling techniques utilized in this assessment are provided below.

2.4.2 Load Forecast and Forecast Disaggregation

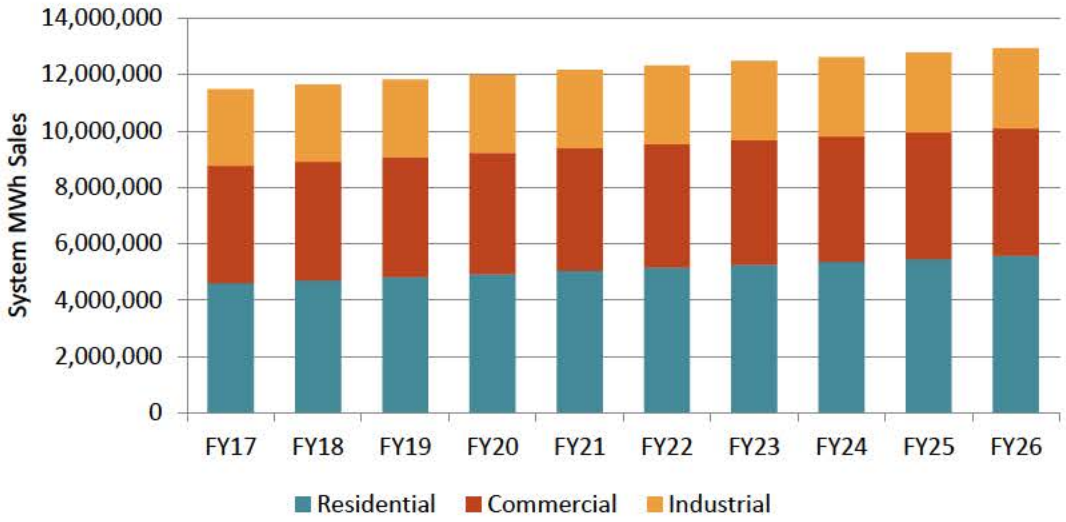
This analysis of the potential for energy efficiency savings begins with utilizing the most recent and available electricity sales forecasts from the two largest electric utilities (Central Maine Power and Emera Maine) for a period of 10 years beginning July 1, 2016. Following discussions between the Maine utilities and Trust staff, it was decided that the study would apply a conservative annual growth rate based on a consensus between CMP and Emera.[5] Next, the study modified the monthly and/or annual forecast customer sales and account data into fiscal year periods, and combined the two forecasts and extrapolated the results into statewide totals for all electric utilities. Last, the study added to the statewide load forecast sales reflecting recent statewide uptake of ductless mini-split heat pumps through the Trust's programs.

Figure 2.4-1 shows the final statewide annual MWh sales forecasts reflecting the methodology described above. Sales are distributed fairly evenly among the residential and commercial sectors in FY2017, with approximately 35% to 40% of annual MWh sales occurring in both the residential and commercial sector, and 25% of annual MWh sales coming from the industrial sector. The MWh sales forecast grows at a compound annual growth rate of 0.33% per year across all sectors over the 10-year forecast.

[4] Peak load reductions will be estimated, to the extent practicable, consistent with the coincident summer peak period of 1:00 to 5:00 PM on non-holiday weekdays in June, July, and August, as defined by the ISO-NE Forward Capacity Market and as reflected in the Trust's Technical Reference Manuals.

[5] The Market Potential Study did not apply load forecasts to the load of Maine's Consumer Owned Utilities (COUs). This exclusion does not impact the cost-effective potential efficiency savings for the Residential sector, which uses a "bottom-up" approach to modeling savings potential. However, in the C&I sectors, this exclusion will reduce the savings potential in proportion to the COUs' share of statewide load.

Figure 2.4-1: Statewide Energy (MWh) Sales Forecast by Sector from July 2016 to June 2026



This disaggregated forecast data provides the foundation for energy efficiency potential estimates for the C&I sectors. The Market Potential Study applied measure-level savings factors (discussed in the overview of technical potential, below) to the corresponding share of energy load by sector, segment (building type), end use, and equipment type.

For the C&I sectors, the study disaggregated the baseline FY2017–FY2026 load forecast using a top-down analysis. The study conducted the top-down forecast disaggregation by applying Maine-specific segment saturation data from the 2012 Maine Nonresidential Baseline Study and end-use consumption shares derived from the 2003 Commercial Buildings Energy Consumption Survey (CBECS) to Maine's nonresidential load forecast.[6] In this exercise, the study:

- Determined energy consumption per customer sector and segment in the baseline year (FY2017);
- Disaggregated customer segment loads into end-use loads such as space cooling, space heating, water heating, etc.; and
- Forecasted the 10-year end-use energy consumption by sector and segment through FY2026.

The commercial sector, as defined in this analysis, includes the following business segments:

- Education
- Health
- Grocery
- Lodging
- Office

[6] http://www.eia.gov/consumption/commercial/data/2003.

- Restaurant
- Retail
- Warehouse

The industrial sector, as defined in this analysis, comprises the following industrial segments:

- Manufacturing
  - Chemicals
  - Petroleum
  - Computers and Electronics
  - Food
  - Beverage
  - Textiles
  - Apparel
  - Wood
  - Metals
  - Paper
  - Plastics
- Mining
- Other Non-Manufacturing

2.4.3 Measure Analysis

Energy efficiency measures considered in the study include all electric savings measures contained in the 2016 edition of the *Efficiency Maine Trust Technical Reference Manuals* (Maine TRMs), as well as energy efficiency measures listed in current databases of electric end-use technologies and energy efficiency measures in other jurisdictions. The study considered measures and practices that are currently commercially available. The Trust was most interested in and focused its attention on analyzing measures that are commercially available in the marketplace.

Number of Measures Evaluated

In total, the Market Potential Study analyzed 270 measure types. Many measures required multiple permutations for different applications, such as different building types, efficiency levels, and decision types. The study developed a total of 3,385 measure permutations and tested all measures for cost-effectiveness under the Total Resource Cost test (TRC). The parameters for cost-effectiveness under the TRC are discussed below. Of the permutations analyzed, 87% of measures or 2,954 total measures had a measure TRC benefit-to-cost (B:C) ratio of 1.0 or higher.

Approximately 39% of all measures types included in this study are found in the Maine TRMs. The study also reviewed 164 additional measure types found in secondary sources to offer a more robust analysis of electric energy efficiency savings potential in Maine.

Table 2.4-1: Number of Measures Evaluated

Sector	# of Unique Measures	# of Unique Measures in TRM	Total # of Permutations	# of Permutations Cost-Effective
Residential	49	25	362	320
Commercial	142	57	1,278	1,008
Industrial	95	40	1,900	1,700
Other	3	3	27	27
Total	**289**	**125**	**3,567**	**3,055**

Measure Characterization

A significant amount of data is needed to estimate the kWh and kW savings potential for individual energy efficiency measures or programs across the entire residential, commercial, and industrial sectors in Maine. The study utilized data specific to Maine when it was available and current. It used the *Maine TRMs*, the *2015 Residential Baseline Study*, the *2012 Commercial Baseline Study*, and the most recent Trust program evaluations as the main sources of data for measure assumptions. For measures not listed in the TRM, the study conducted secondary research to develop reasonable and supportable assumptions.

Measure Savings: The study utilized the *Maine TRMs* to inform calculations supporting estimates of annual measure savings as a percentage of base equipment usage. For custom measures and measures not included in the *Maine TRMs*, the study estimated savings from a variety of sources, including:

- Mid-Atlantic TRM and other existing deemed savings databases;
- Building energy simulation software (such as BEopt) and engineering analyses;
- Scheduled changes in federal codes and standards;
- Secondary sources such as the American Council for an Energy-Efficient Economy (ACEEE), U.S. Department of Energy (DOE), Energy Information Administration (EIA), ENERGY STAR®, and other technical potential studies; and
- Program evaluations conducted by independent third parties under contract to the Trust.

Measure Costs: Measure costs represent either incremental or full costs, and typically include the incremental cost of measure installation. For purposes of this study, nominal measure costs were held constant over time. One exception to this assumption is that the study assumed a decrease over time in costs for LED bulbs and, to a lesser extent, CFL bulbs. LED bulb consumer costs have been declining rapidly over the last several years and future cost projections predict a continued decrease in bulb costs.[7] The study's treatment of LED bulb costs and market penetration are discussed in greater detail in below in "Review of LED Lighting Assumptions."

When available, the study obtained measure cost estimates from the *Maine TRMs*. For measures not in this data set, the Study used the following data sources:

[7] 2014 DOE SSL Multi-Year Program Plan & NEEP Residential Lighting Strategy Report.

- Secondary sources such as the ACEEE, ENERGY STAR, National Renewable Energy Lab (NREL), California Public Utilities Commission, Incremental Cost Database, Northeast Energy Efficiency Partnership (NEEP) Incremental Cost Study, and other technical potential studies;
- Retail store pricing (such as websites of Home Depot, Lowe's, and Grainger) and industry experts; and
- Program evaluations conducted by independent third parties under contract to the Trust.

Measure Life: Measure life represents the number of years that energy consuming equipment is expected to operate. The study obtained measure life estimates from the *Maine TRMs*, and used the following data sources for measures not in the TRMs:

- Manufacturer data;
- Savings calculators and life-cycle cost analyses;
- The California Database for Energy Efficient Resources (DEER) database;
- Evaluation reports; and
- Other consultant research or technical reports.

Baseline and Efficient Technology Saturations: In order to assess the potential electric energy efficiency savings available, estimates of the current saturation of baseline equipment and energy efficiency measures are necessary. The study primarily obtained up-to-date measure or end-use and equipment saturation data from the following recent studies:

- 2015 Residential Baseline Study (by NMR Group, Inc.);
- 2012 Commercial Baseline Study (by GDS/Cadmus);
- 2015 Commercial Baseline Study Update (by Retroficiency/Cadmus)
- 2010 CMP Appliance Saturation Study;
- 2015 Efficiency Maine Lighting Evaluation (by NMR) and other recently completed Efficiency Maine Trust Evaluation Reports;
- Latest (2010) EIA Manufacturing Energy Consumption Survey (MECS); and
- Latest (2003) EIA Commercial Buildings Energy Consumption Survey (CBECS).

Treatment of Codes and Standards

Although this analysis does not attempt to predict how energy codes and standards will change over time, the analysis does account for the impacts of several known improvements to federal codes and standards. Although not exhaustive, key adjustments assumed in the study include:

- Lighting baselines reflect the minimum efficiency standards and schedule established in the Energy Independence and Security Act of 2007 (EISA 2007). As a result, the baseline efficiency for most general lighting was assumed to be a halogen bulb through May 31, 2020. Beginning in June 2020, the analysis reflects the adjustments included in the EISA 2007 backstop provision, and the general service lighting baseline shifts to the CFL bulb. This shift in baseline impacts all bulbs, including those installed prior to 2020.

- The baseline efficiency for air source heat pumps (ASHPs) is anticipated to improve to 14 SEER/8.2 HSPF[8] in 2015. As the existing stock of ASHPs was estimated to turn over and allow for a sell-through period, the baseline efficiency was assumed to be the new federal standard, beginning in FY2018.
- In 2015, amended standards created by DOE become effective for residential water heaters. These require updated energy factors (EFs) depending on the type of water heater and the rated storage volume. For electric storage water heaters with a volume greater than 55 gallons, the standards effectively require heat pumps for electric storage products. For storage tank water heaters with a volume of 55 gallons or less, the new standard (EF=0.948) will be the equivalent of today's efficient storage tank water heaters.[9]
- In March 2015, DOE amended the standards for residential clothes washers. The new standards will require the Integrated Modified Energy Factor (MEF) (ft^3/kWh/cycle) to meet certain thresholds based on the machine configurations. The ENERGY STAR specifications for residential clothes washers will also be amended to increase the efficiency of units that can earn the ENERGY STAR label. Version 7.0 of the ENERGY STAR specification went into effect in March 2015. These amended federal and ENERGY STAR standards have been factored into the study.
- In line with the phase-in of 2005 Energy Policy Act (EPAct) regulations, the baseline efficiency for general service linear fluorescent lamps was moved from the T12 light bulb to a T8 light bulb effective June 1, 2016.

Review of LED Lighting Assumptions

It is important to review the various assumptions that were tailored throughout this analysis given the emerging market for LEDs and the overall importance of lighting to the Trust's energy efficiency portfolio.

Savings: Screw-in LED bulbs were assumed to replace the current federal code baseline according to the EISA 2007. For the initial four years of the analysis (July 2016 through June 2020), LED bulb savings are calculated relative to a halogen bulb. For the final six years of the analysis, the study assumes the CFL bulb becomes the code baseline, and LED savings are calculated against the CFL bulb.

Costs: LED bulb costs are projected to decrease significantly over the next decade. Current estimates project standard LED screw-in bulbs to cost $4.00 by 2020 and $2.40 by 2030.[10] Based on these declining projections, the current price of LED bulbs in Maine, and estimated interim price points, the study

[8] SEER: Seasonal Energy Efficiency Ratio; HSPF: Heating Seasonal Performance Factor.

[9] Ultimately, the study did not incorporate the requirements for large capacity water heaters into the analysis due to recent legislation that allows grid-enabled water heaters to remain at lower efficiency levels.

[10] EIA. Technology Forecast Updates – Residential and Commercial Building Technologies, Reference Case. The 2014 DOE SSL Multi-Year Program Plan, NEEP Residential Lighting Strategy, and IMS Research ("Does LED Lighting Have a Tipping Point?") all estimate the $4.00 LED standard screw-in bulb price point in 2020.

developed annual cost projections for screw-in LED bulbs.[11] Table 2.4-2 shows the annual price projections for a standard 60-watt equivalent LED.

Table 2.4-2: Price Projections for Residential LED Lighting

Bulb Technology	FY2017	FY2018	FY2019	FY2020	FY2021
LED Screw-In	$12.55	10.09	$7.64	$5.18	$3.87

Market Acceptance: In an effort to recognize the increasing market adoption of LED bulbs and the increased focus on LED technologies in the Consumer Products Program, the study's potential analysis also projected an increasing focus on LED screw-in bulb technologies over CFL bulbs. Table 2.4-3 shows the assumed annual applicability of LED versus CFL bulbs assumed in the residential sector based on historical data and input from Trust staff. For example, in 2017, 45% of all assumed efficient screw-in standard bulb installations will be LED.

Table 2.4-3: Assumed Annual Applicability of LED vs. CFL Bulbs

Bulb Technology	FY2017	FY2018	FY2019	FY2020	FY2021
Standard CFL	55%	50%	37%	25%	0%
Standard LED	45%	50%	63%	75%	100%
Specialty CFL	70%	63%	55%	39%	25%
Specialty LED	30%	37%	45%	61%	75%
Income Eligible CFL	90%	90%	80%	80%	50%
Income Eligible LED	10%	10%	20%	20%	50%

As noted above, the screw-in lighting baseline shifts to the CFL bulb in 2020, and all assumed efficient installations shift to LEDs beginning in FY2021 for standard lighting sockets. Specialty bulbs are not subject to the same standards as standard bulbs and, as a result, GDS has adopted a slower conversion to LED bulbs. The Trust expects the Low Income bulb program to continue to support CFL bulbs in the short-term, with a more prolonged transition to LED bulbs.

2.4.4 Potential Savings Overview

Potential studies often distinguish between several types of energy efficiency potential: technical, economic, and achievable. The first two types of potential — technical and economic — provide a theoretical upper bound for energy savings from energy efficiency measures. Still, even the best-designed portfolio of programs is unlikely to capture 100% of the technical or economic potential. Therefore, achievable potential (referred to as maximum achievable cost effective potential) attempts to estimate what savings may realistically and reliably be achieved through market interventions, when it can be captured, and how much it would cost to do so. Figure 2.4-2 illustrates the types of energy efficiency potential considered in this analysis.

[11] According to the 2015 Lighting Evaluation Report, the average cost of a program eligible LED bulb in FY2014 was $16.23.

Figure 2.4-2: Types of Energy Efficiency Potential[12]

<table>
<tr><td>Not Technically Feasible</td><td colspan="3">Technical Potential</td></tr>
<tr><td>Not Technically Feasible</td><td>Not Cost Effective</td><td colspan="2">Economic Potential</td></tr>
<tr><td>Not Technically Feasible</td><td>Not Cost Effective</td><td>Market Barriers</td><td>Maximum Achievable Cost-Effective Potential</td></tr>
</table>

2.4.5 Technical Potential

Technical potential is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. Under technical potential, the study assumed that 100% of new construction and lost opportunity measures are adopted as those opportunities become available (e.g., as new buildings are constructed they immediately adopt efficiency measures), while retrofit and early retirement opportunities are replaced incrementally (10% per year) until 100% of homes (residential) and stock (commercial and industrial) are converted to the efficient measures over a period of 10 years.

Core Equation for the Residential Sector

The core equation used in the residential sector energy efficiency technical potential analysis for each individual efficiency measure is shown below.

Figure 2.4-3: Core Equation for the Residential Sector

Where:

Base Case Equipment End-Use Intensity = the electricity used per customer per year by each base-case technology in each market segment. In other words, the base case equipment end-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.

Saturation Share = the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential water heating, the saturation share

[12] Reproduced from "Guide to Resource Planning with Energy Efficiency," November 2007, U.S. Environmental Protection Agency (EPA), Figure 2-1.

would be the fraction of all residential electric customers that have electric water heating in their household.

Remaining Factor = the fraction of equipment that is not considered to already be energy efficient. To extend the example above, the remaining factor is the fraction of electric water heaters that is not already energy efficient.[13]

Applicability Factor = the fraction of the applicable units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (e.g., it may not be possible to install CFLs in all light sockets in a home because the CFLs may not fit in every socket).[14]

Savings Factor = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

Core Equation for the Commercial and Industrial Sectors

The core equation utilized in the C&I sectors technical potential analysis for each individual efficiency measure is shown below.

Figure 2.4-4: Core Equation for Nonresidential Sector Technical Potential

Where:

Total End Use MWh Sales by Building/Industry Type = the forecasted MWh sales for a given building type (e.g., office buildings).

Base Case Factor = the fraction of the equipment electrical energy that is applicable for the efficient technology in a given market segment. For example, for room air conditioners, the saturation share would be the fraction of all space cooling kWh in a given market segment that is associated with room air conditioner equipment.

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[13] For purposes of the study, the remaining factor for lost opportunity measures was typically 100%. This assumes that all measures, regardless of current efficiency, are eligible to revert back to the code baseline at the time of replacement. This approach is different from the prior market potential study completed by the Cadmus/GDS Team which removed installed measures that were already energy efficient from the analysis pool. The assumption used in the current study results in increased potential, but more closely aligns with the Trust's ability to track savings at the gross and net savings level.

[14] In instances where two (or more) competing technologies exist for the same electrical end use (e.g., heat pump water heaters, water heater efficiency measures, high-efficiency electric storage water heaters, and solar water heating systems), an applicability factor aids in determining the proportion of the available population assigned to each measure. In estimating the technical potential, measures with the most savings are given priority for installation. For all other types of potential, measures with the greatest TRC ratio are assigned installation priority.

Applicability Factor = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (e.g., it may not be possible to install VFDs on all motors in a given market segment).

Remaining Factor = the fraction of equipment (e.g., electric water heaters) that is not considered to already be energy efficient.

Savings Factor = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

2.4.6 Economic Potential

Economic potential refers to the subset of the technical potential that is economically cost-effective (based on screening with the TRC) as compared to conventional supply-side energy resources. Cost-effectiveness under the analysis of economic potential considers the adjusted gross efficiency savings of each measure, which means that where available, historical realization rates derived from prior program evaluations are factored into the estimates of future savings. The study also pre-screened possible energy efficiency technologies and practices based on an understanding of which measures were likely to be cost-effective. Pre-screening removed measures that were not commercially available, were already at current code, or were not applicable to Maine. All measures that were not cost-effective based on the results of the TRC were excluded from further analysis. The study then readjusted and applied allocation factors to the remaining measures that were cost-effective.

Total Resource Cost Test

The TRC measures the net costs of a demand-side management or energy efficiency measure or program as a resource option based on the total costs of the measure or program, including both the participant's and the program administrator's costs.

In general, the benefits calculated in the TRC include the avoided electric supply costs for the periods when there is an electric load reduction; and savings of other resources such as fossil fuels and water. Costs in the TRC (incremental or full cost depending on whether the measure was replaced on burnout or is an early replacement/retrofit) are the program costs paid by the program administrator and the participants. Thus, in a retrofit scenario, all equipment costs, installation, incremental operation and maintenance, cost of removal, and program administration costs are included in this test regardless of who pays the costs. In a replace-on-burnout scenario or new construction scenario, installation costs are excluded and only the incremental cost of the high-efficiency equipment is included.

In an effort to be consistent with the National Action Plan for Energy Efficiency's definition of economic potential, the study did not include marketing; analysis; administration; or evaluation, measurement, and verification (EM&V) costs for the measure cost-effectiveness screening conducted to develop the estimates of economic potential.[15] Although excluded from economic potential, these non-incentive

[15] National Action Plan for Energy Efficiency: Understanding Cost-Effectiveness of Energy Efficiency Programs.

delivery costs are included in the estimates of the program costs and factored into the analysis of achievable potential savings, discussed in the context of MACE, below.

Avoided Costs

The study based the avoided cost forecasts utilized for measure cost-effectiveness and for reporting potential benefits on the latest forecast of *Avoided Energy Supply Costs in New England*.[16] This forecast provided the latest available projections of marginal energy supply costs that will be avoided due to reductions in the use of electricity, natural gas, and other fuels resulting from efficiency programs. The study also utilized projections of the avoided marginal cost of transmission as determined in the *Maine Distributed Solar Valuation Study*.[17] The discount rate and inflation rate used in the study were also provided in the *Avoided Energy Supply Costs* study. Avoided energy costs were differentiated by time and season, where possible. (A sensitivity analysis, assuming lower natural gas prices than those used in the *Avoided Energy Supply Costs in New England, 2015 Report*, was performed to gauge the relative impact that lower gas prices might have on the potential for cost-effective efficiency savings. The results are provided in Appendix B.)

Avoided water use was valued based on the weighted average of marginal rates for water/waste water service from three Maine water utilities (Portland, Augusta, and Orono) and the avoided cost for pumping well water.[18] The two values were weighted by the proportion of homes serviced by municipal water systems and well pump systems.

2.4.7 Maximum Achievable Cost-Effective Potential

MACE potential is the amount of cost-effective energy that can realistically be saved given various market barriers. Achievable potential takes into account real-world barriers to encouraging end users to adopt efficiency measures; the non-measure costs of delivering programs (for administration, marketing, analysis, and EM&V); and the capability of programs and administrators to boost program activity over time. Barriers include first costs; customer awareness and willingness to participate in programs; technical constraints; and other barriers the "program intervention" is modeled to overcome. Achievable potential also screens out certain measures that, while cost-effective, have an incidence and magnitude of free-ridership that cannot be mitigated and, when factored into estimates of future net savings, would render the measure not cost-effective. An example of a measure that is cost-effective but was removed from consideration of achievable potential savings is an efficient computer monitor. While certain models of computer monitors save enough energy to be cost-effective, the incremental cost of these models compared to standard efficiency models is negligible and is assumed to lead to high levels of free-ridership that would be very difficult to mitigate. Additional considerations include policy and/or regulatory constraints.

[16] Avoided Energy Supply Costs in New England, 2015 Report.

[17] Maine Distributed Solar Valuation Study. Maine Public Utilities Commission. May 2015.

[18] Rates were publicly available and accessible from Portland, Augusta, and Orono. An exhaustive and comparative review of all 155+ water utilities in Maine was not within the scope of the study.

While many different scenarios could be modeled, the selected MACE potential approach reflects the expected market adoption associated with the expected program incentive levels (as percentages of incremental costs and observed historical participation trends). For purposes of this study, the Trust assumed continuation of current program incentive levels. The achievable incentives were set at a percentage of measure costs based on historical levels reported in FY2013 through FY2015 Efficiency Maine Reporting & Tracking System (effRT) data and/or Efficiency Maine Trust annual report data.

For new construction, energy efficiency measures can be implemented when each new home or building is built, thus the rate of availability will be a direct function of the rate of new construction. Because there is a short window of opportunity to influence the adoption of high efficiency equipment in new construction when new equipment is being specified and installed, this situation is referred to as "lost opportunity" that can be captured through energy efficiency measures.

For existing buildings, energy efficiency potential in the existing stock of buildings will be captured over time through two principal processes:

1. As equipment replacements are made when a piece of equipment is at the end of its effective useful life (also referred to as "lost opportunity"); or
2. At any time in the life of the equipment or building (referred to as "retrofit" or "early replacement").

For lost opportunity measures in existing buildings, the opportunity to replace existing equipment with high efficiency equipment occurs when equipment fails beyond repair. Under these conditions the potential for upgrades in a given year is determined by equipment failure rates. A lost opportunity also occurs if the consumer is adding new equipment (without replacing old equipment), whether in connection with new construction, remodeling, expansion, or otherwise. Under these conditions the potential for upgrades in a given year is determined by consumer facility upgrade plans.

For the retrofit measures, savings can theoretically be captured at any time; however, in practice, it takes many years to retrofit an entire stock of buildings, even with the most aggressive of energy efficiency programs. For the Market Potential study, it was assumed that 1/10 of the eligible existing equipment would be retrofitted each year.

Achievable Potential Market Penetration Rates

In an effort to inform estimates of market adoption, the study analyzed both the historical achievements of the Trust's programs as well as industry research on the long-term market adoption that could reasonably be expected over time given varied incentive levels. This historical benchmarking yielded an estimate for an initial "ground floor" market adoption rate; the industry research assisted in the development of long-term market adoption values.

Initial Year Market Adoption Rate

The study compared the historical achievements of Trust programs to the estimated annual turnover of individual measures to derive an estimate of what percentage of the available market could be captured in the first year of this Triennial Plan period. For measures that have been incentivized for a long time

(e.g., efficient lighting), the starting point was typically higher than other measures (e.g., heat pump water heaters) that are newer to the relevant market.

Long-Term Market Adoption Rates

The study generally relied on secondary data to determine the long-term market adoption rate at a range of incentive levels based on two data points: (1) a base value from an industry review of utility reports with available information on incentive levels and achievable market adoption; and (2) an industry analysis of EIA data on the elasticity between incentive levels and savings. Based on the publicly available assessments, industry research indicated that roughly 50% adoption can be achieved at an incentive level of 50% of the incremental cost. The EIA regression analysis determined that every 1% increase in incentives would yield two-thirds of a percent increase in year-over-year market adoption. The study then applied a linear growth rate from the analysis's first-year adoption rate to reach the estimated long-term adoption rate. The varying first-year measure adoption rates, incentive levels, and estimated time needed to reach target market adoption yielded measure or program-specific annual market adoption rates.

Although the approach above was primarily used to estimate long-term market adoption, the study occasionally deviated from this method and tailored specific measure long-term market adoption rates to reflect program history or funding constraints. For example, the market adoption rate for lighting in the Consumer Products Program was held constant over time to reflect the maturity of these markets and the low expectation of continued program growth. Similarly, as the residential building shell improvement benefits are dominated by non-electric fuel savings, the long term market adoption was constrained to reflect the limited budgets available for non-electric improvements.

2.5 Study of the Market Potential for Natural Gas Conservation

In 2014, the Trust commissioned a study of the MACE potential for natural gas conservation and efficiency in Maine. The final report,[19] filed at the Commission in Docket Number 2012-00449, described the methodology and results of the study assuming that, as directed by the Omnibus Energy Bill of 2013, conservation programs are extended to all natural gas utilities in the state and are funded at a level sufficient to capture all cost-effective efficiency resources (for natural gas) that are achievable and reliable.

2.5.1 Study Scope

The scope of the study was two-fold. The study included a baseline study and an energy efficiency potential study. The potential study provided an assessment of the achievable cost effective natural gas energy efficiency for Maine across the 2015–2024 time frame. The study looked at potential both among existing customers and anticipated customers that will be added due to the forecasted expansion of natural gas over the next decade. The energy efficiency potential assessment encompassed the residential, commercial, and industrial sectors, and focused on providing reasonable and reliable estimates of technical, economic and achievable potential.

[19] GDS Associates, 2014 Assessment of Natural Gas Energy Efficiency Opportunities in Maine, September 2014.

2.5.2 Study Findings

The study employed essentially the same methodology applied in the Market Potential Study for electrical efficiency in Maine, described in the prior section. The study results indicated cumulative technical potential savings of more than 7.2 million MMBtu by 2024. It analyzed achievable potential with two sets of modeling parameters to create two scenarios. The first scenario, Achievable Potential – High Case, assumed that the Trust would pay 75% of the measure cost as an incentive for each measure, and that the market penetraion would reach 80% in the tenth year of the study time frame. The second scenario, Achievable Potential – Low Case, assumed that the Trust would pay 50% of the measure cost as an incentive for each measure, and that the market penetration would reach 50% in the tenth year of the study time frame. The study found that in the tenth year (2024), approximately 3.2 million MMBtu of cumulative savings could be achieved in the High Case scenario and 2.1 million MMBtu of cumulative savings could be achieved in the Low Case scenario. The full description of the methodology and results can be found in the report which is posted among the Opportunity Studies in the "Library" section of the Trust's website.[20]

2.6 Energy Efficiency Investments and Benefits

This section presents a summary of the investment budgets and savings benefits, by program and by funding category, for the three years covered by Triennial Plan III. A separate table is presented for each year of the plan: FY2017, FY2018, and FY2019.

These tables indicate that the three years of programs and related initiatives described in Triennial Plan III will reduce energy costs by approximately $870 million over the lifetime of the measures installed. The suite of programs and associated initiatives contemplated through this Plan result in estimated Trust costs of $216.8 million over the next three years. When factoring both the Trust's costs and the incremental private funds that are leveraged into the total costs of undertaking all of the energy upgrades from this plan, the ratio of the total direct economic benefits to the total costs, expressed as a B:C ratio, is greater than 2.1 to 1.

The first column lists seven programs, each of which pursues cost-effective resource acquisition. The first column also lists three Strategic Initiatives (Evaluation, Measurement, and Verification; Innovation; Public Information), plus Administration, Federal/Other and Inter-Agency Transfers, that do not by themselves result in quantifiable energy savings but nonetheless are integral to the Trust's implementation and reporting on programs and to compliance with various statutory directives.

The second column presents the proposed budget allocation for all funding sources that are directed at saving electricity. Funding sources that contribute to this budget are the Forward Capacity Market (FCM), the Maine Power Reliability Program settlement, and the Electricity Efficiency Procurement. If a long term contract for capacity were authorized by the Commission, it also would be reflected in this column. The allocation from these funding sources to each individual program reflects the costs of procuring the MACE resource, as modeled by the Trust's Market Potential Study, through the identified

[20] See http://www.efficiencymaine.com/about/library/reports.

program channel. The costs allocated to the three Strategic Initiatives apply a fixed percentage of the MACE electricity program costs: 2% for EM&V, 1% for Innovation, and 0.5% for Public Information. The electricity funds' contribution to the Administration budget is 7% (conservatively less than the 9% allowed by statute and consistent with prior years' costs at the Trust), and Inter-Agency Transfers reflects statutorily directed payments, including notably a 1% set aside for the Commission's oversight of the Trust's activities.

The third column presents the proposed budget allocation for the Natural Gas Conservation Fund. The funding sources are limited at this time to rate-based assessments on natural gas utilities. This amount excludes revenues associated with the usage or potential savings from large volume customers (extremely large industrial users) and residential customers of Summit Natural Gas of Maine. The allocation to each individual program budget reflects the costs of procuring the MACE potential savings. The budget allocation to the three Strategic Initiatives, Administration, and Inter-Agency Transfers uses the same percentages as in the Electric Budget.

The fourth column presents the proposed budget allocation for the revenues of the RGGI and a small allocation ($300,000 per year to be used for weatherization in low-income homes) from the settlement of the Maine Power Reliability Program. The revenue forecasts of RGGI funds are $16.6 million in FY2017, $17.9 million in FY2018, and $20.9 million in FY2019.[21] In contrast to how the funds were allocated for the Electric Budget and the Natural Gas Budget, programs in this column received budget allocations using the same approach to the allocation made in the Omnibus Energy Bill in 2013. The Omnibus Energy Bill established the Maine Legislature's priority to use RGGI funds to reduce heating demand, lower GHG emissions, and provide maximum benefit to the Maine economy.[22] The specific provision of law establishing this priority expires at the end of FY2016. Notwithstanding the expiration of this provision, the Trust proposes in Triennial Plan III to continue allocating the RGGI funds consistent with the most recent expression of priorities by the Legislature.

The results of this allocation are as follows: After setting aside funds needed for Administration, Strategic Initiatives, and Inter-Agency Transfers, 50% of remaining RGGI funds are allocated to programs principally serving C&I customers; 35% of remaining funds are allocated to programs principally serving residential customers; and 15% of remaining funds are allocated to be transferred to the Public Utilities Commission for disbursement to ratepayers in a manner that provides maximum benefit to the Maine economy.

Within the C&I suite of programs, half of the program budget allocation (i.e., 25% of the total program funds) are allocated to the Custom program, which principally serves very large customers. One-quarter of the C&I budget (i.e., 12.5% of total program funds) is allocated to the Prescriptive Program, earmarked for all-fuels measures, and another quarter of the C&I budget is allocated to all-fuels measures promoted through the New Commercial Construction program.

[21] RGGI, Inc., "RGGI 91Cap-Alt Bank MR," prepared by ICF International, 2014.

[22] 35-A MRS §10109(4)(A).

On the residential side of the equation, the entirety of the residential RGGI program funds (plus the Maine Power and Reliability Project [MPRP] set aside for low-income weatherization) are allocated to the Home Energy Savings Program (HESP) to promote all-fuels measures. Allocating RGGI revenues to the HESP carries forward into Triennial Plan III one of the priorities for these funds — to reduce residential heating demand — that was laid out by the Legislature in the Omnibus Energy Bill of 2013.

The Total Budget, in the fifth column, reflects the sum of the budgets for the prior three columns. This is the total amount that the Trust expects to expend to implement the programs and initiatives of the plan, including financial incentives, marketing, delivery services, technical support, and quality assurance. It does not reflect the costs that would be paid by program participants for energy upgrades.

Columns 6-10 indicate the forecasted benefits from each program which also constitute the performance metrics associated with this Triennial Plan. In order, from left to right, these reflect savings of electricity supply (MWh), electricity capacity (MW), natural gas or other fuel supply (MMBtu), the net present value of lifetime economic benefit, and the B:C ratio when applying the TRC for cost-effectiveness according to the Trust's rules and established practice.

Table 2.6-1: Year One Budget and Metrics

	FY 2017								
Program	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	MMBtu Savings	Lifetime Benefit	B:C Ratio
C&I Custom Program	$5,675,930	$95,516	$3,730,462	$9,501,907	59,611	9.5	76,747	$32,589,222	2.28
C&I Prescriptive Program	$11,345,138	$1,744,869	$1,865,231	$14,955,238	46,183	6.6	135,001	$63,302,199	1.92
Commercial New Construction	$711,935	$291,750	$1,865,231	$2,868,916	2,943	0.4	72,048	$2,941,971	3.47
Commercial Small Business	$2,639,247	$0	$0	$2,639,247	6,618	1.3	0	$6,351,869	2.08
Consumer Products	$13,822,325	$0	$0	$13,822,325	113,049	19.8	0	$64,117,472	3.79
Home Energy Savings Program	$5,549,687	$1,090,845	$5,522,646	$12,163,178	15,892	0.4	132,598	$96,976,311	2.19
Low Income Direct Install	$4,396,332	$0	$0	$4,396,332	15,848	2.4	0	$10,945,312	2.78
Programs Subtotal	**$44,140,594**	**$3,222,980**	**$12,983,569**	**$60,347,143**	**260,144**	**40.4**	**416,394**	**$277,224,356**	**2.33**
EM&V	$882,812	$64,460	$362,000	$1,309,271					
Federal / Other	$0	$0	$0	$50,000					
Innovation	$441,406	$32,230	$181,000	$654,636					
Public Information	$220,703	$16,115	$90,500	$327,318					
Administration	$3,089,842	$225,609	$905,000	$4,220,450					
Inter-Agency Transfers	$441,406	$32,230	$312,154	$785,790					
Total	**$49,216,763**	**$3,593,623**	**$14,834,223**	**$67,694,608**	**260,144**	**40.4**	**416,394**	**$277,224,356**	**2.20**

Table 2.6-2: Year Two Budget and Metrics

Program	FY 2018 Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	MMBtu Savings	Lifetime Benefit	B:C Ratio
C&I Custom Program	$6,249,605	$102,521	$4,040,837	$10,392,962	70,460	11.1	83,073	$33,659,866	2.17
C&I Prescriptive Program	$11,877,678	$1,872,559	$2,020,418	$15,770,655	47,700	6.9	145,478	$66,901,507	1.93
Commercial New Construction	$717,259	$313,096	$2,020,418	$3,050,773	2,943	0.4	77,916	$2,926,932	3.58
Commercial Small Business	$2,651,217	$0	$0	$2,651,217	6,618	1.3	0	$6,300,680	2.15
Consumer Products	$12,666,728	$0	$0	$12,666,728	115,982	20.0	0	$56,249,733	3.78
Home Energy Savings Program	$6,319,038	$1,196,711	$5,957,171	$13,472,920	17,980	0.4	143,401	$105,098,142	2.21
Low Income Direct Install	$4,479,168	$0	$0	$4,479,168	16,573	2.5	0	$9,891,382	2.46
Programs Subtotal	**$44,960,692**	**$3,484,886**	**$14,038,844**	**$62,484,423**	**278,256**	**42.6**	**449,868**	**$281,028,243**	**2.27**
EM&V	$899,214	$69,698	$388,000	$1,356,912					
Federal / Other	$0	$0	$0	$50,000					
Innovation	$449,607	$34,849	$194,000	$678,456					
Public Information	$224,803	$17,424	$97,000	$339,228					
Administration	$3,147,248	$243,942	$905,000	$4,296,191					
Inter-Agency Transfers	$449,607	$34,849	$325,154	$809,610					
Total	**$50,131,172**	**$3,885,648**	**$15,947,998**	**$70,014,818**	**278,256**	**42.6**	**449,868**	**$281,028,243**	**2.14**

Table 2.6-3: Year Three Budget and Metrics

Program	FY 2019 Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	MMBtu Savings	Lifetime Benefit	B:C Ratio
C&I Custom Program	$7,219,254	$113,983	$4,771,412	$12,104,648	82,950	12.7	97,594	$36,496,842	2.02
C&I Prescriptive Program	$14,309,018	$2,065,123	$2,385,706	$18,759,847	57,743	8.2	165,445	$79,030,553	1.95
Commercial New Construction	$805,949	$344,989	$2,385,706	$3,536,644	3,254	0.5	90,930	$3,098,577	3.52
Commercial Small Business	$3,305,519	$0	$0	$3,305,519	8,025	1.5	0	$7,682,212	2.19
Consumer Products	$11,806,794	$0	$0	$11,806,794	119,310	20.3	0	$53,977,861	4.05
Home Energy Savings Program	$7,866,542	$1,306,277	$6,979,976	$16,152,795	22,260	0.5	166,183	$124,107,539	2.24
Low Income Direct Install	$5,009,564	$0	$0	$5,009,564	18,207	2.7	0	$10,573,952	2.33
Programs Subtotal	**$50,322,640**	**$3,830,372**	**$16,522,799**	**$70,675,811**	**311,750**	**46.5**	**520,152**	**$314,967,535**	**2.24**
EM&V	$1,006,453	$76,607	$449,200	$1,532,260					
Federal / Other	$0	$0	$0	$50,000					
Innovation	$503,226	$38,304	$224,600	$766,130					
Public Information	$251,613	$19,152	$112,300	$383,065					
Administration	$3,522,585	$268,126	$905,000	$4,695,711					
Inter-Agency Transfers	$503,226	$38,304	$355,754	$897,284					
Total	**$56,109,744**	**$4,270,865**	**$18,569,653**	**$79,000,262**	**311,750**	**46.5**	**520,152**	**$314,967,535**	**2.11**

3. Regulatory Framework

3.1 Purpose of Trust

As enumerated in the Efficiency Maine Trust Act (or "the statute"), the purposes of the Trust are to:

- Provide uniform, integrated planning, program design and administration of programs;
- Reduce energy costs and improve security of the state and local economies;
- Administer cost-effective energy and energy efficiency programs to help individuals and businesses meet their energy needs at the lowest cost;
- Ensure that all expenditures of the trust are cost-effective in terms of avoided energy costs; and
- Actively promote investment in cost-effective energy and energy efficiency measures and systems that use alternative energy resources that reduce overall energy costs for consumers in the State.[23]

In order to develop and administer programs that will help meet Maine's energy needs at the lowest cost and improve its economic security, the statute identifies several goals for the Trust to pursue:

1. Reducing the cost of energy to residents of the State
2. Maximizing the use of cost-effective weatherization and energy efficiency measures
3. Reducing economic insecurity from overdependence on price-volatile fossil fuels
4. Increasing new jobs and business development to deliver affordable energy and energy efficiency products and services
5. Enhancing heating improvements for households of all income levels through implementation of cost-effective efficiency programs, including weatherization programs and affordable heating systems, that will produce comfort, improve indoor air quality, reduce energy costs, and reduce the need for future fuel assistance
6. Simplifying and enhancing consumer access to technical assistance and financial incentives relating to energy efficiency and the use of alternative energy resources by merging or coordinating dispersed programs under a single administrative unit possessing independent management and expertise
7. Using cost-effective energy and energy efficiency investments to reduce GHG emissions[24]

3.2 Program Funds – Objectives, Funding, and Implementation Requirements

The Trust is the designated recipient and administrator of several funding streams. As described in more detail below, the Trust is directed by statute to use these funding streams to promote the more efficient and affordable use of energy and customer-sited alternative energy systems.

[23] 35-A MRS §10103 (1).

[24] 35-A MRS §10103(1)(B).

While some of the Trust's funding streams are automatically recurring, the statute also contemplates that the Trust may access other funds. It may apply for grants from public or private sources, deposit the proceeds of bonds into program funds, collect revenue from the FCM or other capacity payments, and accept funds from the energy infrastructure benefits fund as well as any "other funds received by or from any entity with which the Trust has an agreement or contract."[25]

An important feature of the Trust is its fiduciary responsibility. The funds it receives from electric and natural gas ratepayers, and from the RGGI, are required to be held in trust for the benefit of the energy consumers who pay for the funds.

3.2.1 Electric Efficiency and Conservation Fund

The Electric Efficiency and Conservation Fund is dedicated to programs designed to reduce inefficient use of electricity. The goal of programs supported by this Fund is to help reduce energy costs for electricity consumers. The objectives enumerated in statute for the use of this Fund are to:

- Increase consumer awareness of cost-effective options;
- Create favorable market conditions for increased use of energy efficiency;
- Promote sustainable economic development and reduce environmental damage;
- Reduce the price of electricity over time for all consumers by reducing demand during peak use periods; and
- Reduce total energy costs for electricity consumers.[26]

The principal revenue stream for this Fund comes from payments made by the utilities directly to the Trust for the procurement of cost-effective energy efficiency (the "Electric Efficiency Procurement" or "Procurement"). The payments are deemed by statute to be a just and reasonable element of utility rates. The amount of the Electric Efficiency Procurement is determined by establishing the budgets necessary to capture the MACE energy efficiency potential, which amount is reduced by electricity efficiency resources that are reasonably foreseeable to be achieved using other revenue streams (including any payments from the RGGI, settlements like the Maine Power Reliability Program, and proceeds from the FCM). The Procurement is statutorily capped at 4% of total revenues from retail electricity supply sales and transmission and distribution sales.[27]

While pursuing the enumerated objectives, the Trust allocates budgets and deploys strategies for the Electric Efficiency and Conservation Fund with the target of ensuring a reasonable opportunity for all customers to participate. The statute expressly directs the programs paid for through this fund to:

- Target at least 10% of the Electricity Efficiency Procurement or $2.6 million, whichever is greater, to Low Income residential customers;

[25] 35-A MRS §10103(4).
[26] 35-A MRS §10110(2)(A).
[27] 35-A MRS §10110(4)(A).

- Target at least 10% of the Electricity Efficiency Procurement or $2.6 million, whichever is greater, to Small Business customers; and
- Apportion the remaining funds among customer groups and geographic areas in a manner that allows all other customers to have a reasonable opportunity to participate in one or more conservation programs.[28]

The Trust runs multiple programs funded in whole or in part with this fund, including the Retail Products Program (for lights and appliances), the Business Incentive Program (providing incentives for lights, refrigeration, HVAC, air compressors, drives, etc.), the Small Business Initiative, and Low Income Initiatives.

3.2.2 Natural Gas Conservation Fund

The Natural Gas Conservation Fund is established in statute with the goal of promoting the efficient use of natural gas. Objectives for the use of the fund are to:

- Increase consumer awareness of cost-effective options for conserving natural gas;
- Create more favorable market conditions for the increased use of efficient natural gas products and services; and
- Promote sustainable economic development and reduce environmental damage through the more efficient use of natural gas.[29]

Revenues to the Natural Gas Conservation Fund derive from an assessment on natural gas utilities' which are statutorily deemed to be just and reasonable costs to be included in rates. The amount of the assessment is directed by statute to be the amount that is necessary to capture all cost-effective energy efficiency that is achievable and reliable.[30] In 2013, the Legislature changed the law that previously limited application of the Natural Gas Conservation Fund assessments to the largest gas utility in the state, Northern Utilities (dba Unitil). The amended law expands the Fund's applicability to all local distribution companies (LDCs) providing natural gas in Maine, including Bangor Natural Gas, Maine Natural Gas, and Summit Natural Gas of Maine.

Consistent with the statute, the Trust targets the funds of the Natural Gas Fund so that a reasonable percentage will go to low income residential customers and to small business customers, and so that remaining funds "allow all other [natural gas utility] consumers to have a reasonable opportunity to participate" in the programs.[31]

The Natural Gas Conservation funds are presently used to promote home weatherization among Unitil's residential customers and to rebate a portion of the cost of new, high efficiency gas equipment installed by Unitil's business customers.

[28] 35-A MRS §10110(2)(B).
[29] 35-A MRS §10111(1).
[30] 35-A MRS §10111(2).
[31] 35-A MRS §10111(1)(B)(3).

3.2.3 The RGGI Fund

RGGI is a nine-state regional program to limit carbon emissions from electricity generators. Maine joined RGGI in 2009 at the time the program was established. Under the program, large generators are required to purchase "carbon allowances" in an amount equal to their carbon emissions. Allowances are sold at quarterly auctions for this purpose. In Maine, proceeds from the auctions are transferred to the RGGI Trust Fund managed by the Trust.[32] The statute expressly emphasizes that the Trustees have a fiduciary duty to the customers of the electric utilities and that the RGGI funds are to be held in trust for the purposes of benefiting those customers.

The RGGI Trust Fund is to be used for energy conservation programs that reliably reduce electricity consumption or GHG emissions, giving priority to measures with the highest B:C ratio. In contrast to the situation with the Electric Efficiency and Conservation Fund, the state's largest electricity consumers who take electricity at the Transmission and Sub-Transmission level are eligible for funding from the RGGI Trust Fund.

The price per ton of carbon allowance, and the total number of tons of carbon allowances sold, has varied over the first five years of RGGI auctions. In the initial years of RGGI, annual auction revenues to Maine's RGGI Trust Fund were more than $11 million per year. In the period from 2012 to 2013, the combination of reduced electricity consumption during the economic recession and a major switch by generators from oil to natural gas led to a drop in carbon emissions and a glut of carbon allowances. During that time, revenues from RGGI auctions fell to between $4 million and $6 million per year. In the period governed by this Triennial Plan, the Trust is projecting revenues to the RGGI Fund at approximately $16,600,000 for 2017, $17,900,000 for 2018, and $20,960,000 for 2019.

3.2.4 Energy Efficiency and Renewable Resource Fund

The Renewable Resource Fund was originally established to support research and development (R&D) and demonstration projects for renewable energy.[33] In 2011, the law was modified to further authorize the fund to be used to provide rebates for customer-sited, commercialized renewable energy equipment, meeting a cost-effectiveness test. In 2012, a bill from the Governor modified the law again, allowing voluntary contributions made to the fund to be used for energy efficiency projects (in addition to renewable energy projects) and changing the name of the fund to the Energy Efficiency and Renewable Resource Fund.

At various times during the period covered by Triennial Plans I and II, this fund received revenues from voluntary contributions made by electricity ratepayers; from alternative compliance payments made by electricity suppliers (as a means to complying with their requirements to supply renewable energy); from federal grants; and from a dedicated SBC in the amount of 0.005 cents/kWh for every unit of electricity consumed in Maine. In 2010, statutory authorization for this dedicated SBC "sunset" and was not reauthorized, ending this source of funds. In recent years, all funds from federal grants and the SBC were fully expended. Also, revenues to the fund from alternative compliance payments dropped to zero

[32] 35-A MRS §10109.

[33] 35-A MRS §10121 and §3210(9)(B).

and revenues from voluntary ratepayer contributions fell to approximately $50,000 per year. For the period covered by Triennial Plan III, the Trust will assume that funding for this fund will be limited to revenues from voluntary contributions at a level of $50,000 per year.

3.2.5 Federal Energy Programs

Regarding the use of funds received from the federal government, the statute provides that the Trust shall oversee and administer:

A. The US DOE State Energy Program; and

B. Other federally funded programs and projects related to Trust programs.[34]

During the period of the first Triennial Plan, the Trust administered programs funded by six separate federal grants totaling more than $93 million. Nearly all of this amount came through one-time grants from the American Recovery and Reinvestment Act of 2009 (ARRA) which, except for certain revolving loan funds, was not be available for programs during the period of this Second Triennial Plan. A notable exception was revenues received from the recurring State Energy Program formula grant, which in recent years occasionally provided between $20,000 and $50,000 per year for the Trust to invest in energy programs. The Trust intends to apply for federal grants through competitive requests for proposals (RFPs) when funding from those solicitations present a good fit with the Trust's mission and Triennial Plan. However, at this time and for purposes of budgeting and planning, the Trust is not forecasting receipt of any federal grants during Triennial Plan III.

As with any federal grants, the allowable uses are set by the granting federal agency and memorialized in contract terms are agreed to between the Trust and the granting agency.

3.3 Long-Term Targets

As described above, each individual funding stream established by statute is given specific goals, objectives, and targets. Each also has specific requirements and restrictions as to the fund's use. While these fund-specific directives govern the funding and implementation of programs from day to day and year to year, the Trust is also guided by several over-arching targets that play out over a period of 10 to 20 years. The long-term targets enumerated in statute are:

1. Reducing energy costs, including residential heating costs;
2. Weatherizing substantially all homes whose owners or occupants are willing to participate and share the cost of cost-effective home weatherization;
3. Reducing peak-load electric energy consumption by 300 MW by 2020;
4. Reducing the State's consumption of liquid fossil fuels by at least 30% by 2030;
5. By 2020, achieving 20% savings of electricity, natural gas savings and heating fuel;
6. Creating stable private sector jobs providing alternative energy and energy efficiency products and services in the State by 2020; and

[34] 35-A MRS §10115(1).

7. Reducing GHG emissions, with a goal of 10% below 1990 levels by 2020, from the heating and cooling of buildings in Maine.[35]

3.4 Principles of Administration

Leading up to the legislative decision to shift responsibility for administering programs to the new, independent Trust, there was robust policy debate about what principles should guide the implementation of programs. A consensus emerged and was endorsed by the then-active advisory Energy Conservation Board to increase the focus on customers' energy needs; promote independent and objective planning and decision-making; enhance nimbleness and flexibility in program management in order to adjust quickly to changes in energy prices and the emergence of new technologies or program strategies; and, promote efficient administration, transparency, and accountability.[36]

These industry best practices were later codified in the Efficiency Maine Trust Act, which directs the Trust to ensure that program design and implementation conform to enumerated "Principles of Administration," in order to be:

- **Consumer-Oriented.** Programs are consumer-oriented such that the processes for participation and program design are targeted to serve the multiple needs of energy consumers in this State.
- **Independent, Objective, Nimble.** The effectiveness of programs is maximized by building up and centralizing expertise, addressing conflicts of interest, mitigating the influence of politics, promoting flexible, timely program management and providing a champion for funding cost-effective energy and energy efficiency.
- **Efficient.** The efficiency with which programs are planned, designed, overseen and delivered is maximized.
- **Sustainable.** Sufficient checks and balances are provided to ensure consistency with public policy and accountability so that energy efficiency programs in the State are sustainable for the long term.[37]

The model of using an independent, third-party administrator such as the Trust to help achieve these principles in the administration of efficiency programs and alternative energy programs is becoming more common across the U.S. This model is also employed in Delaware, the District of Columbia, Hawaii, New Jersey, New York, Oregon, Wisconsin, and Vermont.

[35] 35-A MRS §10104(4)(F).

[36] Energy Conservation Board, "Principles for Consolidating Energy Efficiency Administration," March 30, 2009.

[37] 35-A MRS §10104(2).

3.5 Other Statutory Directives

The PACE Act

The Property Assessed Clean Energy (PACE) Act was enacted in Maine in 2010 to facilitate financing of energy saving improvements in Maine buildings.[38] The PACE Act establishes underwriting standards for small loans (up to $15,000) and authorizes the Trust to administer a program of marketing, financing and servicing loans for energy upgrades.

Capacity Resource Adequacy

In recent years, the Maine Legislature enacted a provision authorizing the Commission to approve long-term contracts for capacity and energy under specific circumstances.[39] The purposes of this provision include:

- To reduce electric prices and price volatility for the State's electricity consumers and to reduce GHG emissions from the electricity generation sector; and
- To develop new capacity resources to reduce demand or increase capacity so as to mitigate the effects of any regional or federal capacity resource mandates.[40]

Among other things, the Commission may contract with the Trust to deliver energy efficiency capacity resources and the available energy that is associated with such resources.[41]

Potential Energy Infrastructure Revenues

In 2009, the Maine Legislature established a process by which proposals for electricity transmission lines or gas pipelines could apply for and be permitted to use the existing rights-of-way along certain state-owned corridors: I-95, I-295 and the Searsport-Loring pipeline easement. The law provides that until July 31, 2017, in the event a transmission line or pipeline is permitted to use one of these corridors, a portion of the payments from the project due to the state will be deposited in the Energy Infrastructure Benefits Fund which is to be established and managed by the Trust.[42] The statute further directs that the Trust is to use any such proceeds from the Energy Infrastructure Benefits Fund to be invested for grants, loans, programs and incentives "[t]o improve the State's economy by pursuing lower energy costs for people, communities and businesses in a manner that will enhance the environment of the State in accordance with the triennial plan."[43] To date, no payments have been made to the Fund and no qualifying projects have been permitted that would require payments to the Fund.

3.6 Program Guidelines

The regulatory framework in which the Trust operates starts with the statutory provisions outlined above. This framework is given more detailed explanation through a series of rules that the Trust (or

[38] 35-A MRS §10151 et seq.

[39] 35-A MRS §3210(C).

[40] 35-A MRS §3210(C)(2)(B) and (2)(C).

[41] 35-A MRS §3210(C)(6)(A).

[42] 35-A MRS §122(6-A) and (6-B); see also, 5 MRS §282(9).

[43] 35-A MRS §10103(4-A).

the PUC, the Trust's predecessor in administering Efficiency Maine programs) has adopted and through Program Guidelines. The Trust's rules, codified at Section 95-648 of the Code of Maine Rules, and individual program guidelines are all available on the Efficiency Maine website at www.efficiencymaine.com.

3.7 Oversight from the Public Utilities Commission

The Commission has oversight of the Trust's program planning and administration.[44] As mentioned above, the Triennial Plan must ultimately be approved by the Commission. The Commission will approve the Plan if it reasonably explains how the programs will achieve the requirements of the statute and the performance metrics contained in the Plan.

The Commission's oversight includes evaluating performance of the programs and ratifying the performance metrics if the metrics conform with the statute's principles of program administration and are in the public interest. The Commission may open an investigation and issue appropriate orders to address concerns of non-compliance. The Commission is empowered to establish a fund to cover the costs of its oversight responsibilities.

3.8 Legislature

The Trust has an ongoing relationship with its committee of jurisdiction in the Maine Legislature — the Energy, Utilities and Technology Committee. On December 1 of each year, the Trust presents to the Committee the annual report of the prior year's activities, results, and financials. On January 30 and July 30 of each year, the Trust also submits to the Committee year-to-date financial updates and the operating budget. By practice, the Trust typically also provides a briefing on the annual report and plans for the year ahead to the Committee early in the year for each legislative session. Periodically through the course of a session, the Trust provides briefings, written information, analysis and testimony about energy issues. When a Triennial Plan is being developed, the Trust provides an opportunity for the members of the Committee to ask questions and give input.

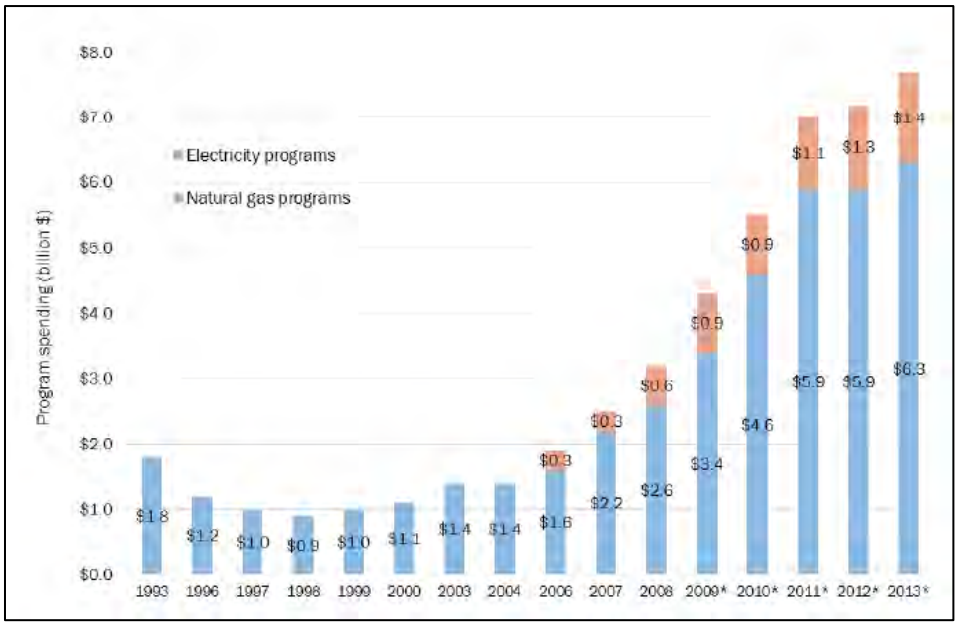
[44] See, generally, 35-A MRS §10104(4) and §10120.

4. Results and Goals

4.1 Recent History for Energy Efficiency Programs

Nationally, energy efficiency programs are well-established as a means for cost-effectively lowering energy bills and reducing carbon dioxide and other air pollutants. Efficiency programs also have proved successful in promoting business profitability, local economic development, and jobs. It should be no surprise then to learn that across the U.S., $7.7 billion was invested in 2013 through programs to promote the more efficient use of electricity, heating fuels and industrial process fuels. This 550% increase in nationwide funding for energy efficiency programs over the past decade reflects the growing recognition that efficiency is a low-cost, low-carbon, indigenous, and highly reliable energy resource.

Figure 4.1-1: National Energy Efficiency Program Spending[45]



Energy efficiency programs have been delivering cost savings in Maine for decades. Before the restructuring of Maine's electric utilities in 2000, the investor-owned utilities — Central Maine Power, Bangor Hydro Electric, and Maine Public Service — were vertically integrated, owning and managing generation stations as well as the transmission and distribution lines. They also offered energy efficiency programs to their customers. Among the first energy efficiency programs in the country, these initiatives were referred to as Demand Side Management (DSM) programs. Showing their commitment to providing Maine ratepayers with low-cost energy efficiency, Central Maine Power proposed and the Commission approved DSM budgets above $20 million per year in the early- and mid-1990s.

[45] From 1993 to 2008, values represent actual program spending (including customer-funded programs); from 2009 on, they represent program budgets. Natural gas spending is not available for the years 1993–2004. Sources: Nadel, Kubo, and Geller 2000; York and Kushler 2002, 2005; Eldridge et al. 2008, 2009; Molina et al. 2010; Sciortino et al. 2011; Foster et al. 2012; Downs et al. 2013. Reprinted from ACEEE 2014 State Scorecard, p. 19.

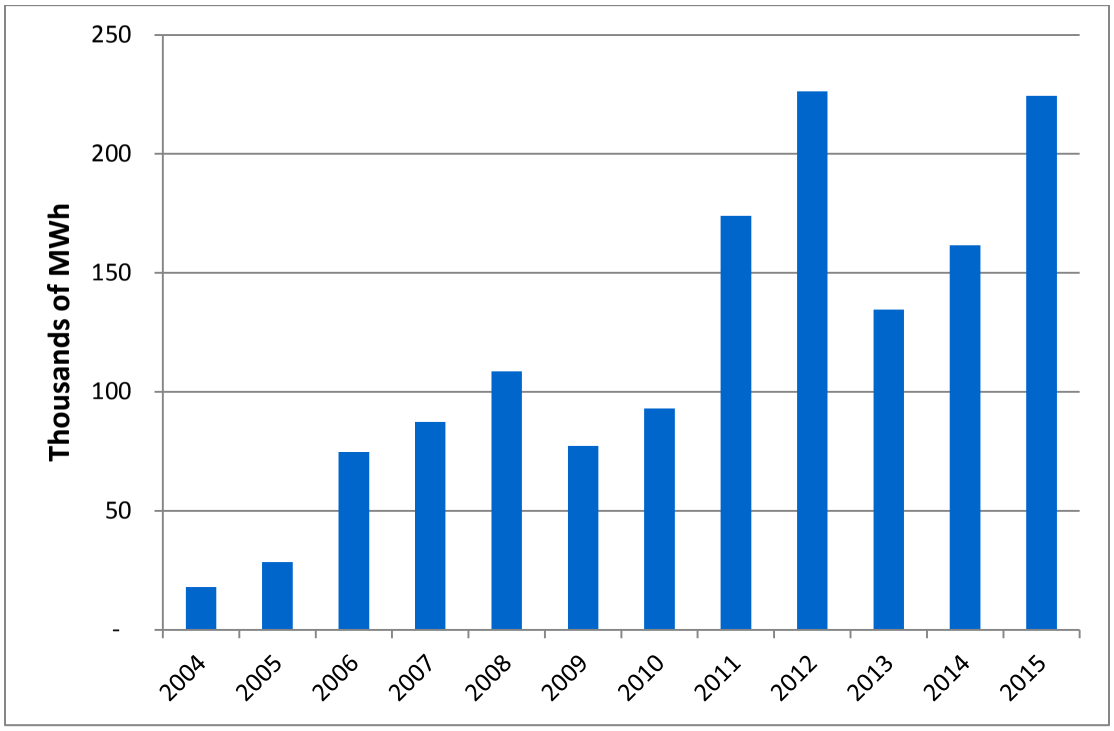
Starting in 2002, the Commission assumed responsibility for administering statewide energy efficiency programs funded with a SBC. Over eight years, the programs grew from a handful of small educational and training initiatives to a full-fledged efficiency program, branded as "Efficiency Maine," offering energy saving measures from the smallest low-income residential setting to the largest paper mills. Under Commission management, the Efficiency Maine programs adopted a market-based approach that relied on developing a network of trade allies (e.g., electrical and plumbing contractors, equipment suppliers, architects and engineers) who are referred to as "Qualified Partners" (or "QPs"). Efficiency Maine also targeted residential and business lighting, among the most cost-effective opportunities for energy savings, and helped transform the market to high-efficiency compact fluorescent bulbs and high-performance T-8 linear fluorescent tubes. During this period, the Efficiency Maine programs were funded at a level of about $9 million per year in the middle of the decade. As the pre-existing Power Partners programs reached their end and made more funds available for Efficiency Maine, the budgets for electricity savings programs grew to between $14 million and $15 million annually by 2009.

In 2009, the State enacted legislation to shift responsibility for administering Efficiency Maine programs to a newly established, independent trust — the Efficiency Maine Trust. Starting on July 1, 2010, the Trust consolidated responsibility for administering multiple revenue streams, including the Electric Conservation Fund, the Natural Gas Conservation Fund, the newly created RGGI Fund, the Renewable Resource Fund, and the federally funded State Energy Program. The mission given to the new Trust by the Legislature was to coordinate and, where appropriate, to integrate the administration of electric and thermal efficiency programs and alternative energy programs.

4.2 Energy Savings

Looking at the results of the electricity savings programs, the following figures show that Efficiency Maine has been steadily delivering energy savings and lowering energy costs to Maine's electric utility customers. Figure 4.2-1 shows the annual electrical savings from Efficiency Maine programs from FY2004 to FY2015. On average, electric equipment upgrades last more than a decade, so cumulative annual savings of the measures will be multiplied across many years. This will persist until the end of the measure life.

Figure 4.2-1: Efficiency Maine Programs Annual MWh Savings (2004–2015)



4.3 Financial Savings (Benefits)

Energy and capacity savings from efficiency projects are the chief contributors to financial savings, which are referred to in the Trust's calculus of cost-effectiveness as "benefits." The financial savings represent the net cost that is avoided, or not paid, by the customer and other ratepayers as a result of the efficiency upgrade. Over the past decade Efficiency Maine programs have been delivering significant benefits that dramatically outweigh the total costs.[46]

Figure 4.3-1 and Figure 4.3-2 highlight the financial savings, over the full lifetime that efficiency upgrades remain operational, for Efficiency Maine's two largest, most popular, and longest-running programs — the Business Incentive Program and the Residential Lighting Program.[47] Because the financial benefits are a function of the price of the energy that is being avoided, they may decrease even as budgets or energy savings are increasing.

[46] "Total Costs" reflect the sum of the Trust's costs for administration and financial incentives plus the incremental capital and operating costs paid by the customer.

[47] In Triennial Plan III, the Trust has renamed these two programs — now the C&I Prescriptive Program and the Consumer Products Program, respectively — and made minor modifications to the program designs.

Figure 4.3-1: Business Incentive Program Benefits (Lifetime) vs. Costs

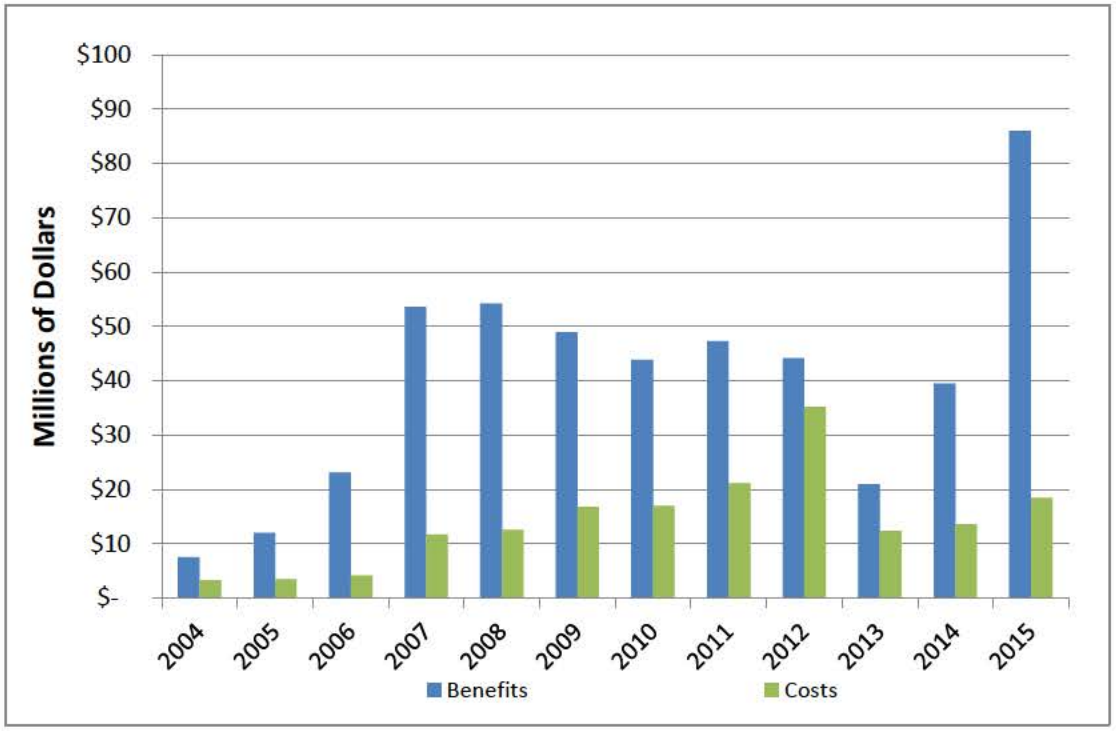


Figure 4.3-2: Residential Lighting Program Benefits (Lifetime) vs. Costs

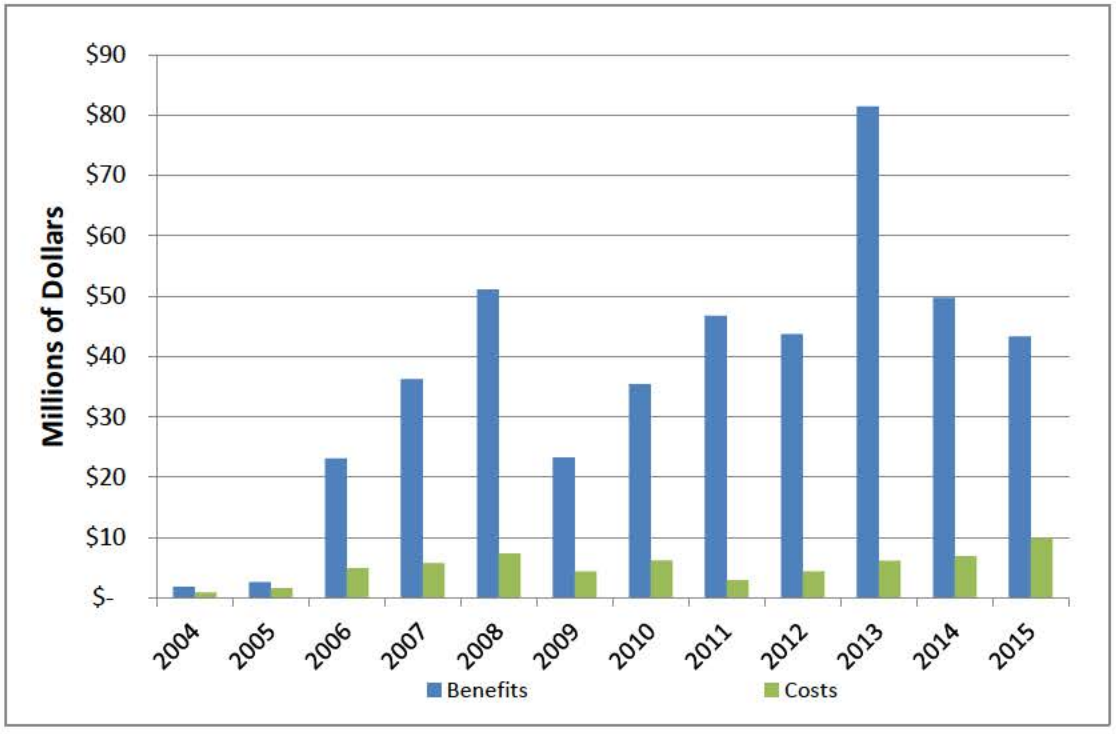
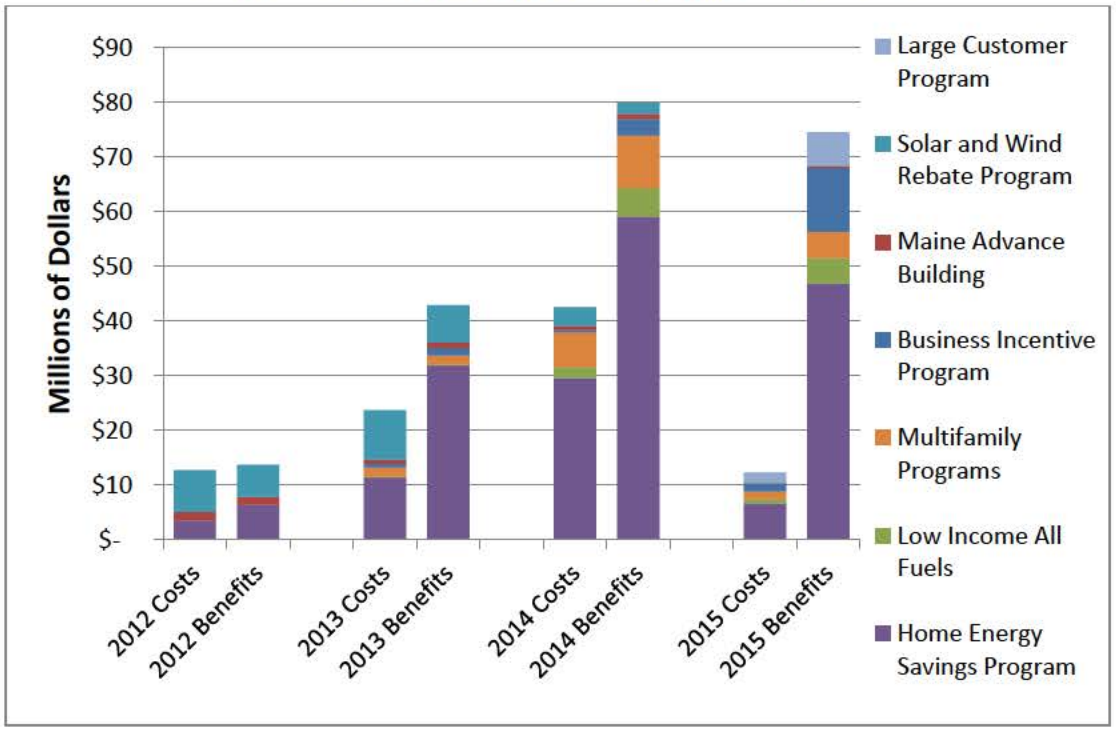


Figure 4.3-3 highlights the Trust's all-fuels programs. All-fuels programs are programs designed to achieve energy savings regardless of fuel type. For purposes of allocating budgets and tracking savings, the term all-fuels is limited to characterizing the impacts on unregulated fuels such as oil, propane, kerosene or wood. These programs have delivered a large amount of heating fuels savings over the past three years. This increase in savings is driven primarily by activity in the HESP.

Figure 4.3-3: All Fuels Program Benefits (Lifetime) vs. Costs



4.4 The Low Price of Efficiency

A different way to look at the value of energy efficiency programs is to translate the cost savings into a price per unit of supply. When the total of the costs paid by the Trust and the incremental costs paid by participating customers is spread across the lifetime energy savings (e.g., electricity saved) of each year's projects, the result is a price to deliver a unit of energy savings that we can usefully compare to the value of a unit of energy supply that is being avoided. As reported in each of the Trust's Annual Reports from FY2011 – FY2014, the total cost of electricity efficiency has ranged from 2.5 to 3.5 cents/kWh saved.

4.5 Goals

As noted above, section 10104(4)(F) of the statute provides that an objective of the Triennial Plan is to design, coordinate and integrate programs that advance six long-term goals related to: reducing costs; weatherizing homes; reducing peak-load electricity demand; achieving savings of electricity, natural gas, and heating fuels; building private sector jobs; and, reducing GHG emissions. These goals, as revised

through the Omnibus Energy Bill in 2013, and the Trust's progress in advancing them, are presented below.

4.5.1 Reducing Energy Costs, including Residential Heating Costs

The Maine statute provides the Trust the general goal of reducing energy costs in Section 10104(4)(F)(1) of Title 35-A. It does not provide a specific targeted amount of cost reduction. Rather, the statute directs the Trust to use energy efficiency, conservation and alternative energy resources to "help individuals and businesses meet their energy needs at the lowest cost"[48] and, specific to electricity customers, to "reduce energy costs for electricity consumers in the State by the maximum amount possible."[49] The annual and lifetime energy cost reductions achieved through the Trust's programs are provided in the Trust's annual reports, all of which are posted online.[50]

4.5.2 Weatherizing All Homes by 2030

The second long-term statutory goal, found at Section 10104(4)(F)(2) of Title 35-A, is to weatherize substantially all homes whose owners or occupants are willing to participate in and share the costs of cost-effective home weatherization to a minimum standard of weatherization, as defined by the Trust, by 2030.

Since the launch of the first phase of HESP (HESP 1) in 2010, the Trust has provided rebates for energy upgrades in more than 25,000 participating Maine homes, specifically:

- 2010–2011: 3,200 participants in HESP 1
- 2012–2013: 8,000 participants in Air Seal Initiative
- 2013–2015: 15,000 participants in the second phase of HESP (HESP 2)

The Trust has seen a large increase in the number of homes installing weatherization measures since the Trust launched the second phase of HESP in September 2013. In 24 months, HESP 2 processed home energy upgrades in more than 10,000 homes.

This Triennial Plan proposes an approach to reach all Maine homes before 2030. That said, the Plan does not propose or identify a source of funding that could support this proposal. Figure 4.5-1 illustrates the number of homes that participated in a weatherization program and have completed at least one prescriptive heating demand savings measure recognized and recorded by a Trust program. (It does not reflect homes that made improvements on their own, without participation in an Efficiency Maine Trust program, nor does it reflect the 200 to 300 homes per year that are weatherized through the federally funded programs to assist Low Income residents administered by the Maine State Housing Authority.) Assuming additional funding were established, the Trust would ramp up towards weatherizing 35,000 homes per year by 2020. The Trust would then ramp down efforts towards home

[48] 35-A MRS §10103(1)(B).

[49] 35-A MRS §10110(2).

[50] http://www.efficiencymaine.com/about/library/reports/.

weatherization after 2026 until approximately 550,000 homes have participated in weatherization by 2030.

For the Triennial Plan II, the Trust assumed that approximately 20% (or 100,000 units) of the state's homes had been weatherized in prior years or were recently built and do not require additional weatherizing. A recent residential baseline study showed that 20% of Maine homes have basement insulation. Using that figure as a proxy for weatherization, the Trust will continue to assume that 100,000 homes are already weatherized.

Figure 4.5-1: Weatherizing Plan

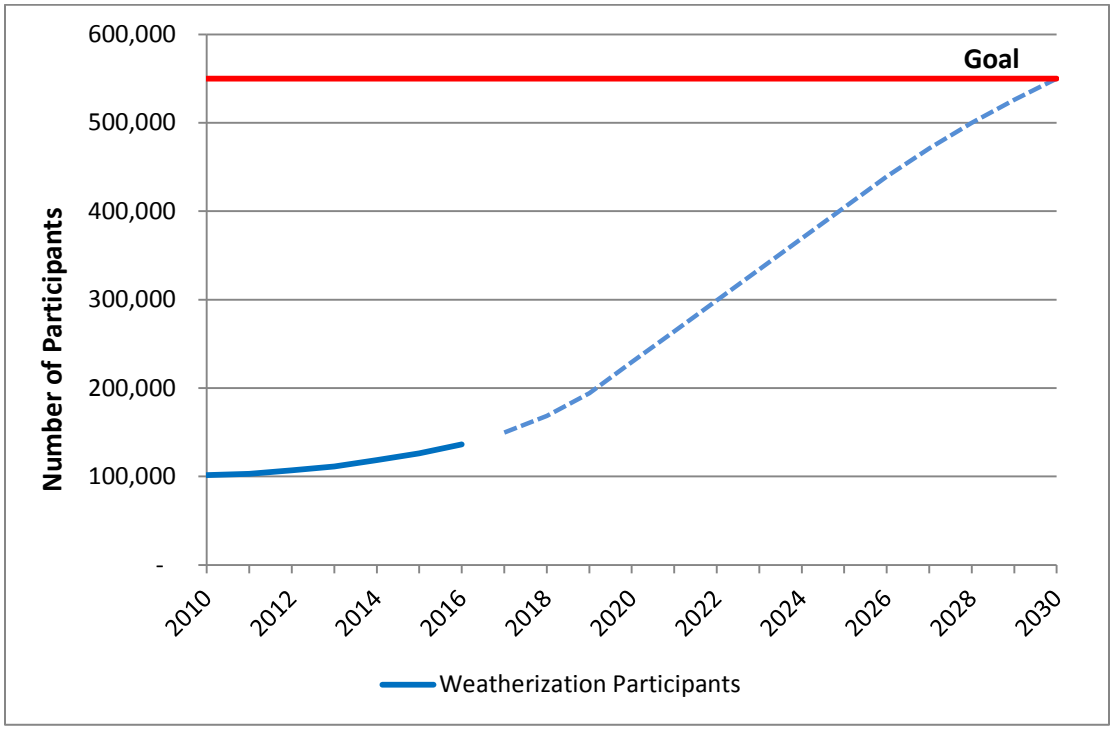
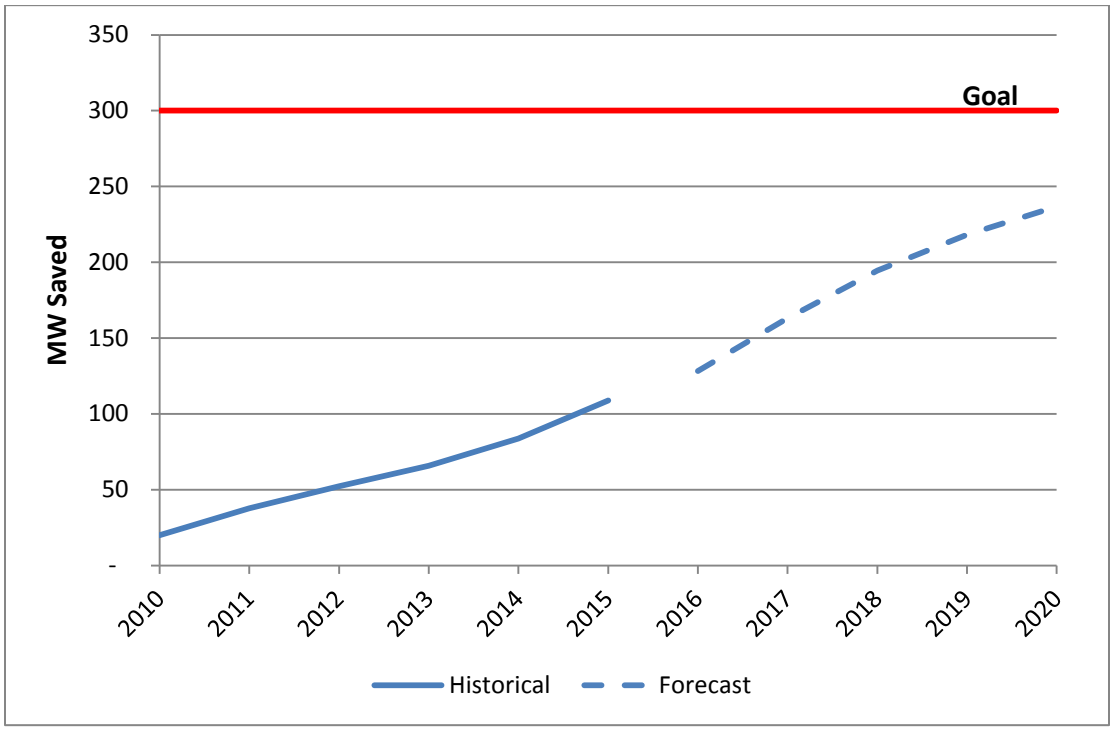


Figure 4.5-2**: Reducing Peak Load Electricity Demand by 300MW by 2020**



4.5.3 Achieving 20% Electricity Savings by 2020

Part of the fourth statutory long-term goal is to achieve electricity savings of at least 20% by 2020. In developing Triennial Plan I, the Trust elected to set 2007 as the baseline from which the target of achieving 20% electricity savings.[51] The Trust selected 2007 as the baseline at the time because it was the most recent year with complete consumption data; it would have been fresh in legislators' minds when they were debating the bill that initially set the goals in the fall of 2008 and winter of 2009; and, it pre-dated the recession so was viewed as being more representative of typical consumption levels.

The electricity savings goal was arrived at by multiplying the 2007 consumption (or "load") by 20%. The resulting target is slightly more than 2.3 million MWh of savings, as represented by the horizontal red line in Figure 4.5-3. The target does not shift according to changes in load forecasts into the future. When applied in this way, the goal assures that economic growth in Maine is not inhibited.

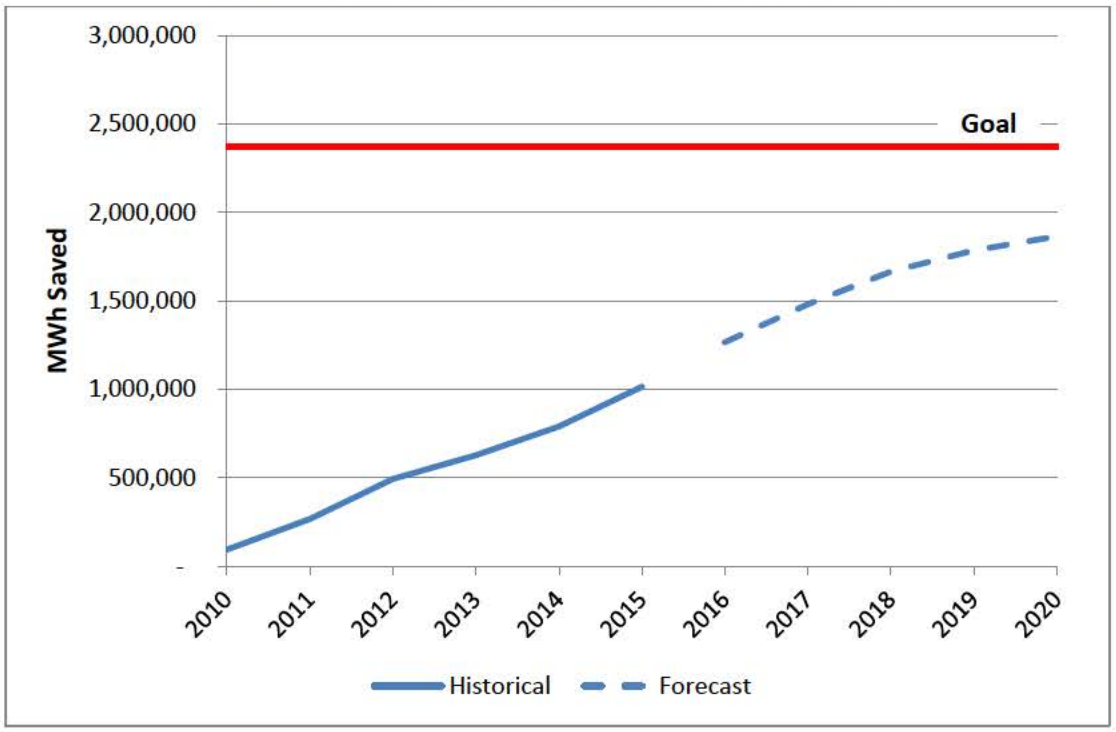
As in the two prior plans, this Triennial Plan recognizes that "savings" means that a quantifiable amount of energy has been saved as the result of an energy efficiency project or program, and that less electricity will be consumed relative to what would have happened without the project or program. It does not necessarily mean that net electricity consumption will decrease relative to the load in 2007. For example, if a factory installs high efficiency drives and controls that save energy compared to the old equipment, and at the same time decides to add a third shift of operations, the Trust still counts the savings even though net electricity consumption at the plant will increase due to the third shift.

[51] Optimal Energy Inc., "Strawman" Stakeholder Input Facilitation Tool, January 2010, p. 7.

Furthermore, given the increasing popularity of mini-split heat pumps and the prospect of more electric vehicles entering the marketplace, the Trust aims to promote higher efficiency purchases rather than to discourage new consumption. The Trust views energy savings as a way to help Maine's economy grow by enabling businesses and residents to stretch their energy dollars further; the Trust does not view the goal as a requirement that, by 2020, Maine's electricity consumers should be using 20% less electricity than they did in 2007.

Figure 4.5-3 shows that through 2015, the Trust programs' "historical" savings will come close to 1,000,000 MWh in savings.

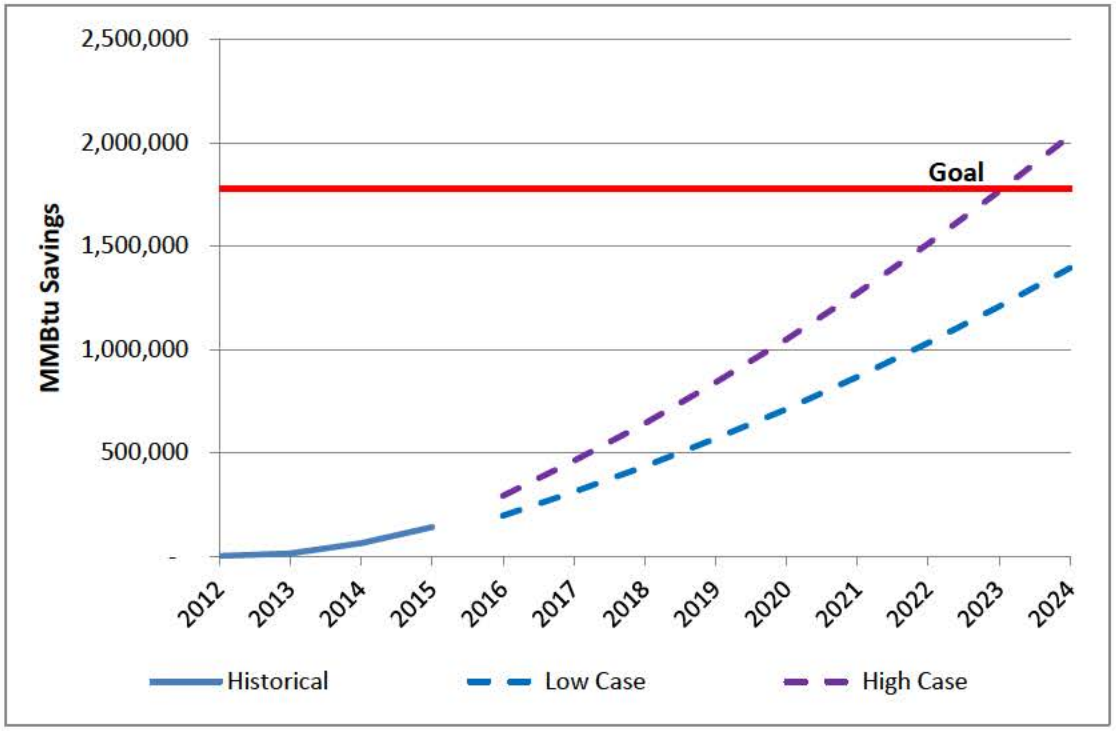
Figure 4.5-3: Achieving Electricity Savings of 20% by 2020



4.5.4 Achieving 20% Natural Gas Savings by 2020

Part of the fourth statutory long-term goal is to achieve natural gas program savings of at least 20% by 2020. The Trust's historic and forecasted progress towards achieving 20% savings of natural gas and capturing all cost-effective natural gas is illustrated in Figure 4.5-4. Using the 2007 Baseline, the target for 2020 is to save 1.78 million dekatherms (Dth) or MMBtu. As the figure shows, the Trust's programs through 2015, during which time program activity was essentially limited to Unitil customers around Portland and Lewiston/Auburn, will have reached 213,000 MMBtu of savings. From that point forward, as programs expand to serve customers in all four natural gas utilities across the state, savings are projected to reach between 1.6 million and 2.4 million MMBtu by 2020, depending on funding levels. The two scenarios are based on the high and low cases identified by the 2014 natural gas potential study. The Trust is proposing to base its savings projections and proposed budget off of the low-case scenario for Triennial Plan III.

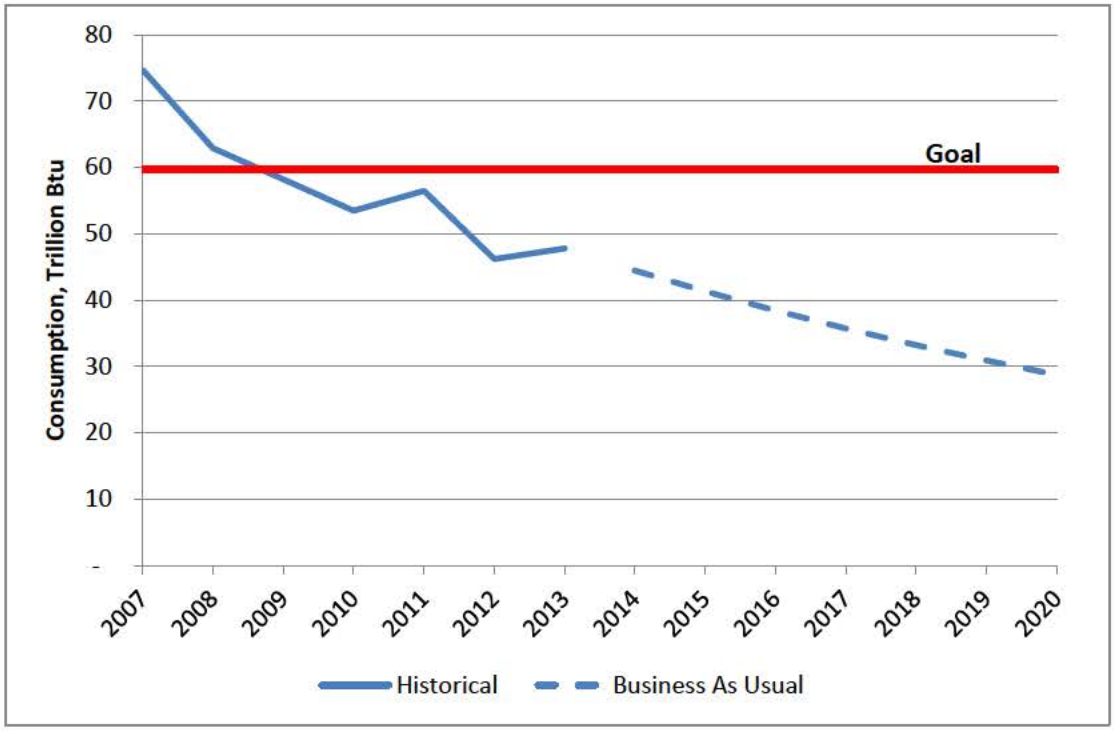
Figure 4.5-4: Achieving Natural Gas Savings of 20% by 2020



4.5.5 Saving 20% of Heating Fuel Use by 2020

Part of the fourth statutory long-term goal is for the statewide consumption of heating fuel to be reduced at least 20% by 2020. In the baseline year of 2007, the statewide consumption in the residential and commercial sectors of #2 distillate fuel, kerosene, and propane was 75 trillion Btu. A 20% savings from this baseline is 15 trillion Btu, which is reflected in Figure 4.5-5, along with the overall statewide reduction in heating fuel consumption. A significant portion of this reduction is due to fuel switching, and a modest contribution is also made by energy efficiency upgrades to homes and businesses. From 2009 to 2015, the Trust's programs helped save 0.60 trillion Btu, which is projected to increase very gradually as a result of the continuation of HESP and similar programs targeting C&I customers. As a point of reference, Figure 4.5-5 presents the most recent available data (from 2007 to 2013) showing that consumption of heating fuels in Maine has declined by 26.9 trillion Btu, or 36%.

Figure 4.5-5: Heating Fuel Use in Maine



4.5.6 Building Stable Private Sector Jobs Providing Clean Energy and Energy Efficiency Products and Services in the State by 2020

The fifth statutory long-term goal, provided in Section 10104(4)(F)(5), is to create stable private sector jobs providing alternative energy and energy efficiency products and services in the State by 2020. The Trust assumes 9.3 job-years are created per million dollars invested through cost-effective energy efficiency programs. A job-year is a full time equivalent job lasting one year. This ratio is based on a Pacific Northwest National Laboratory (PNNL) report prepared for the DOE, which surveyed seven similar studies.[52]

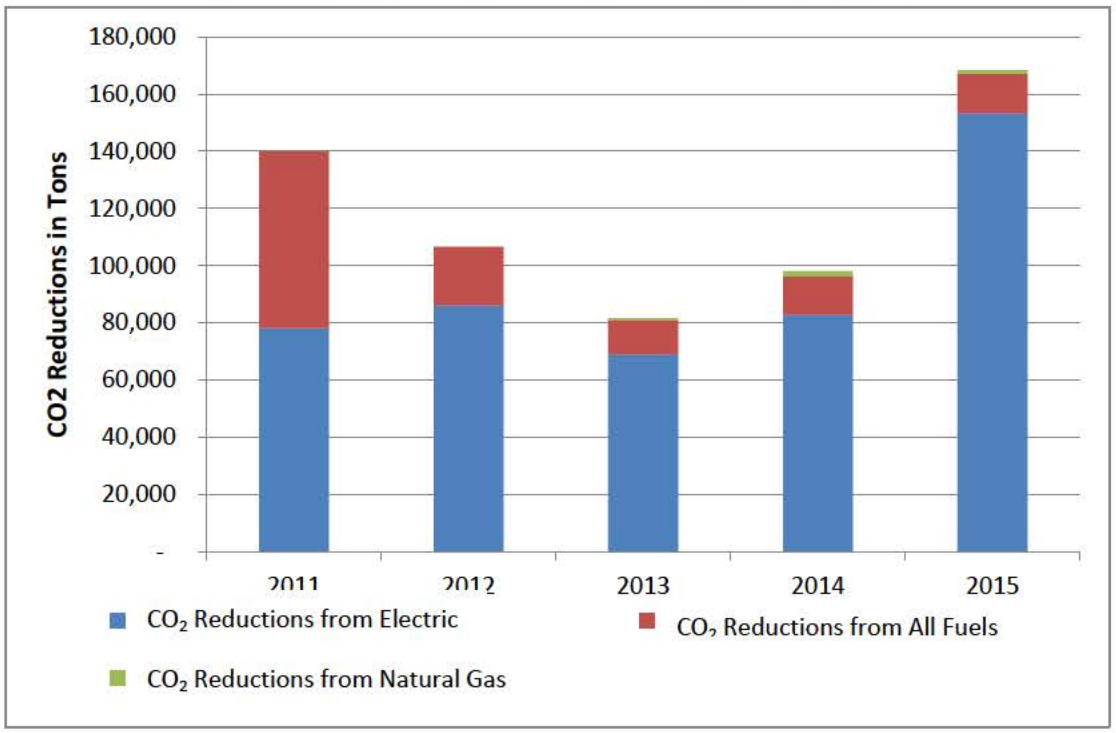
Through Triennial Plan III, the Trust forecasts investing approximately $186 million dollars through its programs, which, when applying the ratio from the PNNL report will result in an estimated 1,730 job-years.

4.5.7 Reducing Greenhouse Gas Emissions by 10% below 1990 Levels by 2020

The final statutory long-term goal is reducing GHG emissions from the heating and cooling of buildings in Maine. Approximately 0.01 metric tons of CO_2 is emitted from every gallon of #2 distillate or kerosene used in a furnace or boiler, and about half as much is emitted from each gallon of propane.

[52] "Assessing National Employment Impacts of Investment in Residential and Commercial Sector Energy Efficiency: Review and Example Analysis," Pacific Northwest National Laboratory, June 2014.

Figure 4.5-6: Historic GHG Reductions from Trust Programs[53]



This figure illustrates the fact that from 2011 to 2012, funding for programs designed to save All-Fuels (principally heating oil, propane, and kerosene) decreased as the one-time revenue from the federal ARRA was exhausted. The up-tick in CO_2 reductions in 2014 reflects the revitalization of the HESP, and comparable programs targeting oil use in C&I customers, following the directive of the Omnibus Energy Bill of 2013.

The Plan projects three-year savings of between 1.6 million and 2.4 million MMBtu from natural gas programs, depending on the level of funding. Applying the conversion for natural gas combustion to CO_2, this suggests the Plan would achieve an additional 89,577to 136,136 metric tons of CO_2 savings from natural gas programs.

Finally, because the electricity sector is operating under the carbon cap established by RGGI, a savings of electricity from a Trust-funded project does not technically create a net reduction in GHGs. It will, however, advance the target of reducing GHGs by making it more affordable for Maine's electricity consumers to operate within the RGGI system.

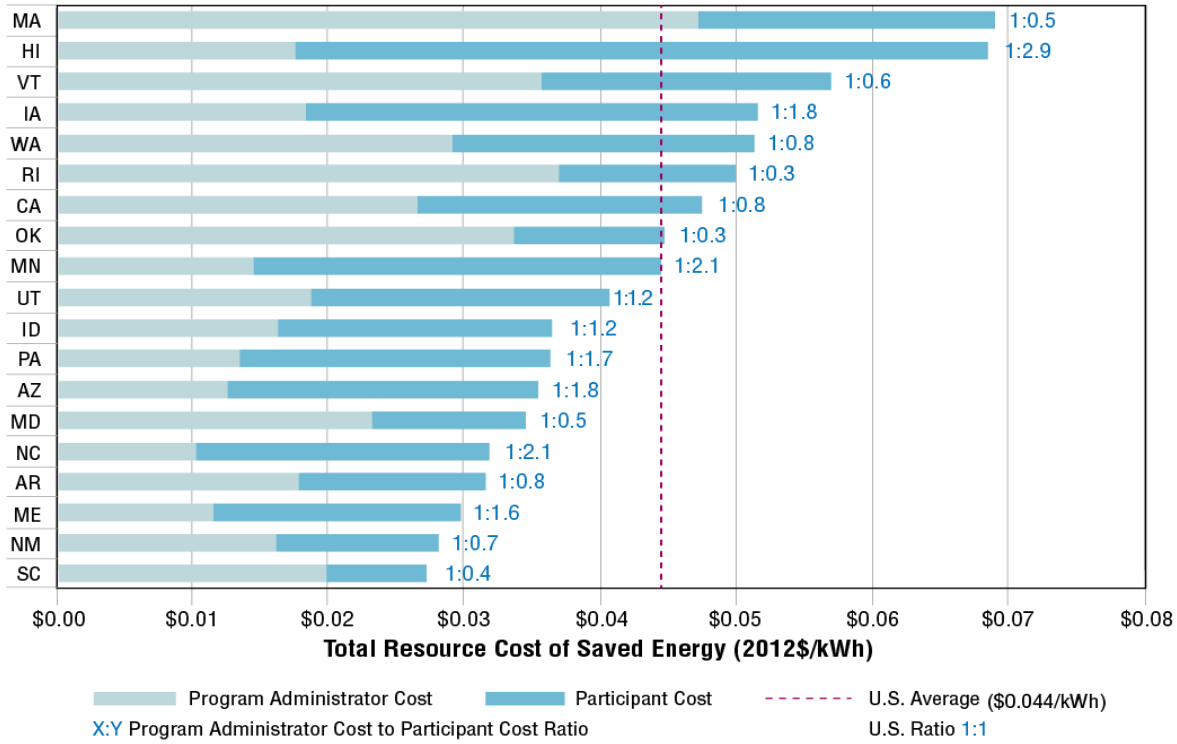
[53] The reported CO_2 reductions from Electric in this figure does not factor into consideration the impact of Maine's electricity generators being regulated under the carbon cap of the RGGI. In 2013 the Trust began reporting RGGI activity by fiscal year. Prior to 2013, activity was reported by calendar year. To avoid double counting activity from July to December 2012, values reported for 2013 represent half a year's worth of activity (January through June 2013).

4.6 Efficient Administration of Programs

Maine statute identifies several best practices in program administration that the Trust is directed to pursue. Among these is the principle of maximizing "the efficiency with which programs are planned, designed, overseen and delivered."[54] This principle is complemented by guidance of the statute in the efficient deployment of RGGI funds to "minimize administrative costs and maximize program participation and effectiveness."[55]

The Trust has achieved reasonable success in delivering energy savings at a low cost of production during the period of Triennial Plan II. This success is reflected in the following figure.

Figure 4.6-1: State Rankings for Costs of Saving Energy[56]



The Trust continuously commissions independent, third-party evaluations and is committing more resources to measurement, verification and analysis of program performance. By accelerating its collection of information on market prices, how measures are performing in the field, and what is driving customer participation in the programs, the Trust aims to continuously improve the effectiveness of its energy savings strategies and maximize the efficiency of program delivery.

[54] 35-A MRS §10104(2)(C).

[55] 35-A MRS §10109(4)(G) states, "In order to minimize administrative costs and maximize program participation and effectiveness, the trustees shall, to the greatest extent feasible, coordinate the delivery of and make complementary the energy efficiency programs under this section and other programs…."

[56] Lawrence Berkeley National Lab, "The Total Resource Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs," November 17, 2014, slide 14.

5. Program Descriptions

5.1 Commercial and Industrial: Custom Program

5.1.1 Overview

The Custom Program for C&I customers is designed to overcome the barriers confronting Maine's businesses and institutions from making investments in complex, uncommon or novel energy efficiency and distributed generation projects. C&I customers comprise all non-residential customers, including municipal and institutional customers, as well as multifamily (or apartment) property owners.

The Custom Program will promote energy efficiency projects, in both the commercial buildings and industrial facilities, involving site-specific applications that require customized engineering analysis and/or projects contemplating energy conservation measures that are not covered in the prescriptive offerings.

5.1.2 Objectives

- Help C&I customers overcome the barriers to implementing complex custom energy efficiency and distributed generation projects
- Reduce electricity consumption or GHG emissions and energy costs at commercial or industrial facilities
- Reduce the price of electricity over time for all consumers by achieving reductions in demand for electricity during peak use periods
- Reduce total energy costs for electricity consumers in the state by increasing the efficiency with which electricity is consumed
- Create more favorable market conditions for the increased use of energy-efficient products and services

5.1.3 Opportunity

Customer Market Barriers

While each custom energy efficiency project faces market barriers unique to their type, industry, and location, the most common barrier is the upfront cost and the relatively long payback periods. Businesses in Maine commonly require that investments achieve a 1.5- to 3-year payback; custom projects typically have a 4- to 7-year payback before accounting for incentives. Businesses and institutions have many competing demands for capital, and most energy efficiency and distributed generation projects are weighed against other capital investments in internal decision-making processes.

Maine businesses and institutions also often lack full-time staff dedicated to energy or facility management. Without in-house expertise, Maine businesses rely on outside contractors and vendors to identify energy efficiency opportunities. Most custom projects require site-specific engineering. This site-specific engineering is capital-intensive and extends beyond what most energy contractors or

vendors are willing to explore on speculation. As a result, the Trust has found that relying on market-based contractors and vendors alone leaves many potential custom efficiency projects untapped.

In other cases, a custom energy efficiency or distributed generation project involves technology or processes that are new to or uncommon in the marketplace. Such measures are not well-suited to promotion through a prescriptive list of highly standardized measures. The unfamiliarity of contractors and customers with uncommon measures represents a hurdle for custom projects.

Electricity Savings Potential

Market

The C&I Custom Program is a market-based program that will include energy efficiency and distributed generation projects involving site-specific applications that require detailed engineering analysis and/or projects with energy conservation measures that are not covered by the C&I Prescriptive Program.

The Program addresses both retrofit and lost opportunity purchasing scenarios. For purposes of modeling the potential savings through the Custom Program channel, the study only looked at projects that would deliver an annual savings of at least 35,000 kWh. This threshold applies to customers in both the C&I sectors. The model also assigned retrofits from T-5s to LEDs to the Custom Program, as this measure is only cost effective in certain site specific applications with high annual hours of use. The total potential of custom measures is a function of the building types within the commercial sector and industry type in the industrial sector. For example, some custom measures (e.g., VFDs) are applicable in most industry types, but only some commercial building types. These applicability factors drive the individual contributions of the commercial and the industrial sectors to the total Custom Program savings potential. The Custom Program will include distributed generation projects as well, focusing only on projects that offset grid supplied electric energy consumption.

The atypical work schedule of industrial settings means that many industrial measures are custom projects. In commercial buildings there is an opportunity to address ventilation, cooling, heating, refrigeration and other end uses through the custom path. The Market Potential Study found that approximately 25% of the total technical potential is in the commercial sector and 75% is in the industrial sector.

The magnitude of the savings potential for the Custom Program is a function of the sales forecasts, program design, and technical applicability of each measure included in the analysis of C&I energy efficiency potential. Qualifying custom projects capable of achieving the target level of energy savings are included in the top-down analysis of custom savings possibilities. For instance, machine drive measures can achieve this level of savings, so these measures are included in the amount of kWh sales identified for the Custom Program. Nevertheless, the technical applicability of each measure type is considered across all building types in order to determine the total fraction of the sales forecasts that would fall within the Custom Program. Machine drive measures are applicable in many industrial settings, but are not applicable in most commercial settings.

For the commercial sector, the development of the energy efficiency technical potential estimate begins with a disaggregated energy sales forecast over the 10-year forecast horizon (FY2017 to FY2026). The commercial sector energy sales forecast is broken down by building type, then by electric end use. Then a specific savings factor is applied to end use electricity sales to determine the potential electricity savings for each end use. As stated above, the Trust found only 23% of the custom potential was in commercial spaces. For more details on the commercial baseline, refer to the C&I Prescriptive Program.

For the industrial sector, the study used the EIA MECS to break out the industrial sales forecast into end uses, according to the following categories:

- Direct Uses – Process: These end uses are specific to the carrying out of manufacturing. They include process heating (e.g., kilns, furnaces, ovens, strip heaters), process cooling and refrigeration, machine drive, electrochemical processes, and other direct process uses. "Direct" denotes that only the quantities of electricity or fossil fuel used in their original state (i.e., not transformed) are included in the estimates.
- Direct Uses – Non-process: These end uses are unrelated to processes that may be found at manufacturing facilities, including HVAC other than steam and hot water; other facility support (e.g., cooking, water heating, office equipment); onsite transportation; conventional electricity generation; and other non-process uses.
- Electrochemical Process: This category represents the direct process end use in which electricity is used to cause a chemical transformation. Major uses of electrochemical process occur in the aluminum industry in which alumina is reduced to molten aluminum metal and oxygen, and in the alkalies and chlorine industry, in which brine is separated into caustic soda, chlorine, and hydrogen.
- Facility HVAC: The direct non-process end use that includes energy use in systems that condition air in a building is represented in this category.
- Facility Lighting: This category represents the direct non-process end use that includes energy used in equipment that illuminates buildings and other areas on the establishment site.
- Facility Support: This category represents the direct non-process end use that includes energy used in diverse applications that are normally associated with office or building operations such as cooking in cafeterias; operation of office equipment such as personal computers and copying machines; and operation of elevators.
- Machine Drive (Motors): The direct process end use in which thermal or electric energy is converted into mechanical energy. Motors are found in almost every process in manufacturing is represented in this category. Therefore, when motors are found in equipment that is wholly contained in another end use (such as process cooling and refrigeration), the energy is classified there rather than in machine drive.
- Process Cooling and Refrigeration: The direct process end use in which energy is used to lower the temperature of substances involved in the manufacturing process is represented in this category.

Once the data was categorized into these end-uses, the study applied the MECS End-Use Fuel Consumption survey to divide the forecast into industry types based upon national NAICS Codes consumption data. Following are the industry types used in the industrial models.

Table 5.1-1: Industrial Sales by Segment

Industrial Segment	Industrial kWh	Percent of kWh Sales
Paper	1,344,815	47%
Wood	231,752	8%
Food	200,074	7%
Trans. Equipment	155,571	5%
Plastics & Rubber	155,521	5%
Chemicals	129,960	5%
Fabricated Metals	129,091	5%
Textile Mills	81,011	3%
Nonmetallic Mineral	80,124	3%
Beverage	62,832	2%
Computer & Electronics	58,883	2%
Printing	47,417	2%
Machinery	34,321	1%
Apparel & Leather	27,839	1%
Textile Mill Products	23,906	1%
Miscellaneous	21,962	1%
Primary Metals	20,550	1%
Furniture	17,314	1%
Elec. Equipment	9,063	0%
Petroleum	7,809	0%
Total	**2,839,816**	**100%**

Technical Potential

Technical potential represents the reduction in energy use that would occur if all technologically available energy efficiency measures are immediately adopted in all feasible instances. The result, therefore, is a theoretical quantification of savings that does not account for practical considerations such as cost-effectiveness constraints or the willingness of customers to participate.

Table 5.1-2 provides a summary of the estimated costs[57] and savings associated with the technical potential for the Custom Program calculated by the Market Potential Study. Combined heat and power (CHP) potential was studied separately and is not reflected in the technical potential here.

[57] The costs associated with technical potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings

Table 5.1-2: C&I Custom Program – Technical Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$69,023,542	$6,902,354
MWh Savings	417,832	41,783
MW Savings	37.2	3.7

Economic Potential

The Economic Potential removes all measure that do not pass the TRC. Table 5.1-3 provides a summary of the estimated costs[58] and savings associated with the economic potential for the Custom Program found by the energy efficiency potential study. As noted above, CHP potential was studied separately and is not reflected in the economic potential in this table.

Table 5.1-3: C&I Custom Program – Economic Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$69,023,542	$6,902,354
MWh Savings	417,832	41,783
MW Savings	37.2	3.7

Achievable Potential

The achievable potential for the Custom Program accounts for cost-effectiveness constraints, and the ability of the program to deliver the measure within acceptable levels of free-ridership. Achievable potential also recognizes that participation in a program is a function of customer adoption rates consistent with past program history and the Trust's ability to ramp up activity over time. Table 5.1-4 provides the achievable potential savings and costs for the Custom Program during the FY2017–FY2019 time frame of the Triennial Plan. CHP potential is reflected in the achievable potential.

Table 5.1-4: C&I Custom Program – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-Year Totals
Total Efficiency Maine Trust Costs	$5,675,930	$6,249,605	$7,219,254	$19,144,788
MWh Savings	59,611	70,460	82,950	213,020
MW Savings	9.5	11.1	12.7	33.3

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of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

[58] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

Table 5.1-5 provides an overview of the annual estimated costs and savings associated with the achievable potential for the Custom Program found by the energy efficiency potential study.

Table 5.1-5: C&I Custom Program – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$5,675,930	59,611	9.5
FY2018	$6,249,605	70,460	11.1
FY2019	$7,219,254	82,950	12.7
FY2020	$6,437,808	80,744	12.7
FY2021	$6,477,939	81,844	12.9
FY2022	$6,557,541	83,099	13.0
FY2023	$6,183,597	82,604	13.1
FY2024	$6,266,971	83,907	13.3
FY2025	$6,349,286	85,234	13.5
FY2026	$6,434,009	86,585	13.7
10-Year Totals	**$63,851,938**	**797,038**	**125.6**
Annual Average	**$6,385,194**	**79,704**	**12.6**

The estimated MWh savings increases from 59,611 MWh to 82,950 MWh across the FY2017–FY2019 time frame. This change is primarily a function of the anticipated increase in expected distributed generation over time.

MACE Measures

The economic potential for the Custom Program includes all cost-effective measures included in the technical potential estimates, whereas the achievable potential accounts for factors that limit the adoption of cost-effective measures over time. Achievable potential also factors in to the benefit-cost calculus the non-incentive costs (marketing, program management, implementation, etc.) needed to operate the program.

The constraints limiting the adoption of measures over time are included in the analysis of MACE in order to reflect historical program performance for measures currently offered by the Trust. Two key assumptions were made in order to estimate the long-term adoption of each measure. First, the study made an assumption, primarily informed by recent program performance, regarding what percentage of the available market could be captured in the first year of the Plan. For measures that have been incentivized for a long time, the starting point is higher than other options. The second key assumption in the estimation of MACE was an estimate of the expected long term market adoption that could reasonably be expected over time given the level of incentive offered by the Trust.

The savings of the Custom Program measures are being driven by distributed generation, machine drive, variable speed drive controls and chillers. Table 5.1-6 provides an overview of the estimated electric energy and demand savings associated with the programs most impactful measure types.

Table 5.1-6: C&I Custom Program – Top Measures

Description	MWh Savings	MW Savings	MWh Savings	MW Savings	MWh Savings	MW Savings
	2017		2018		2019	
Combined Heat and Power	42,868	6.1	53,585	7.6	64,302	9.2
Machine Drive	9,870	2.7	9,870	2.7	9,870	2.7
Variable Speed Drive Control, 40 HP	4,427	0.1	4,517	0.1	6,023	0.1
Process Cooling & Refrigeration	599	0.2	599	0.2	599	0.2
T5 Replacement with LEDs	469	0.1	507	0.1	676	0.1
Process Heating	349	0.1	349	0.1	349	0.1
Centrifugal Chiller, 0.51 kW/ton, 500 tons	287	0.1	287	0.1	287	0.1
Centrifugal Chiller, 0.51 kW/ton, 300 tons	287	0.1	287	0.1	287	0.1
Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	144	0.1	144	0.1	144	0.1
Totals	**59,300**	**9.5**	**70,146**	**11.0**	**82,538**	**12.7**
% of Program	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**

The Trust also reviewed the cost-effectiveness and savings potential for replacing T5 fixtures with LED fixtures in high hours of use subsectors (warehouses, industrial settings, etc.). Assuming use of 8,760 hours per year and the replacement of 2-Lamp 4' T5s with LED 2x4 fixtures, this measure was found to be cost effective.

A total of 12 measure iterations were included in the technical potential analysis of the Custom Program. The benefit-cost screening identified all 12 of these measures to be cost-effective. VFDs, efficient compressors and chillers were found to be among the most cost-effective measures.

Natural Gas Savings Potential

Market

The natural gas portion of the C&I Custom Program as modeled will serve Maine's industrial customers that use natural gas. These customers will be targeted using the Program Opportunity Notice for Greenhouse Gas (CO_2e) Reduction Projects (called the GHG PON) that is marketed under the Custom Program.

Table 5.1-7 shows the industrial sector's technical potential and economic potential by end use. Technical potential estimates the total savings potential if all technically feasible measures are installed. Economic potential, a subset of the technical potential, only includes cost-effective measures. The 2014 natural gas potential study identified 2,152,822 MMBtu of technical potential and 1,825,246 of

economic potential in the industrial sector.[59] The method for determining the technical and economic potential is consistent with the electric potential study.

Table 5.1-7: Industrial Technical and Economic 10-Year Savings Potential (MMBtu)

	Technical Potential		Economic Potential	
End Use	Existing Customers	Expansion Customers	Existing Customers	Expansion Customers
Conventional Boiler Use	340,093	33,255	274,934	26,757
Process Heating	704,226	70,817	556,298	56,256
Facility HVAC	426,707	54,260	381,049	48,445
Building Envelope	147,993	12,801	112,236	7,694
HVAC Controls	321,597	41,073	320,641	40,936
Total	**1,940,616**	**212,206**	**1,645,158**	**180,088**

The three-year budget and savings forecasts proposed by the Trust are based on the achievable potential identified in the 2014 natural gas potential study. The achievable potential takes into account potential barriers for market adoption and the level of incentives offered by the Trust. The study identified two achievable potential scenarios:

1. High Case - This scenario assumes the Trust pays incentives equal to 75% of the measure cost and that the Trust can reach an 80% market penetration within 10 years.
2. Low Case - This scenario assumes the Trust pays incentives equal to 50% of the measure cost and that the Trust can reach a 50% market penetration within 10 years.

The Trust is basing its proposed Triennial Plan III budget on the low case from the potential study. Table 5.1-8 shows the estimated savings potential under the low case for the 10 years covered by the potential study.

Table 5.1-8: C&I Custom Program – Low Achievable Potential 3-Year Costs and Savings (MMBtu)

	Low Case Potential		
Description	Existing Customers	Expansion Customers	All Customers
Total Efficiency Maine Trust Costs	$232,745	$79,274	$312,019
MMBtu Savings	14,383	4,899	19,282

C&I natural gas baseline conditions assumed by the Third Triennial Plan are based on data gathered for the 2014 natural gas potential study. The study collected data on-site from 25 businesses with natural gas connections and from 10 businesses without natural gas connections but in areas where natural gas

[59] The exact amount could change based on any action taken as a result of Section 2 of H.P. 649 – L.D. 946 Resolve, To Establish a Moratorium on the Assessment of Large Volume Consumers by Gas Utilities and To Evaluate Cos-effective Natural Gas Conservation and Efficiency Improvements for Large Volume Consumers, passed in Maine's 127th Legislature in 2015.

expansion is expected to occur over the next 10 years. The on-site data collection was supplemented by data from the natural gas LDCs and phone surveys.

Table 5.1-9 shows the estimated savings potential by end use in the low case scenario used by the Trust to set its proposed budgets. The table shows building envelope measures have the lowest level of potential savings and process heating has the highest level of potential savings.

Table 5.1-9: 10-Year Low Achievable Savings Potential by End Use (MMBtu)

End Use	Existing Customers	Expansion Customers	All Customers
Process Heating	50,450	21,767	72,217

Efficient Alternatives

Table 5.1-10 shows the 10-year achievable savings potential reported by the 2014 natural gas potential study for categories of measures in the industrial sector. The table shows numerous measures with relatively equal savings potential. For the purpose of modeling, all measures associated with the building envelope and HVAC systems were assigned to the Prescriptive Program and the results are reported in the next section of this Plan. Because there will be occasional custom opportunities associated with the building envelop and HVAC systems, the Trust may from time to time fund one of these opportunities through the Custom Program.

Table 5.1-10: 10-Year Low Industrial Sector Savings Potential (MMBtu)

Conventional Boiler Use	MMBtu
Facility Heating Controls & Tune-ups	37,176
Efficient Hot Water Boiler	24,550
Pipe and Tank Insulation	13,856
Process Heating Controls & Tune-ups	10,321
Boiler Blowdown Heat Exchanger (Steam)	7,555
Efficient Steam Boilers	6,153
Boiler / Furnace Burner Change-Out	7
Process Heating	**MMBtu**
Process Heating Controls & Tune-ups	44,206
Heat Recovery	21,591
Efficient Hot Water Boiler	17,111
Efficient Water Heating Equipment	28,729
Pipe and Tank Insulation	10,574
Direct Fired Make Up Air System - Facility HVAC	7,728
Efficient Steam Boilers	4,332
Boiler / Furnace Burner Change-Out	13
Facility HVAC	**MMBtu**
Unit and Infrared Heater	41,723
Efficient Furnaces	32,307
Improved Duct Sealing	24,447
Heat Recovery	10,959
Direct Fired Make Up Air System - Facility HVAC	13,976
Building Envelope	**MMBtu**
Insulation Improvements	25,708
Integrated Building Design	27,701
HVAC Controls	**MMBtu**
Facility Heating Controls & Tune-ups	72,143
Ventilation Controls	44,111
Improved Duct Sealing	24,387
Destratification Fans	3,380
Commissioning & Retrocommissioning	2,392
Zoning	471
Total	**557,607**

All-Fuels Savings Opportunity

Based on the relative share of statewide consumption, by fuel type, in the C&I sector, the Trust estimates that the potential for cost-effective all-fuels savings through the Custom Program channel is between three and four times greater than for natural gas savings potential. The budget needed to capture such savings would dramatically exceed RGGI and other funds currently available to the Trust to

capture savings of unregulated fuels such as oil, propane, kerosene and biomass. The ability for the Trust to achieve all-fuels savings therefore is limited by its budget and not the market opportunity.

5.1.4 Budget and Metrics

Table 5.1-11: C&I Custom Program Budget and Metrics

FY	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	Cost per kWh	MMBtu Savings	Cost per MMBtu	Lifetime Benefit	B:C Ratio
2017	$5,675,930	$95,516	$3,730,462	$9,501,907	59,611	9.5	$0.10	76,747	$49.85	$32,589,222	2.28
2018	$6,249,605	$102,521	$4,040,837	$10,392,962	70,460	11.1	$0.09	83,073	$49.88	$33,659,866	2.17
2019	$7,219,254	$113,983	$4,771,412	$12,104,648	82,950	12.7	$0.09	97,594	$50.06	$36,496,842	2.02

For extra-large custom efficiency or distributed generation projects that meet the criteria of the program but exceed the upper limits on the size of the annual incentive allowed under the current program design, the Trust may seek authorization for additional funding through the Commission's Long Term Contract authority.[60]

5.1.5 Program Design

The Custom Program is designed to be flexible enough to invite a broad array of potential projects and participation from customers of varying sizes.

Because custom energy efficiency projects often span several years between identification and completion, program consistency is critical to ensuring customer interest for capital-intensive custom projects. The Trust anticipates pairing incentives for technical assistance studies and custom energy saving projects with customized engineering and technical support. The Trust will continue to review and award project proposals on a rolling basis rather than annual or semi-annual grant rounds. This approach is designed to ensure that project investments can sync with customers' internal budgeting processes. In addition, rolling deadlines better enable customers and energy contractors to submit complete applications; in the past, some projects could not be considered because project specifications or energy calculations were submitted before they were complete in order to meet a filing deadline.

The Custom Program will invest in custom efficiency projects during the Triennial Plan III period consistent with the following program design elements:

1. Minimum project size: The program will set a minimum project threshold in order to ensure that the project savings exceed investment costs in custom engineering. In FY2016, the minimum electricity project size was 35,000 kWh annual savings.
2. Simple payback: The program will set a minimum threshold for simple payback that will apply to all applicants. Because every customer has a slightly different cost of energy, the program will assess the simple payback from the customer's perspective for each project and ensure it exceeds the Program's minimum threshold. This entails estimating the financial value of site-specific energy savings through a billing analysis and comparing these savings to the total cost of the project as supported by specific bids from contractors and

[60] 35-A MRS §3210-C.

vendors. This minimum threshold is applied to ensure that projects would move forward only with Program incentives.

3. A ceiling on the cost of first year energy savings: The Program will apply a cost ceiling, expressed as dollar-per-unit of savings, to ensure that it does not overpay for savings.
4. Customer Contribution: The program will continue to require that customers pay a percentage of the projects cost. This requirement may differ between retrofit and new construction projects.

During Triennial Plan III, the Custom Program will continue to offer incentives for cost-effective CHP projects, as it has since 2009 when the program was initiated. In addition to the above criteria, the program will also apply the following extra criteria to CHP projects:

1. The Program will only consider the avoided electricity (including capacity) from the output of a generation unit that coincidentally offsets grid supplied electricity. The Program will examine hourly data to ensure that the output of a proposed project will be used on site, behind the customer's meter. For projects that propose to take advantage of the state's net metering options, the program will pro-rate all costs and benefits based on the percentage of the project output that would be used on-site verses net metered to the grid and reduce the portion of the project eligible for Program rebates accordingly.
2. Projects that involve the combustion of fossil fuels will need to meet an overall annual operational efficiency threshold.

Program History

This Program has evolved since its initial offering in 2009, when it was overseen by the Maine PUC. Throughout its operation, the Program has sought to offer incentives to the most cost-effective energy efficiency and distributed generation projects. However, the strategies for identifying, developing and awarding those projects have changed over time. In recent years, the Program has migrated toward more targeted outreach and customized offerings to better meet the specific needs of large custom projects.

During the Triennial Plan II period, the means for selecting projects shifted away from conducting semi-annual RFPs to offering a rolling application using a PON. The Trust has offered two different categories of PONs over the Triennial Plan II period: one for electrical efficiency and distributed generation projects, and another for GHG reductions through the installation of more efficient equipment. Both PONs have established criteria that projects must meet to be eligible for funding. Those criteria ensure that projects must have at least 50% matching funds, meet a threshold dollar per kWh or ton of GHG, and not achieve a simple payback in less than one year.

In the past, the Trust differentiated between very large custom projects and smaller custom projects. Generally, the larger projects were handled through what was formerly called the Large Customer Program and smaller projects were processes through what was formerly called the Business Incentive Program. As described in more detail below, in Triennial Plan III the Trust will handle all custom projects for C&I customers through this Custom Program, regardless of the customer's size. All prescriptive

measures for C&I customers will be handled through the C&I Prescriptive Program, as described in the next section.

The custom outlet has enabled the program to incentivize emerging technologies and address complex installations. As the program has matured, many technologies have moved from custom to the prescriptive measure list, including LED lighting.

Measures Promoted

During FY2017–FY2019, the Trust anticipates following the same practices that have been developed over the last four years of offering competitive incentives for relatively large, custom energy efficiency and distributed generation projects.

Unlike prior years, however, during Triennial Plan III the Trust also will explore potential cost-effective savings from transportation measures. The Maine Department of Environmental Protection reports that more than 45% of the greenhouse gases emitted in Maine come from the transportation sector. By issuing one or more competitive solicitations, the Trust will seek proposals from C&I customers for transportation measures that satisfy the criteria for and restrictions on the use of RGGI funds. Examples of the types of measures that may be considered include EPA SmartWay verified idling reduction strategies, and efficiency improvements on electricity charging stations or natural gas filling stations serving Maine-based fleets. The portion of RGGI funds allocated to transportation measures will be determined by the Board through its annual budgeting process.

Marketing

The unique, site-specific nature of custom projects and the barriers they face means the Program focuses on an individualized, customer-focused outreach strategy. Program outreach starts with raising awareness of the program among the leadership of targeted C&I businesses and institutions, offering scoping audits to likely customers, and incentivizing technical assessments of promising projects.

There are roughly 500 utility customers in Maine having an average peak load of 400 KW or greater. These customers are the most likely to have cost-effective custom energy efficiency and distributed generation opportunities that warrant support from the Program and will constitute the primary focus of Program marketing. Customers having a peak load of less than 400 kW will also be served by this program when they have sizeable, economic custom project opportunities.

The Program will meet with the leadership of these facilities to described custom energy saving opportunities. In prior years the program has partnered with trade associations of likely customers like the Maine Hospital Association, and industry groups like the Industrial Energy Consumers Group. For those businesses and institutions that do not have a dedicated energy staff, the Program will offer scoping audits. At larger facilities, Program staff will focus efforts on senior leadership to ensure energy staff on site has support for pursuing energy efficiency and distributed generation opportunities.

In addition to targeting potential customers, the Program markets custom energy efficiency opportunities to the major architectural and engineering firms working in Maine. These energy professionals are able to “pitch” program participation to potential clients.

Technical Assistance

The Program provides technical assistance to potential customers in a number of different ways. Program staff may provide no-cost scoping audits to potential program participants to evaluate energy efficiency opportunities. The Trust cost-shares technical assistance studies to evaluate potential energy-saving projects. The Trust has found that these studies have resulted in well-designed and successful efficiency and distributed generation projects and reduced the need for costly review or re-design at later stages in the installation process.

As appropriate, the Program will offer free scoping audits to customers where there is a reasonable likelihood of cost-effective energy efficiency and distributed generation projects; customers are required to demonstrate commitment to investing in energy efficiency. The audits themselves are meant to be a starting point in the Program, with a goal of identifying at least one project that the customer could develop into an application into the program. In addition, many projects identified during scoping audits result in referrals of projects that can be incentivized through the C&I: Prescriptive Program.

The Trust expects that many of the projects identified in the scoping audit process will need to undergo more thorough engineering analysis. In such cases, the program offers incentives to support targeted technical assistance. This assistance is designed to help inform customers and the Trust about potential energy saving projects and how to best prioritize investments. In fiscal years 2014 and 2015, the Trust incentivized 13 technical studies at facilities that needed additional expertise to evaluate complex efficiency projects. Nine of the 13 studies have been completed as of the writing of this Triennial Plan, eight of which have led to actual projects projected to leverage $2.2 million in private investment and create $22 million in lifetime energy benefits.

In addition, the Trust has found that through the process of providing technical assistance and reviewing project applications, the Trust's impartial expertise helps improve the accuracy of projections of the amount of energy savings that can reasonably be expected from the energy upgrade. The Trust thus plays an important role in ensuring that Program participants feel confident in moving forward with significant investments and helps secure necessary approval from corporate decision makers.

Financial Incentives

The Program will continue to offer financial incentives that reduce the upfront cost of energy efficiency and distributed generation projects. As described above, the Program will incentivize technical assistance studies to support likely custom projects.

Quality Assurance/Quality Control

Because each custom project is unique, each requires site-specific oversight by Program staff. The Trust cross-checks energy saving calculations in project proposals and equipment specifications. By evaluating proposals in collaboration with the customer, the Trust provides added security to customers installing projects that may have been proposed by outside contractors or employ new technologies. The Trust also analyzes how the paybacks of the proposed projects relate to the internal investment hurdles of the customers.

Custom projects are reviewed from their earliest stages through to their completion. This includes conducting site visits, reviewing design plans, and reviewing invoices to ensure that each project is completed according to initial design specifications. If projects run over budget, the customer will be responsible for the overrun, placing the onus on private sector project managers to exert budget oversight. Upon project completion, Program staff will conduct a site visit to verify project installation details. All projects are inspected. Savings are adjusted for as-built conditions. All distributed generation projects will be metered by the Trust and their ongoing performance will be logged in the Trust's customer tracking database.

5.2 Commercial and Industrial: Prescriptive Program

5.2.1 Overview

The Prescriptive Program provides C&I customers access to financial incentives for the installation of energy efficient equipment. The Program prioritizes energy efficient equipment that has practical applications across Maine and across the C&I sector. Application of a prescriptive approach helps to keep program costs low and makes it easier for contractors and customers to access the efficiency measures and associated benefits.

5.2.2 Objectives

- Reduce total energy costs for electricity consumers in the State by increasing the efficiency with which electricity is consumed
- Increase consumer awareness of cost-effective options for conserving natural gas
- Motivate C&I customers to improve building energy consumption performance through early retirement of inefficient equipment
- Promote highest efficiency equipment options when customers are replacing old equipment or adding new equipment
- Create more favorable market conditions for the increased use of energy-efficient products and services
- Promote sustainable economic development and reduce environmental damage

5.2.3 Opportunity

Electric

Market

The market for this Program is all non-residential customers of electric utilities in Maine, including commercial, industrial, municipal, nonprofit, and institutional entities. Based on the aggregated forecast from CMP and Emera Maine, the Trust estimates that the commercial sector accounts for 35% of total sales and the industrial sector accounts for 25%.

Non-residential customers in Maine are eligible for the C&I: Prescriptive Program. The Market Potential Study found that approximately 88% of the technical potential from efficiency measures promoted through the Prescriptive channel lies in the commercial sector and 12% of the technical potential is in

the industrial sector. To develop this potential, the Trust analyzed the end use sales per segment for both C&I customers in Maine updated to reflect the most recent data from the Commercial Building Interval Meter Data Analytics Study. Each segment's share of load in the C&I sectors is represented in the following tables.

Table 5.2-1: Commercial Sales by Segment

Commercial Segment	Commercial kWh	Percent of kWh Sales
Office	1,082,120,887	29%
Retail	588,160,097	16%
Restaurant	555,436,292	15%
Lodging	313,263,675	8%
Education	295,406,512	8%
Grocery	238,867,764	6%
Health	237,281,292	6%
Other Com. & Ind.	227,461,099	6%
Warehouse	165,081,516	4%
Total	**3,703,079,135**	**100%**

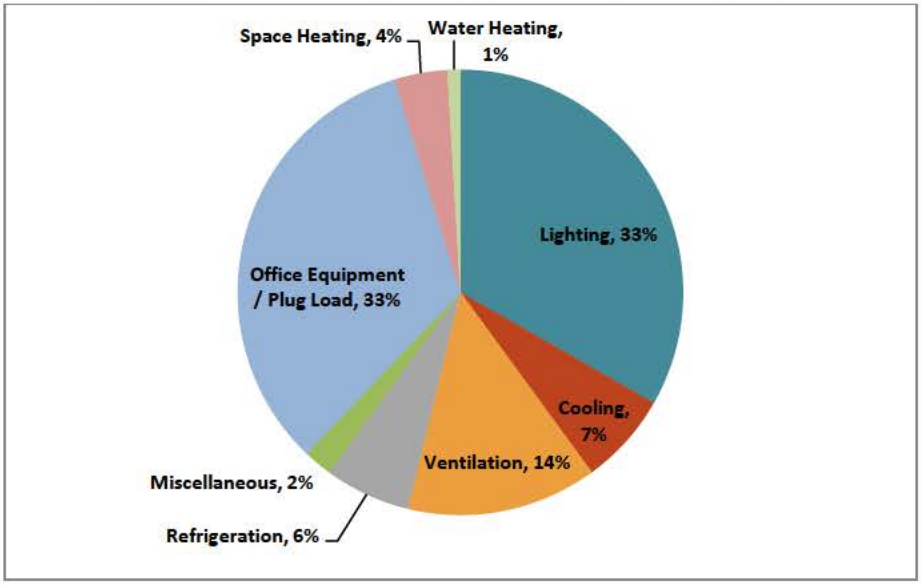
Table 5.2-2: Industrial Sales by Segment

Industrial Segment	Industrial kWh	Percent of kWh Sales
Paper	1,344,815	47%
Wood	231,752	8%
Food	200,074	7%
Trans. Equipment	155,571	5%
Plastics & Rubber	155,521	5%
Chemicals	129,960	5%
Fabricated Metals	129,091	5%
Textile Mills	81,011	3%
Nonmetallic Mineral	80,124	3%
Beverage	62,832	2%
Computer & Electronics	58,883	2%
Printing	47,417	2%
Machinery	34,321	1%
Apparel & Leather	27,839	1%
Textile Mill Products	23,906	1%
Miscellaneous	21,962	1%
Primary Metals	20,550	1%
Furniture	17,314	1%
Elec. Equipment	9,063	0%
Petroleum	7,809	0%
Total	**2,839,816**	**100%**

Assumptions about baseline conditions and energy efficiency opportunities are derived from data collected in the Trust's 2012 study of the market potential for cost-effective energy efficiency and updated data and analysis developed in 2015.[61] The study focused on the collection of primary field data regarding building and electric equipment characteristics in Maine's C&I sectors. This primary data provided key energy-efficiency potential assessment inputs (e.g., saturations of various electric end uses), and the percentages of already efficient equipment. The on-site survey also assessed energy-efficiency attitudes of businesses in Maine.

Figure 5.2-1 provides the breakdown of baseline commercial end uses. Lighting maintains the highest share with more than 40% of the total load. Cooling, ventilation, and refrigeration each hold a 12% share, with office equipment, space heating, water heating and miscellaneous loads also contributing to the total load.

Figure 5.2-1: Commercial Electricity End Use Breakdown – Percentage of Total Load



Following is additional detail on the greatest opportunities for energy savings in the commercial sector: lighting, cooling systems, and refrigeration systems. Figure 5.2-2 provides the breakdown of commercial lighting found in the 2012 baseline study. Interior fluorescent tubes accounted for the largest share of bulb types. The industrial lighting breakdown yields similar characteristics of bulb and location types, with a greater share of nonfluorescent tubes, such as high-intensity discharge lamps, due to different characteristics of building types in the industrial sector.

[61] Cadmus Group, "Assessment of Energy Efficiency and Distributed Generation Baseline and Opportunities,"2012; Retroficiency/Cadmus Group, "Commercial Sector Baseline Update," September 2015.

Figure 5.2-2: Commercial Lighting Breakdown – Percent of Installed Wattage

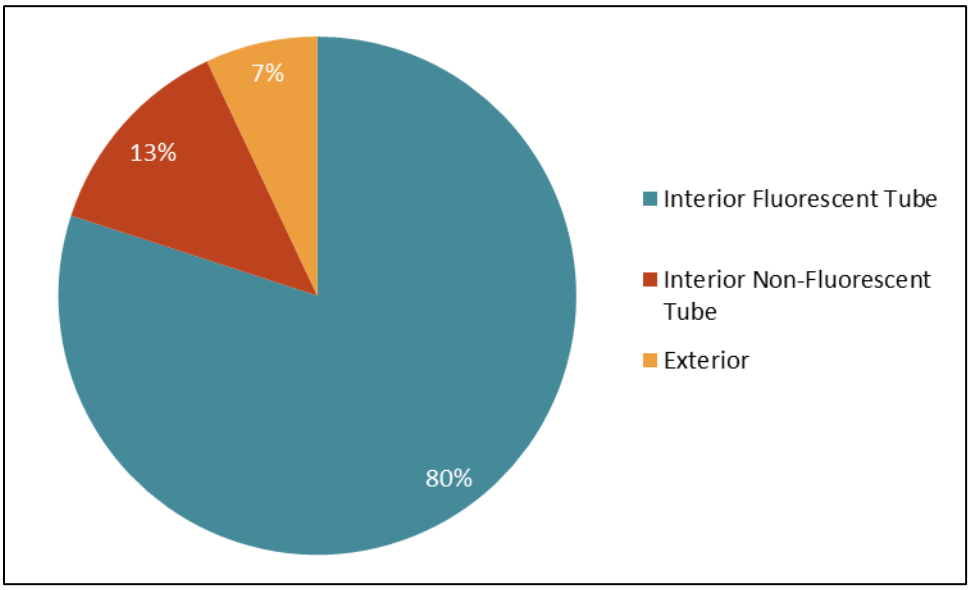


Figure 5.2-3 provides the percentages of fluorescent fixture types in the commercial sector. A variety of efficient alternatives to these bulb/fixture types are available for commercial buildings, including replacement of T12s with High Performance T8s and conversion to new LED technologies.

Figure 5.2-3: Commercial Lighting Fixture Types – Percent of Fluorescent Fixtures

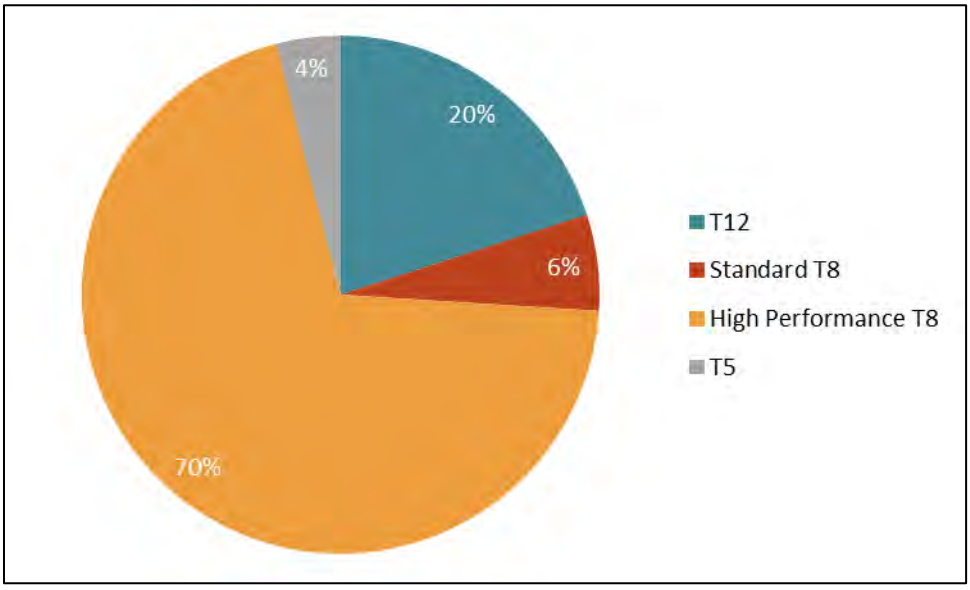
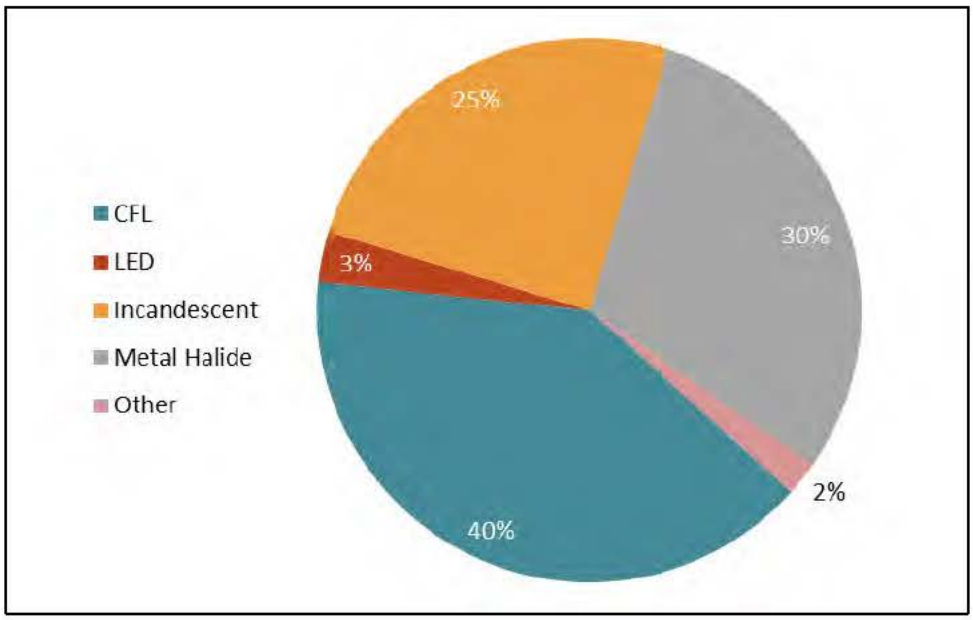


Figure 5.2-4 shows the relative proportions of nonfluorescent bulb types in the commercial sector. As of 2012, incandescent bulbs accounted for 25% of bulbs, and metal halides accounted for 40% of bulbs. Both of these types of bulbs have energy efficient alternatives (CFLs and LEDs) that are widely available. Lighting controls also represent a large savings opportunity because only 10% of lighting is controlled by

timers or programs. The remaining 90% is manually controlled, which means lights may sometimes be left on when not needed.

Figure 5.2-4: Nonfluorescent Bulb Types in the Commercial Sector



While the lighting end use has historically been the source of the greatest savings in the C&I sectors, refrigeration and cooling also present significant savings opportunities. Table 5.2-3 lists the baseline share of cooling system types in the commercial sector, many of which have efficient alternatives (e.g., high efficiency ductless heat pumps).

Table 5.2-3: Types of Cooling Systems in the Commercial Sector

Type of System	Percent of Units
Window Unit A/C	34%
Packaged System	28%
Split System	28%
Heat Pump	3%
Mini-Split System	3%
Air Cooled Chiller	2%
Water Cooled Chiller	2%

Table 5.2-4 lists the share of refrigeration system types in the commercial sector. Efficient alternatives for these system types include ENERGY STAR Reach-In refrigerators and freezers and high efficiency evaporator fans.

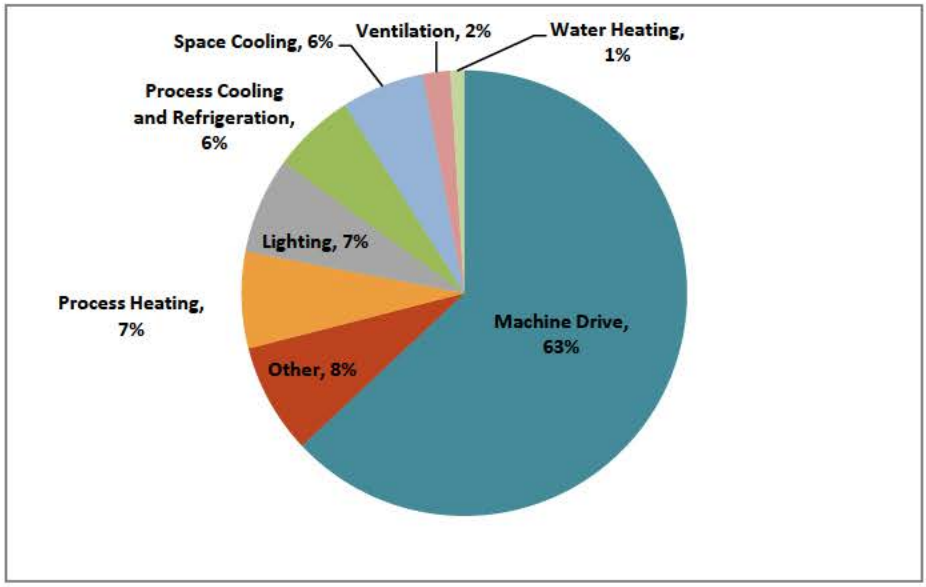
Table 5.2-4: Refrigeration System Types in the Commercial Sector

Type of System	Percent of Units
Glass Door Reach In Refrigerator	42%
Glass Door Beverage Cases	12%
Glass Top Freezer Cases	10%
Open Upright Display Cases	9%
Other Refrigeration	6%
Service Cases	5%
Glass Door Reach In Freezer	4%
Ice Machines	4%
Solid Door Reach-In Freezer	4%
Solid Door Reach-In Refrigerator	3%
Island Cases	1%

Many of the prescriptive measures evaluated for the commercial sector, such as lighting retrofits, are also applicable to the industrial sector. The industrial sector contains industry specific measures by process end-uses, such as process heating, process cooling and refrigeration and machine drive. These other measures are incorporated into the C&I Custom Program.

Figure 5.2-5 provides a breakdown of industrial electrical load end uses. Machine drives, which are addressed in the custom program, represent by far the highest share with more than 60% of the total load and the greatest opportunity for energy efficiency projects in the industrial sector. Lighting, process heating, other, process cooling and refrigeration, and space cooling all contribute between 6% and 8% of the total

Figure 5.2-5: Industrial End Use Breakdown – Percentage of Total Electric Load



Streetlights

Pursuant to the 2013 Omnibus Energy Bill, the Maine PUC is developing an order that will allow municipalities to own their streetlights rather than continuing to pay utilities to install, maintain, and deliver the lights. Several municipalities have already expressed interest in leveraging Efficiency Maine Trust incentives to help replace their streetlights with more efficient models. For example, South Portland, Falmouth, and Rockland reportedly have more than 2,900 lights they want to replace. CMP calculates that it has more than 48,000 street lights just in their territory.

For the street lighting analysis, the study used the 2014 CMP Street and Area Light inventory list to develop a bottom-up estimate of the LED savings potential. The estimated street and area light total usage per year was validated against CMP's forecast and was within 1.7% of that 36,089,401 kWh forecast.

Technical Potential

Technical potential represents the reduction in energy use that would occur if all technologically available energy efficiency measures are immediately adopted in all feasible instances. This is therefore a theoretical quantification of savings.

For the C&I sectors, the development of the energy efficiency technical potential estimate begins with a disaggregated energy sales forecast over the 10-year forecast horizon (2017 to 2026). As described above in Section 2.4.2, the commercial sector energy sales forecast is broken down by building type, then by electric end use. The one exception to this approach is in the study's street lighting analysis, where the Trust used the 2014 CMP Street and Area Light inventory list to develop a bottom-up estimate of the LED savings potential. Then a savings factor is applied to end use electricity sales to determine the potential electricity savings for each end use.

Table 5.2-5 provides a summary of the estimated costs[62] and savings associated with the technical potential for the C&I Prescriptive Program found by the energy efficiency potential study. The technical potential for the C&I Prescriptive Program would be expected to displace an estimated 1,308,482 MWh of electric energy and 259 MW of electric demand across the 2017-2026 time frame at an average annual cost of $70,858,822.

Table 5.2-5: C&I Prescriptive Program – Technical Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$708,588,224	$70,858,822
MWh Savings	1,308,482	130,848
MW Savings	258.8	25.9

[62] The costs associated with technical potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario. For technical potential, incentives were assumed to be 100% of the measure incremental cost.

Economic Potential

Economic potential accounts for cost-effectiveness constraints. It does not account for other practical considerations associated with the willingness of customers to participate or marketing the program to potential customers.

Table 5.2-6 summarizes the estimated costs[63] and savings associated with the economic potential for the C&I Prescriptive Program, as estimated by the energy efficiency potential study. The economic potential for the C&I Prescriptive Program could displace MWh of electric energy and 242.2 MW of electric demand across the 2017-2026 time frame at an average annual cost of $51,201,470.

Table 5.2-6: C&I Prescriptive Program – Economic Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$512,014,698	$51,201,470
MWh Savings	1,279,858	127,986
MW Savings	242.2	24.2

The economic potential excludes several measures that are not cost-effective, as is reflected by the decrease in the 10-year technical potential from 1,308,482 MWh to 1,279,858 MWh in the economic potential scenario. Several measures and equipment measures that are included in the technical potential did not pass the TRC test and are omitted from the economic potential including solar water heating, energy efficiency transformers and refrigeration heat recovery.

Achievable Potential

The achievable potential for the C&I Prescriptive Program accounts for cost-effectiveness constraints and the ability of the program to deliver the measure within an acceptable level of free-ridership. Achievable potential also recognizes that participation in a program is a function of customer adoption rates consistent with past program history and the Trust's ability to ramp up activity over time. Table 5.2-7 provides the achievable potential savings and costs for the C&I Prescriptive Program during the FY2017–FY2019 time frame of the Triennial Plan.

Table 5.2-7: C&I Prescriptive Program – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-Year Totals
Total Efficiency Maine Trust Costs	$11,345,138	$11,877,678	$14,309,018	$37,531,835
MWh Savings	46,183	47,700	57,743	151,626
MW Savings	6.6	6.9	8.2	21.7

[63] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For economic potential, incentives were assumed to be 100% of the measure incremental cost.

Table 5.2-8 provides an overview of the annual estimated costs and savings associated with the achievable potential for the C&I Prescriptive Program, as estimated by the energy efficiency potential study for the next 10 years.

Table 5.2-8: C&I Prescriptive Program – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$11,345,138	46,183	6.6
FY2018	$11,877,678	47,700	6.9
FY2019	$14,309,018	57,743	8.2
FY2020	$9,599,741	37,891	5.8
FY2021	$9,254,474	36,580	5.5
FY2022	$9,420,629	36,648	5.5
FY2023	$6,841,354	26,031	4.1
FY2024	$6,895,692	26,099	4.1
FY2025	$6,953,370	26,167	4.1
FY2026	$7,324,906	25,397	4.1
10-Year Totals	**$93,822,001**	**366,438**	**55.0**
Annual Average	**$9,382,200**	**36,644**	**5.5**

The estimated MWh savings increases from 46,183 MWh to 57,743 MWh across the FY2017–FY2019 time frame, but then to decline gradually and then reach a plateau in the latter half of the 10-year period.

Natural Gas

Market

The market served by for the Prescriptive Program's natural gas measures is all eligible non-residential customers of natural gas utilities in Maine.[64] The Trust's incentives are awarded only to eligible customers for customer-owned equipment. Businesses whose primary business function is to generate power to be sold into a power market will not be eligible for program incentives.

The natural gas portion of the C&I Prescriptive Program will serve businesses that use natural gas or have chosen to convert to natural gas. The Trust plans to primarily serve Maine's commercial consumers of natural gas through the C&I Prescriptive Program and industrial consumers through the C&I Custom Program.

The commercial sales forecast from Maine's natural gas utilities include aggressive expansion plans and are forecasting a 5% annual increase in the number of Maine businesses using natural gas. The 2014

[64] As noted above, future action that may be taken as a result of Section 2 of H.P. 649 – L.D. 946 Resolve, To Establish a Moratorium on the Assessment of Large Volume Consumers by Gas Utilities and To Evaluate Cos-effective Natural Gas Conservation and Efficiency Improvements for Large Volume Consumers, passed in Maine's 127th Legislature in 2015, could impact whether certain very large natural gas customers are eligible for this program.

natural gas potential study found these expansion customers account for a significant portion of the energy efficiency potential In Maine. Serving these businesses will be a major focus for the Trust.

Table 5.2-9 shows the commercial sector's technical potential and economic potential by end use. Technical potential estimates the total savings potential if all technically feasible measures are installed. Economic potential, a subset of the technical potential, only includes cost-effective measures. The potential study identified 2,641,795 MMBtu of technical potential and 2,420,044 of economic potential in the commercial sector. The method for determining the technical and economic potential is consistent with the electric potential study which is described in more depth in Section 2.4, above.

Table 5.2-9: Commercial Technical and Economic 10-Year Savings Potential (MMBtu)

	Technical Potential		Economic Potential	
End Use	Existing Customers	Expansion Customers	Existing Customers	Expansion Customers
Space Heating	955,312	688,747	931,817	668,100
Building Envelope	113,984	78,437	73,463	49,375
Water Heating	341,828	144,686	269,985	115,917
HVAC Controls	94,217	62,933	94,008	62,794
Space & Water Heating	1,249	818	1,249	818
Cooking	140,777	18,807	134,544	17,974
Total	**1,647,367**	**994,428**	**1,505,066**	**914,978**

The three year budget and savings forecasts proposed by the Trust are based on the achievable potential identified in the potential study. The achievable potential takes into account potential barriers for market adoption and the level of incentives offered by the Trust. The study identified two achievable potential scenarios:

1. High Case - This scenario assumes the Trust pays incentives equal to 75% of the incremental cost and that the Trust can reach an 80% market penetration within 10 years.
2. Low Case - This scenario assumes the Trust pays incentives equal to 50% of the incremental cost and that the Trust can reach a 50% market penetration within 10 years.

The Trust is basing its proposed Triennial Plan III budget for natural gas on the Low Case scenario from the Natural Gas Potential Study. Table 5.2-10 shows the estimated savings potential under the Low Case for 3 years.

Table 5.2-10: C&I Prescriptive Program – Low Case Achievable Potential 3-Year Costs and Savings (MMBtu)

	Low Case Potential		
Description	Existing Customers	Expansion Customers	All Customers
Total Efficiency Maine Trust Costs	$4,238,775	$1,443,754	$5,682,529
MMBtu Savings	182,906	62,299	245,205

C&I natural gas baseline conditions assumed by the Third Triennial Plan are based on data gathered by the 2014 natural gas potential study. The study collected data on-site from 25 businesses with natural gas connections and 10 businesses without natural gas connections but in areas where natural gas expansion is expected to occur over the next 10 years. The on-site data collection was supplemented by data from the natural gas LDCs and phone surveys.

All the businesses surveyed with natural gas connections use natural gas as the primary heating source. Over 97% of the businesses without natural gas connections used oil as the primary heating source. Table 5.2-11 shows the estimated savings potential by end use in the low case scenario used by the Trust to set its proposed budgets. The table shows that a majority of the potential comes from space heating measures.

Table 5.2-11: C&I Prescriptive Program Low Achievable Savings Potential by End Use (MMBtu)

End Use	Existing Customers	Expansion Customers	All Customers	Percent of Total
Space Heating	388,119	132,196	520,314	52%
Space & Water Heating	534	182	716	0%
Building Envelope	44,270	15,079	59,348	6%
HVAC Controls	77,421	26,370	103,791	10%
Cooking	33,500	11,410	44,910	4%
Water Heating	88,508	30,146	118,654	12%
Conventional Boiler Use	35,344	12,038	47,382	5%
Process Heating	0	0	0	0%
Facility HVAC	81,107	27,626	108,733	11%
Total	**748,802**	**255,047**	**1,003,848**	**100%**

Figure 5.2-6 shows the saturation of various space heating efficiency measures in Maine businesses. As shown on the figure, 66% of boiler system pipes are currently wrapped to reduce stand-by losses and therefore hold less savings opportunity than other measures. On the other hand only a fraction of businesses have efficient boiler controls.

Figure 5.2-6: Saturation Levels of Select Space Heating Efficiency Measures

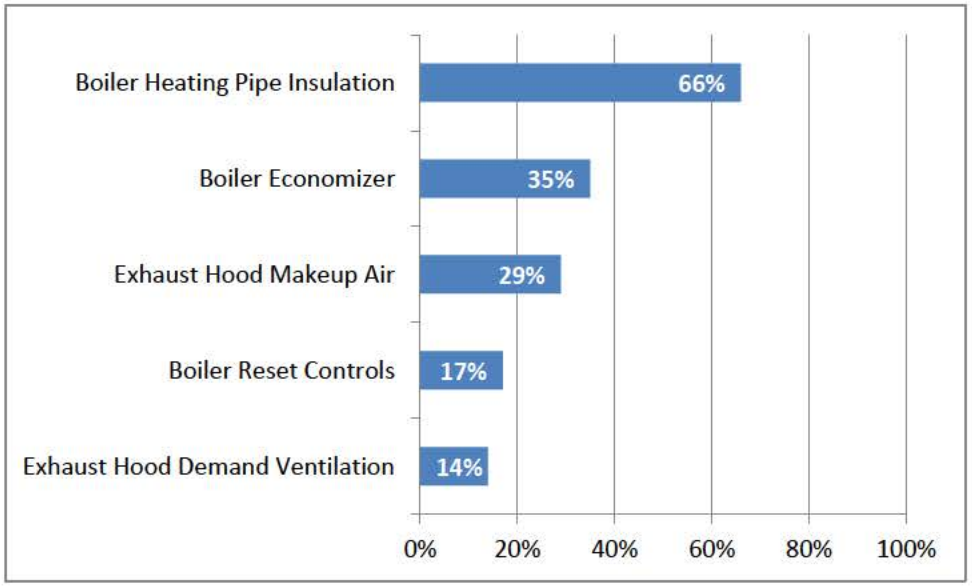


Table 5.2-11 above shows that a majority of the savings potential comes from space heating in the commercial sector. Table 5.2-12 shows the top 10 measure groupings that make up approximately 84% of the savings opportunity estimated by the potential study. The top 5 measure groups all come from within the space heating end use. Water heating measures like low-flow showerheads, low-flow spray nozzles, and efficient dishwasher or laundry appliances also exhibited savings potential.

Table 5.2-12: Top 10 Measure Groupings

Measure Grouping	End Use	Savings as a Percent of Total Savings Potential
Ventilation Controls	Space Heating	15%
Furnace Upgrades	Space Heating	14%
Improved Duct Sealing	Space Heating	14%
Heating System Sensor Controls & Tune-Up	Space Heating	9%
Destratification Fans	Space Heating	8%
Low Flow Devices Water	Heating	7%
Efficient Cooking Equipment	Cooking	6%
HRV Water	Heating	4%
Integrated Building Design	Building Envelope	4%
Efficient Dishwashers & Laundry	Water Heating	3%
Total Top 10		**84%**

All-Fuels

Based on the relative share of statewide consumption, by fuel type, in the C&I sector, the Trust estimates that the potential for cost-effective all-fuels savings through the Prescriptive Program channel

is between three and four times greater than for natural gas savings potential. The budget needed to capture such savings would dramatically exceed RGGI and other funds currently available to the Trust to capture savings of unregulated fuels such as oil, propane, kerosene and biomass. The ability for the Trust to achieve all-fuels savings therefore is limited by its budget and not the cost-effective market opportunity.

5.2.4 Budget and Metrics

Table 5.2-13: C&I Prescriptive Program Budget and Metrics

FY	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	Cost per kWh	MMBtu Savings	Cost per MMBtu	Lifetime Benefit	B:C Ratio
2017	$11,345,138	$1,744,869	$1,865,231	$14,955,238	46,183	6.6	$0.25	135,001	$26.74	$63,302,199	1.92
2018	$11,877,678	$1,872,559	$2,020,418	$15,770,655	47,700	6.9	$0.25	145,478	$26.76	$66,901,507	1.93
2019	$14,309,018	$2,065,123	$2,385,706	$18,759,847	57,743	8.2	$0.25	165,445	$26.90	$79,030,553	1.95

5.2.5 Program Design

The Program uses a marked-based approach, connecting contractors with Maine's C&I community to install high-efficiency equipment. The Program incentivizes these contractors and customers to choose the high-efficiency options with incentives that reduce the incremental cost between the low- and high-efficiency options. As described in the opportunity description above, the Trust anticipates delivering this program at levels consistent with the regular cycle of equipment replacements in the marketplace.

The Program encourages the installation of "off-the-shelf" high-efficiency equipment through established rebates and access to a network of trade allies (Qualified Partners). These measures are commonly available, easily installed, and achieve relatively uniform, predictable energy savings: projects that are more complex or utilize unique equipment are handled through the Custom Program. Non-residential energy customers, including businesses, municipalities, schools, other non-residential customers, and multifamily properties with five or more units, are eligible to participate in the program.

Program History

The C&I Prescriptive Program, previously called the "Business Incentive Program," is a long-standing energy efficiency program in Maine. Incentive programs for energy efficient equipment have been available to Maine's C&I customers since the early 1980s when the program was first offered by the electric utilities and subsequently by the PUC as an Efficiency Maine program.

The Program has evolved over time as the market has matured and as energy efficiency technologies and design standards have advanced. Since the Trust has run the Program, Program Field Staff have stepped back from playing a leading role in identifying customers, identifying energy efficiency opportunities, and processing applications. Now a network of more than 700 contractors identifies potential customers and opportunities, and submits electronic applications. Staff focuses on technical support, outreach to participating contractors, and quality assurance for participating projects. This shift to placing more responsibility on trade allies has reduced administrative costs.

In addition, the list of measures incentivized through the Program has evolved. Paralleling trends in other efficiency programs, the list has grown from lighting to heating, ventilation, cooling, and mechanical measures. A number of emerging technologies (e.g., LED lights) have shifted from the Custom Program to the Prescriptive Program as they have become more readily available and in greater demand.

Program activity has historically been driven by the lighting retrofit opportunities. However, the Program now but also acts as a channel for investing in natural gas and all-fuel saving measures. As funds from the Natural Gas Procurement and RGGI are available, heating measures will be a larger part of the Program. Natural gas saving measures (formerly called the Business Natural Gas Incentive Program) were originally offered and delivered by Unitil Natural Gas. Since 2012, the Trust integrated the delivery of the Program with the delivery of the Business Incentive program for electrical efficiency measures. In 2015, the Program was expanded to include all natural gas utilities in Maine.

The Program experienced an unprecedented level of interest in FY2015 as many businesses in Maine prepared for an expected increase in electricity costs and businesses had access to significantly greater product choices and contractors. Program participation levels reached an all-time high: businesses recognized energy efficiency as the most cost-effective way of managing their energy costs, and many recognized LED technologies as a timely energy efficiency solution. The result was that there was greater program interest than available funds, and two years' worth of funding was invested to meet demand. The Trust is learning from this significant interest and anticipates implementing a number of program design changes when lighting measures are re-launched. Such changes may include instituting a maximum incentive per business, a maximum percentage of the total project cost, and movement toward lighting design of one-to-one replacement retrofits to ensure that program dollars are invested across Maine and support broad participation among customers.

Measures Promoted

The Program will incentivize proven energy saving measures that are widely available and represent a significant opportunity for Maine's C&I sector. The Program will prioritize measures that have practical applications across the state and across sectors. Emerging technologies and solutions that are not widely available will be incentivized through the C&I Custom Program and are described in that Program's opportunity. As noted above, larger and more complex manufacturing technologies and process improvements will be routed through the Custom Program.

This Program invests funds from multiple sources which enables the Program to incentivize measures to reduce electricity, natural gas, and heating fuel consumption. Eligible measures range from lighting controls to ductless heat pumps to boiler controls to refrigeration units. What these measures have in common is that they meet a significant efficiency opportunity across the state, are readily available, and are third-party verified (e.g., on the DesignLights Consortium or the Air Conditioning, Heating and Refrigeration Institute product lists).

The Program's list of incentivized measures is continuously monitored and adjusted. Measures that become "industry standard" will be removed and new, proven technologies will be added. The Program

anticipates that municipal street lighting, lighting controls, and design lighting will become a larger part of the Program over the Triennial Plan III period. In addition, energy management systems, heating controls, and ventilation controls will become a greater source of energy savings.

In addition to incentivizing equipment replacements, the Program will explore providing incentives for ongoing energy savings through tuning building performance (i.e., pay-for-performance for buildings undergoing retro-commissioning). Ongoing building performance could be monitored with interval data available through the state's extensive deployment of smart meters.

Marketing

The primary marketing channel for this program is the Qualified Partner network. The Efficiency Maine Qualified Partner (QP) network comprises nearly 700 contractors, vendors, suppliers, and energy professionals who have been trained to provide support to businesses interested in saving energy. These independent businesses are the primary marketers of the Program by working with their customers and identifying new customers for energy efficient equipment. The Trust has found that all but the smallest businesses in Maine work with contractors for electrical, heating, and mechanical solutions. Rather than encourage businesses to work with a new energy efficiency contractor, or work directly with the Trust, the Trust instead focuses on encouraging contractors to become engaged with the Program.

For those businesses that do not currently work with a contractor or a Qualified Partner, the Efficiency Maine website features a Qualified Partner locator tool to easily put potential customers in touch with a Qualified Partner in their area.

The Program markets to Qualified Partners through a dedicated Qualified Partner website as well as a monthly electronic newsletter. In addition, the Program participates in supplier open houses and meets with professional associations and groups including the American Society of Heating, Refrigerating and Air-Conditioning Engineers, illumination Engineering Society, and International Brotherhood of Electrical Workers to share information about energy efficiency opportunities and encourage more industry professionals to become Qualified Partners.

The Program also markets directly to potential customers. This activity may include advertising in trade or business publications or participation at targeted trade shows and presentations to relevant business groups. In the past, the Program has worked to reach members of Maine Real Estate and Development Association, Maine Health Care Association, Maine Rural Water Association, Maine Restaurant Association, Rotary groups, economic development groups, local chamber of commerce, and more.

Education and Training/Workforce Development

The Efficiency Maine Qualified Partner network of energy professionals has been trained to provide support to businesses interested in saving energy. They are critical partners to Efficiency Maine in marketing the program — promoting, identifying, and delivering services to customers. All Qualified Partners must go through an annual recertification process to ensure that they have the most up-to-date information about the Program and ensure that they are compliant with eligibility criteria:

Qualified Partners must provide proof of current licensure, certifications and appropriate insurance in order to be recertified.

Targeted technical training for Qualified Partners will be held throughout the year. Training may include technology specific instruction or "soft skills" including sales training to enable the Qualified Partners to provide better information to potential customers.

Technical Assistance

The Program provides technical assistance to participating contractors in a number of ways. The Program makes equipment information, including cut sheets, available on the Qualified Partner website, as well as program information and answers to frequently asked questions. The Program also sends Qualified Partners general information on the industry, the Program, and case studies in a monthly, electronic newsletter. Qualified Partners may check on the status of a project through the Program's project database, effRT. The exclusive Qualified Partner website it available as a technical resource and program resources and sales tool. As described above, technology-specific information may also be addressed through trainings on new technologies or advanced installation techniques: for example, the Program has offered trainings on advanced heat pump installation and lighting controls in the past. Lastly, Qualified Partners are invited to call Program Staff with questions on eligible measures or technical questions.

Whenever possible, eligible measures are third-party verified and vetted. For example, measures incentivized through the Program may be listed and verified by the Consortium for Energy Efficiency (CEE), the Air-Conditioning, Heating & Refrigeration Institute (AHRI), and the DesignLights Consortium. These organizations also provide technical information on high-efficiency equipment and installation best practices. Most major distributors are also Qualified Partners and they are able to ensure that high-efficiency equipment from these lists and eligible for Program incentives are kept in stock. The Trust collaborates with distributors to ensure continuing availability of the most common efficient replacement equipment.

The Program provides information to potential customers through the Trust's website as well as over the phone. On the website, the Trust provides information about product eligibility and shares case studies of Maine businesses and the efficiency solutions they implemented. Most importantly, the Trust connects potential customers with Qualified Partners working in their area through an online contractor locator tool.

Financial Incentives

For retrofit projects that replace operational equipment, incentives are established based on the full installation costs of efficiency measures. These retrofits achieve savings equal to the difference between the usage of the efficient technology and the usage of the previously existing technology. For upgrades made at the time of planned investment in equipment and systems (also referred to as lost opportunity projects), incentives are set to reflect the incremental cost of efficient measures relative to standard efficiency measures. These purchases are made because the existing equipment has reached the end of its useful life or has otherwise failed or when additional equipment is being added.

In general, financial incentives will be targeted at 35%–50% of the incremental cost between an inefficient and efficient piece of equipment, including installation costs in the case of retrofits. Incentives will be set and periodically adjusted by monitoring market activity and market prices. Rebates may also be paired with financing; or financing may represent the only form of incentive, where appropriate and effective.

In addition, the Program will explore alternative ways to incentivize high-efficiency measures. For example, high-efficiency lighting and lighting controls projects will not always need one-to-one replacements: one LED fixture with controls may replace two inefficient fluorescent fixtures if properly designed. Accordingly, the Trust will explore incentivizing lighting design or output in addition to one-to-one replacements. Similarly, the Trust may incentivize ongoing energy savings in a large retrofit project through monitoring customer interval data in a pay-for-performance incentive. In the case of equipment that is purchased as emergency replacement, in particular roof-top HVAC units, the Trust will explore incentivizing the equipment upstream so the cost of the replacement equipment is commensurate with inefficient units. The Trust believes that this may encourage more building-owners to replace inefficient equipment with higher efficiency options in situations requiring immediate replacement.

Quality Assurance/Quality Control

All incentive applications are screened for completeness, including a review of equipment cut sheets and contractor invoices. In addition, all applications are signed by the customer to ensure that applicable terms and conditions have been reviewed by both the customer and the contractor.

Applications over a certain threshold (currently incentives greater than $10,000) receive a technical review before project pre-approval is granted. At project completion, these larger projects are reviewed again before incentive payment is issued. In addition, a random sample of projects is inspected on-site; currently 10% of all projects are inspected on-site. Issues identified while on-site are addressed with the installation contractor.

Participants may be surveyed to determine the level of satisfaction with the Qualified Partner (if applicable) and the Program so that any issues may be promptly addressed.

5.3 Commercial New Construction

5.3.1 Overview

The Commercial New Construction program (branded as “Maine Advanced Buildings”) is designed to provide technical support and incentives for high performance in new construction and major renovations in commercial facilities.

5.3.2 Objectives

- Increase awareness of cost-effective energy efficient options to engineers, architects and their clients

- Create favorable market conditions for increased use of energy efficiency in new commercial construction and major renovations
- Promote a holistic, whole building approach and integrated design model
- Maximize the use of weatherization and increase the efficiency of heating and cooling systems
- Promote new jobs and business development to deliver affordable energy and energy efficiency products and services
- Reduce GHG emissions from the commercial building sector

5.3.3 Opportunity

The Commercial New Construction program prioritizes integrated design processes and high-performance buildings that are more than 30% more efficient than buildings built to the current building codes. There are many pathways to achieving high-performance buildings, ranging from well-sealed building envelopes to advanced lighting design. The Trust supports new construction projects with a project checklist where building owners and designers can pick and choose energy efficient design strategies that will result in a high-performance building. The strategies implemented may differ, but all high-performance buildings share an integrated design process in which all building elements and systems are considered together and optimized to ensure right-sized systems and efficient, ongoing building performance.

Customer Market Barriers

The most significant market barrier to constructing high-performance buildings is the conventional design-build process: multiple sub-contractors working in sequence to install systems almost always results in building systems that are over-sized. While many buildings may have energy efficient components, true high-performance buildings are only possible through the well-planned integration of all building systems: envelope, fenestration, lighting, heating, ventilation, etc. Such integration demands coordinated planning between owners, designers, builders, and contractors from the beginning of new construction projects. This integrated approach adds labor costs to the project, especially in the early stages. In addition, some of the building systems and construction techniques adopted to meet high-performance goals may be more costly than conventional systems.

The Trust's program attempts to overcome these barriers by incentivizing both the high-performance construction and the design team involved in the project. In this way, the program acknowledges that the design and construction process is as much the barrier as the sophistication or performance of any individual building systems.

Additional market barriers, described in the C&I Prescriptive Program relating to the installation of high-efficiency lighting and HVAC equipment, are also applicable to the customers managing a new commercial construction project through the conventional design-build process.

Market

The target market for this Program is Maine property owner-builders, developers, architects and engineers who are in the initial stages of either new construction or a major renovation project at a commercial building. This Program does not target residential housing or industrial facilities.

New construction statistics, nationwide, show an overall increase in construction starts from 2010 to 2015 in all nonresidential sectors. Maine has seen a similar, albeit more modest, increase over the same time frame.

The program targets buildings of 100,000 SF and smaller because energy savings in larger buildings are more challenging to forecast through high-performance design guidelines and check lists.

Participation in this program is heavily dependent on owner interest. Owners that opt for a design-build process or projects that cannot meet Maine Advance Building standards are eligible for participation in the C&I Prescriptive Program.

Electric

The Program for commercial new construction projects offers comprehensive strategies to help Maine property owners, developers, architects and engineers design new buildings that will achieve significant energy savings. This sub-section characterizes the building types in the commercial sector that are targeted and discusses the baseline for the program.

This program targets commercial new construction projects or major renovation projects. Eligible projects include commercial new construction or major renovation projects which meet the following requirements:

- Structures between 10,000 and 100,000 sq. ft.
- Building Types:
  - Schools
  - Municipal Buildings
  - Healthcare Facilities
  - Office Buildings
  - Warehouses

The baseline condition is a new construction project or major renovation project which only meets the minimum requirements for energy efficiency. The current standards are the requirements of the Maine Uniform Building and Energy Code. The amount of new construction is estimated to be approximately half of the growth in the sales forecast for the commercial sector. The other half of the growth in the sales forecast is assumed to be increases in production and occupancy in existing buildings.

Each project eligible for the program must be designed to meet Tier 2 of the New Building Institute's Core Performance. The savings of each program will be the estimated consumption of a building built to code minus the estimated consumption of the building that meets the Tier 2 criteria.

Technical Potential

Technical potential represents the reduction in energy use that would occur if all technologically available energy efficiency measures are immediately adopted in all feasible instances. This is therefore a theoretical quantification of savings which does not account for practical considerations such as cost-effectiveness constraints or the willingness of customers to participate.

Table 5.3-1 provides a summary of the estimated costs[65] and savings associated with the technical potential for the Commercial New Construction Program found by the energy efficiency potential study. The Commercial New Construction Program would be expected to displace 79,571 MWh of energy and 8.4 MW of electric demand across the 2017-2026 time frame at an average annual cost of $568,990.

Table 5.3-1: Commercial New Construction Program – Technical Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$5,689,896	$568,990
MWh Savings	79,571	7,957
MW Savings	8.4	0.8

Economic Potential

Economic potential accounts for cost-effectiveness constraints. Table 5.3-2 provides a summary of the estimated costs[66] and savings associated with the economic potential for the Commercial New Construction Program found by the energy efficiency potential study. The Commercial New Construction Program would be expected to displace 73,795 MWh of electric energy and 8.4 MW of electric demand across the 2017-2026 time frame at an average annual cost of $389,828.

Table 5.3-2: Commercial New Construction Program – Economic Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$3,898,279	$389,828
MWh Savings	73,795	7,379
MW Savings	8.4	0.8

Table 5.3-3 provides an overview of the annual estimated costs and savings associated with the economic potential for the Commercial New Construction Program found by the energy efficiency potential study. The economic potential for this program is identical to the technical potential. All measures in the program passed the TRC cost-effectiveness screening.

[65] The costs associated with technical potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

[66] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

Table 5.3-3: Commercial New Construction Program – Economic Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$389,828	7,379	0.8
FY2018	$389,828	7,379	0.8
FY2019	$389,828	7,379	0.8
FY2020	$389,828	7,379	0.8
FY2021	$389,828	7,379	0.8
FY2022	$389,828	7,379	0.8
FY2023	$389,828	7,379	0.8
FY2024	$389,828	7,379	0.8
FY2025	$389,828	7,379	0.8
FY2026	$389,828	7,379	0.8
10-Year Totals	**$3,898,279**	**73,795**	**8.4**
Annual Average	**$389,828**	**7,379**	**0.8**

Achievable Potential

The achievable potential for the Commercial New Construction Program accounts for cost-effectiveness constraints. Achievable potential also recognizes that participation in a program is a function of program awareness and the Trust's ability to ramp up activity over time. Table 5.3-4 provides the achievable potential savings and costs for the Commercial New Construction Program during the FY2017–FY2019 time frame of the Triennial Plan.

Table 5.3-4: Commercial New Construction Program – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-Year Totals
Total Efficiency Maine Trust Costs	$711,935	$717,259	$805,949	$2,235,143
MWh Savings	2,943	2,943	3,254	9,140
MW Savings	0.4	0.4	0.5	1.3

Table 5.3-5 provides an overview of the annual estimated costs and savings associated with the achievable potential for the Commercial New Construction Program found by the energy efficiency potential study.

Table 5.3-5: Commercial New Construction Program – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$711,935	2,943	0.4
FY2018	$717,259	2,943	0.4
FY2019	$805,949	3,254	0.5
FY2020	$636,609	2,633	0.4
FY2021	$639,412	2,633	0.4
FY2022	$650,980	2,633	0.4
FY2023	$566,572	2,322	0.4
FY2024	$568,826	2,322	0.4
FY2025	$571,464	2,322	0.4
FY2026	$585,701	2,295	0.4
10-Year Totals	**$6,454,707**	**26,301**	**4.1**
Annual Average	**$645,471**	**2,630**	**0.4**

MACE Measures

The economic potential for the Commercial New Construction Program includes all cost-effective measures included in the technical potential estimates, but the achievable potential accounts for factors which limit the adoption of cost-effective measures over time. Achievable potential also provides an estimate of the non-incentive costs (marketing, program management, implementation, etc.) needed to operate the program. The Program is targeting incentives at 75% of incremental cost. Based on an industry analysis of EIA data on the elasticity between incentive levels and savings the Trust would anticipate an adoption rate of 68%.

Table 5.3-6 provides an overview of the estimated electric energy and demand savings associated with the programs most impactful measure types.

Table 5.3-6: Commercial New Construction Program – Top Measures

Description	MWh Savings	MW Savings	MWh Savings	MW Savings	MWh Savings	MW Savings
	2017		2018		2019	
30% More Efficient Design - New Construction	888	0.2	888	0.2	888	0.2
H.E. Evaporative Fan Motors	377	0.0	377	0.0	503	0.1
15% More Efficient Design - New Construction	345	0.1	345	0.1	345	0.1
Variable Speed Drive Control, 5 HP	209	0.0	209	0.0	279	0.0
Integrated Building Design	179	0.0	179	0.0	179	0.0
Variable Speed Drive Control, 15 HP	138	0.0	138	0.0	184	0.0
Vending Miser for Soft Drink Vending Machines	89	0.0	89	0.0	119	0.0
Totals	**2,224**	**0.3**	**2,224**	**0.3**	**2,495**	**0.3**
% of Program	**76%**	**66%**	**76%**	**66%**	**77%**	**66%**

A total of 122 measure iterations were included in the technical potential analysis of the Commercial New Construction Program. The top measures were performance-based lighting incentives at 15% and 30% more efficient than code. Solar water heating, energy efficiency transformers and refrigeration heat recovery measures were found to not be cost-effective in this context.

Natural Gas

Market

The natural gas portion of the Commercial New Construction Program will be used to incentivize natural gas measures implemented under the program.

Table 5.3-7 shows the estimated savings potential by end use in the low case scenario used by the Trust to set its proposed budgets. The table shows building envelope measures and space heating measures account for a majority of the savings potential identified by the potential study.

Table 5.3-7: 10-Year Savings Potential by End Use (MMBtu)[67]

End Use	New Construction Customers	Percent of Total
Space Heating	35,262	52%
Space & Water Heating	48	0%
Building Envelope	4,022	6%
HVAC Controls	7,034	10%
Cooking	3,044	4%
Water Heating	8,041	12%
Conventional Boiler Use	3,211	5%
Process Heating	0	0%
Facility HVAC	7,369	11%
Total	**68,032**	**100%**

All Fuels

The Trust allocates 12.5% of RGGI revenues to the Commercial New Construction Program. The potential for thermal savings in this area far exceeds funds available to pay for measures that save unregulated fuels. The Trust will continue to invest in high-performance new construction as budgets allow.

5.3.4 Budget and Metrics

Table 5.3-8: Commercial New Construction Budget and Metrics

FY	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	Cost per kWh	MMBtu Savings	Cost per MMBtu	Lifetime Benefit	B:C Ratio
2017	$711,935	$291,750	$1,865,231	$2,868,916	2,943	0.4	$0.24	72,048	$29.94	$2,941,971	3.47
2018	$717,259	$313,096	$2,020,418	$3,050,773	2,943	0.4	$0.24	77,916	$29.95	$2,926,932	3.58
2019	$805,949	$344,989	$2,385,706	$3,536,644	3,254	0.5	$0.25	90,930	$30.03	$3,098,577	3.52

5.3.5 Program Design

Building owners and design teams dedicated to high-performance building project may need to make challenging decisions between meeting energy efficiency goals or meeting project budgets. Incentives that reduce the incremental cost between standard and high-performance construction help ensure that high-performance projects are built as optimally designed. Incentives that reduce the costs of the design process are also an important way to promote high-performance buildings.

Program History

Since as early as 2005, Efficiency Maine programs have included incentives to promote high-efficiency new construction in commercial buildings. In 2009, Efficiency Maine introduced a more holistic approach aimed at achieving high-performance buildings and energy reductions regardless of fuel by

[67] End use percentages based on the percentage for all customers: - existing, expansion, and new construction customers.

establishing the Maine Advanced Buildings program. The new initiative was initially funded using a federal ARRA-SEP grant. With ARRA funds, the program was able to promote and incentivize heating oil savings. This made measures such as high-efficiency insulation, windows and heating systems eligible for program incentives.

Since its launch, the Program has relied on national high-performance guidelines set by the non-profit New Buildings Institute. The New Buildings Institute's Core Performance Guide improves accuracy of energy savings estimates, simplifies a complex integrated design process, and results in more efficient buildings. Through this Program, the Trust traditionally has offered incentives per square foot to participating building owners in order to reduce the incremental construction costs between code-required and high-performance buildings. During the second Triennial Plan period, incentives were also made available for the design team in order to reduce costs associated with integrated design.

From 2010 to 2014, 31 new construction or major renovation projects were built consistent with the Maine Advanced Building standards. Others began but did not complete the process due to changes in project budgets, design priorities, or concerns about construction costs. Many of the buildings that started but did not complete the program were able to install high-efficiency measures with assistance from the precursor to the C&I Prescriptive Program. Through program refinements in the New Buildings Institute standards that are incorporated into Maine Advanced Building and in the Program's marketing and administration by the Trust, the B:C ratio has risen from 0.74 to 1.25 over the past five years. The Program generally has experienced higher administrative costs than other Trust programs in part due to the need for custom reviews of project proposals.

Measures Promoted

Through the New Construction program, Efficiency Maine promotes high-performance building design and the installation of energy efficient systems and materials including building envelope, lighting, heating, and ventilation systems. Many of these measures are also promoted through the Prescriptive Program, however the Commercial New Construction Program incentivizes integrated design. This may include systems that may employ new energy efficient technologies. It may also incentivize design that prioritizes passive energy solutions including daylighting and natural ventilation. In order to achieve significant energy savings compared to code-compliant buildings, the Program prioritizes the design process: the process is integral to the energy performance of the resulting building.

Currently, the program targets energy performance at least 30% better than the minimum standards of the Maine Uniform Building and Energy Code. The Program may in the future incentivize even better performing buildings. For example, the Program may consider different tiers of incentives for differing levels of energy performance, using third-party standards, including the New Building Institute's Tier 3, Tier 4, or Net-Zero.

Marketing

The Trust will deliver the Program through collaborations with Maine's design-build community as well as with building owners and developers. The Program will be administered by a program delivery

contractor selected through a competitive bidding process; the delivery contractor will provide project support and technical advice during the design and construction process.

In the past, the Trust has relied on a third-party certified, high-performance new construction process developed by the New Building Institute. The Trust has found that a high-performance building checklist is a clear way to communicate energy goals and guide the design process. The New Building Institute's *New Construction Guide* can guide better-than-code energy performance while eliminating the need for costly energy models or energy evaluations. The Trust anticipates that New Building Institute guidelines will remain as an important part of the implementation strategy during the Triennial Plan III period but the Trust will also evaluate other energy standards.

The Trust anticipates that program activity will remain steady; the Trust will target approximately 10% of the new construction market. The time frame for many new construction development projects is long: projects begun in the current Triennial Plan period will not be concluded until the next Triennial Plan period. Program budgets may differ year-to-year depending on the number of project completions.

Because high-performance buildings are so dependent on an integrated design approach, the Trust focuses marketing efforts on Maine's architectural and engineering community. This includes outreach to architect and engineer professional associations and to the primary architecture and engineering firms. These firms, in turn, pitch the Program during project proposals and in initial conversations with clients. Most high performance building projects must start at the earliest stages of conceptual design in order to meet energy standards. The Trust has found that the best way to be "at the table" is by working with design professionals.

The Program markets directly to potential new building owners through meetings, conferences, and other marketing channels. The Trust also anticipates targeting building developers, institutional and municipal building owners, and multifamily building owners as part of the Program in the Triennial Plan III period.

The Trust and other efficiency efforts nationwide have had less success with new construction projects built by developers or on speculation. During the Triennial Plan III period, the Trust will also explore if program materials can be shared with property owners and developers at the time of real estate transactions in order to reach a larger share of this developer-owned market.

Technical Assistance

As described above, the chief barrier to high-performance building construction is the piecemeal approach to design and construction. The Program provides technical assistance to overcome this barrier by connecting program participants with the guidelines and checklists developed by the New Building Institute. In addition, the Trust provides technical assistance to ensure that projects are constructed as planned and meet shared energy performance goals. Program support staff works in collaboration with architects on the design, reviews equipment cut sheets, reviews engineering plans, and conducts field reviews during significant construction and installation milestones.

Financial Incentives

Under Triennial Plan III, the New Construction Program will continue to offer financial incentives per square foot for the building project and for the design team. The Trust may set an incentive cap per building in order to ensure that program budgets are not invested in a single, large project, causing other interested developers to choose between delaying a year or reducing energy goals.

Recognizing that not all newly constructed buildings or those undergoing substantial renovations are a fit for the Commercial New Construction Program, the Trust will also offer incentives for purchases of new, high-efficiency lights, equipment, and controls as allowed by applicable funding sources through the C&I: Prescriptive Program.

The Commercial New Construction Program could be complemented by a pay-for-performance approach that monitors energy consumption in an ongoing basis. The program could target larger buildings through a pay-for-performance incentive and verify ongoing high-efficiency operations through interval data.

Quality Assurance/Quality Control

Program support staff meet with the design team as needed. In addition, the team reviews equipment cut sheets, reviews engineering plans, and conducts field reviews during significant construction and installation milestones. The design team submits final "as-built" plans for review.

5.4 Small Business Initiative

5.4.1 Overview

The Small Business Initiative provides a suite of services and financial incentives that cater to the needs of eligible small businesses in targeted areas.[68] Small businesses traditionally have been underserved in Trust programs and in efficiency programs nationwide. The Program is designed to overcome the unique barriers experienced by small businesses including the lack of time and expertise to analyze energy options in-house and the perceived hassle of making arrangements to purchase and install upgraded equipment. For businesses operating close to the line of profitability, investing in outsourced services to analyze options, provide advice, and general contracting of project management may seem like a luxury they cannot afford. Due to their relatively small size and lower energy use, these businesses tend to receive less attention from contractors and vendors seeking to develop new projects. This program endeavors to overcome these barriers by bringing information and technical support to the customer's doorstep, offering enhanced financial incentives (compared to the basic incentives of the Prescriptive Program), and scheduling and executing energy upgrades using the "direct install" approach.

5.4.2 Objectives

- Advance the statutory directive to target at least 10% of the Electricity Efficiency Procurement or $2.6 million, whichever is greater, to programs for small business customers

[68] For the purposes of this plan, small businesses are defined as Small General Service customers of 25kW or less.

- Increase consumer awareness of cost-effective options
- Create favorable market conditions for increased use of energy efficiency
- Reduce total energy costs for electricity consumers in the State by increasing the efficiency with which electricity and natural gas is consumed
- Maintain a strategic approach to deliver efficiency and conservation resources, cost-effectively and equitably, to Maine's small businesses

5.4.3 Opportunity

The core measures promoted through the Small Business Initiative are various kinds of high-efficiency lighting. Both interior lighting and outside lighting found at many small businesses are suitable for retrofitting with high-efficiency alternatives. These measures have a relatively high B:C ratio, allowing the project more easily to achieve payback periods, with the help of the Trust's incentives, that are tolerable for small businesses. As noted above, ongoing analysis of data collected from recent Program participants will indicate whether there is a good opportunity to expand the list of eligible measures (to include refrigeration or HVAC) for the Program.

Customer Market Barriers

Small businesses face greater barriers to accessing energy efficiency savings than other non-residential customers or most residential customers, and as a result limited numbers of small businesses have installed energy efficient products. For most small businesses, the up-front cost of the efficiency improvement, limited access to working capital, lack of information, and lack of technical expertise present significant market barriers. In most cases, small business owners require a short payback period in order for any investments to move forward, including energy efficiency. This is particularly true of small businesses in short-term leasing agreements.

In addition, contractors and vendors commonly prefer to focus on larger opportunities. This phenomenon is more pronounced in rural areas of the state.

Market

During Triennial Plan II, this Program targeted C&I customers having a peak demand of 100 kW or less. During the Triennial Plan III period, the Trust proposes to focus the program on a smaller subset of businesses having peak demand of 25 kW or less. Eligible customers will include non-residential customers in selected geographical areas. More than 75,000 small business accounts are in this target market statewide. Recent focus of the program has been on the installation of energy efficient lighting measures given the very high B:C potential and the relatively low price-point for these measures. In theory, other cost-effective measures could be added to the suite of offerings through this channel.

Electric

The Small Business Initiative will focus on delivering a cost-effective lighting retrofit program to small businesses in Maine by addressing common barriers energy efficiency improvements experienced by this sector such as time, capital, and technical expertise.

As with all retrofit projects where operational equipment is replaced, incentives are established based on the full installation costs of efficiency measures. Savings are equal to the difference between the efficient technology and the previously existing technology.

Customers eligible for incentives with the Small Business Initiative must have no more than 25kW monthly demand. The program only addresses lighting upgrades at this time. The list of potentially eligible lighting measures is comparable to those offered through the C&I Prescriptive Program.

In 2012, the Trust conducted its original C&I baseline study, sampling a cross-section of large, medium and small commercial customers. The 2012 study estimated that Small Business energy consumption constituted 12.5% of total commercial energy consumption. It also found that generally, across the commercial sector, a significant share of interior linear fluorescent lights were already highly efficient.

However, as described more below, the Trust successfully ran this program in FY2015 in parts of Aroostook County, Oxford County, and Kennebec County, resulting in significant lighting upgrades in more than 460 small businesses. The Trust observed that the small businesses encountered during this program in FY2015 had a significantly higher opportunity for efficient lighting retrofits than the average calculated by the 2012 study. The Trust thus initiated additional analysis on the baseline conditions of this sector to better determine the conditions.

Technical Potential

Table 5.4-1 provides a summary of the estimated costs[69] and savings associated with the technical potential for the Small Business Initiative found by the energy efficiency potential study. The program' would be expected to displace 127,749 MWh of energy and 19.1 MW of electric demand across the 2017-2026 time frame at an average annual cost of $3,689,104.

Table 5.4-1: Small Business Initiative – Technical Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$36,891,040	$3,689,104
MWh Savings	127,749	12,775
MW Savings	19.1	1.9

Economic Potential

Table 5.4-2 provides a summary of the estimated costs[70] and savings associated with the economic potential for the Small Business Initiative found by the energy efficiency potential study. The Small

[69] The costs associated with technical potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

[70] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

Business Initiative would be expected to displace 96,119 MWh of electric energy and 11.3 MW of electric demand across the 2017-2026 time frame at an average annual cost of $2,050,539.

Table 5.4-2: Small Business Initiative – Economic Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$20,505,394	$2,050,539
MWh Savings	96,119	9,612
MW Savings	11.3	1.1

Achievable Potential

The achievable potential for the Small Business Initiative accounts for cost-effectiveness constraints. Table 5.4-3 provides the achievable potential savings and costs for the Small Business Initiative during the FY2017–FY2019 time frame of the Triennial Plan. The total achievable potential costs are sub-divided into incentive costs and delivery costs.

Table 5.4-3: Small Business Initiative – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-yr Totals
Total Efficiency Maine Trust Costs	$2,639,247	$2,651,217	$3,305,519	$8,595,983
MWh Savings	6,618	6,618	8,025	21,262
MW Savings	1.3	1.3	1.5	4.1

Table 5.4-4 provides an overview of the annual estimated costs and savings associated with the achievable potential for the Small Business Initiative found by the energy efficiency potential study.

Table 5.4-4: Small Business Initiative – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$2,639,247	6,618	1.3
FY2018	$2,651,217	6,618	1.3
FY2019	$3,305,519	8,025	1.5
FY2020	$2,014,317	5,211	1.0
FY2021	$2,019,392	5,211	1.0
FY2022	$2,024,563	5,211	1.0
FY2023	$1,376,205	3,804	0.8
FY2024	$1,384,232	3,804	0.8
FY2025	$1,391,000	3,804	0.8
FY2026	$1,559,730	3,804	0.8
10-Year Totals	**$20,365,423**	**52,112**	**10.2**
Annual Average	**$2,036,542**	**5,211**	**1.0**

MACE Measures

The economic potential for the Small Business Initiative includes all cost-effective measures included in the technical potential estimates and also provides an estimate of the non-incentive costs (marketing, program management, implementation, etc.) needed to operate the program.

The measure savings of the Small Business Initiative are being driven by fluorescent fixture and occupancy sensor savings. The program also includes a specific sub-set of refrigeration and HVAC measures that the Trust determined to be most applicable for small business customers. For instance, smaller HVAC replacement measures, such as High Efficiency AC - Unitary & Split Systems less than or equal to 11.25 tons were included, while larger measures such as High Efficiency AC greater than 11.25 tons and Chiller replacements were not included. For refrigeration, larger and more costly measures, such as discuss and scroll compressors and floating head pressure controls, were not included.

Table 5.4-5 provides an overview of the estimated electric energy and demand savings associated with the programs most impactful measure types.

Table 5.4-5: Small Business Initiative – Top Measures

Description	MWh Savings	MW Savings	MWh Savings	MW Savings	MWh Savings	MW Savings
	2017		2018		2019	
LED Outdoor Area Fixture	1,777	0.3	1,777	0.3	2,369	0.4
LED Wallpack	684	0.1	684	0.1	912	0.2
Remote Mounted Occupancy Sensor	752	0.2	752	0.2	752	0.2
Switch Mounted Occupancy Sensor	752	0.2	752	0.2	752	0.2
Lamp & Ballast Retrofit (HPT8 Replacing T12)	331	0.1	331	0.1	441	0.1
LED Lighting in Refrigeration	270	0.0	270	0.0	360	0.0
Controls for H.I.F.	280	0.1	280	0.1	280	0.1
LED Downlight	220	0.0	220	0.0	293	0.0
Zero-Energy Doors	166	0.0	166	0.0	166	0.0
Door Heater Controls	135	0.0	135	0.0	180	0.0
LED Traffic / Pedestrian Signals	128	0.0	128	0.0	171	0.0
Totals	**3,717**	**0.7**	**3,717**	**0.7**	**4,307**	**0.8**
% of Program	**56%**	**56%**	**56%**	**56%**	**54%**	**53%**

Natural Gas

All businesses, regardless of size, are eligible and encouraged to participate in the C&I Prescriptive Program which offers incentives for high-efficiency natural gas equipment. At this time, however, there is no specially allocated budget for delivering natural gas or all fuels measures through the Small Business Initiative. In the future, it is possible that the Trust would offer low-cost measures through this delivery channel.

All Fuels

At this time there is no budget for delivering all-fuels measures through the Small Business Initiative. In the future, it is possible that the Trust would offer low-cost measures through this delivery channel.

5.4.4 Budget and Metrics

Table 5.4-6: Small Business Initiative Budget and Metrics

FY	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	Cost per kWh	MMBtu Savings	Cost per MMBtu	Lifetime Benefit	B:C Ratio
2017	$2,639,247	$0	$0	$2,639,247	6,618	1.3	$0.40	0	N/A	$6,351,869	2.08
2018	$2,651,217	$0	$0	$2,651,217	6,618	1.3	$0.40	0	N/A	$6,300,680	2.15
2019	$3,305,519	$0	$0	$3,305,519	8,025	1.5	$0.41	0	N/A	$7,682,212	2.19

5.4.5 Program Design

The program will target areas having a significant number of small businesses under 25kW; the program is particularly well-suited to targeting regions located outside of traditional energy efficiency supply chains or traditionally under-served by the contractor community. The program pairs local marketing with streamlined delivery to incentivize customers in a targeted geographic area to act quickly to replace inefficient lights with high-efficiency models. The program has a higher adoption rate than the Prescriptive Program because it is designed specifically to overcome most obstacles to installing energy efficient measures in eligible businesses.

"Direct install" is a term that describes delivery of efficiency measures that are brought directly to the attention of the property owner at the property site, and where the equipment procurement, scheduling and installation (with the consent of the customer) are arranged by the program delivery team. This contrasts from prescriptive or custom program delivery approaches in which the customer (or their contractor) is relied upon to initiate and manage purchases and project installation. Under the Small Business Initiative, the customer pays a portion of the project costs upon its completion while Efficiency Maine pays the balance of the project cost to the installing contractor. This arrangement means the customer does not need to pay the full cost of the project upon completion and then wait for the incentive payment.

As described below, the program first will target rural and more remote areas of the state first; the Trust anticipates that the costs to deliver the program to these areas (for example, Washington County) may be higher than in later years when the program focuses on more densely populated areas. The Program also may accelerate an area served to meet Non Transmission Alternative needs or reduce grid constraints. In those cases, additional measures or larger business-size criteria may be applied. The description of the market opportunity above does not include these larger businesses or additional measures.

Program History

This program initially was conducted as a pilot program in FY2013–FY2014 with a $1 million budget. Maine Public Service Company, Bangor Hydro Electric Company, and Kennebunk Power and Light

partnered with the Trust on the pilot; Presque Isle, Machias, Jonesport, and Kennnebunk served as pilot regions. These regions were selected because they are located outside of the major areas served by the energy efficiency supply chain and because they contain a critical mass of small business customers. The pilot's objectives were to demonstrate that a program design using "direct installation" could cost-effectively deliver retrofit lighting measures and overcome the common barriers to small businesses in Maine.

By targeting specific geographic regions for limited periods of time, the Trust was able to achieve significant economies of scale through incentivizing and pre-ordering a limited number of energy efficient lighting options and working with contractors in a small area. The pilot also experimented with varying approaches to marketing and levels of incentives to encourage customer action. The limited time offer was persuasive in motivating customers to take action. During the pilot, 125 projects were completed resulting in an estimated energy savings of 1,248,942 kWh. Pilot participants are estimated to be saving an average of $108 a month on their electricity bills.

The pilot demonstrated that small businesses in Maine constitute a unique customer type well-suited to a direct install program. The pilot initially experienced limited uptake among potential participants. This was partly due to a number of potential participants dropping out of the pilot in between the initial assessment and installation of measures. The Trust determined that incentives should be set at a level to meet payback periods of around one year in order to overcome the potential participants' uncertainty in their longer-term financial viability and their aversion to debt. The full-fledged program — the Small Business Initiative — launched in FY14. It was modified to eliminate delays between steps — assessment, installation, and incentive payment — and streamline the customer experience by having each customer work with only one contractor from the beginning to end of the process.

The Small Business Initiative continued to target specific geographic regions characterized by large numbers of small businesses located outside of the easily accessed energy efficiency supply chain. Geographic targeting enabled the Trust to work with locally-based contractors and ensure a quick and streamlined process for participating businesses; regional suppliers were leveraged to ensure that inventory was in stock to reduce wait times.

Geographic targeting was also a significant component of the marketing campaign. The Trust worked with local business leaders to announce the opportunity to the small business community including announcing the Small Business Initiative with the chamber of commerce. Other marketing tactics included working with iconic local businesses to participate in the program and then having them host business-to-business events.

In FY2015, the Small Business Initiative served four regions:

- Region 1: Fort Kent, Madawaska, Caribou, and Van Buren
- Region 2: Houlton
- Region 3: Norway, Oxford, South Paris, Mechanic Falls, and Poland
- Region 4: Waterville, Oakland, Fairfield, and Winslow

There were 460 small businesses that participated in the program. The retrofit projects completed included high-efficiency T8, LED spot and screw-in bulbs, and exterior LED fixtures. Businesses participating in the program realized an average 11,879 kWh electricity savings in the first year or $1,544 at current electricity costs.[71]

Measures Promoted

Eligible measures will continue to include efficient lighting equipment and lighting controls. The Trust has been collecting site specific data regarding refrigeration, compressed air, and HVAC equipment, for the evaluation of future program measures. Natural gas measures will also be considered. New measures will be evaluated if similar market barriers apply and if the measure is common enough to be suited for a direct-install program. This may differ according to region: for example, a coastal area with a number of seafood businesses and restaurants may have more opportunity for high-efficiency refrigeration measures than an inland area. Some energy efficiency solutions for small businesses may remain better suited to be handled through the C&I Prescriptive Program.

The market opportunity described above includes lighting and lighting controls. The market potential for efficiency measures relating to refrigeration, compressed air, or HVAC in Maine small businesses are discussed in the C&I: Prescriptive Program description, above.

Program benefits includes a walk-through assessment and enhanced incentives for a prescriptive list of cost-effective energy efficiency opportunities. Where funds allow and the customer is creditworthy, it will also include access to financing. Business owners will receive a proposal containing cost estimates, associated energy savings estimates, and financial incentives with payback periods short enough to spur action. To support the program, the Trust will choose an equipment distributor through a competitive bid process, and contractors who commit to a timely direct installation of select measures. Equipment distributors will be invited to participate in periodic, competitive bids for equipment; those bids set the price for a given equipment list, for a specified region, for a limited period of time. New proposals may be launched as market prices demand or as new regions are targeted.

Using a turnkey program delivery model, the program consists of five elements:

- Performing a building assessment and identifying opportunities for efficiency upgrades;
- Developing the project and marketing to customer;
- Installing the recommended measures;
- Performing quality assurance and quality control through on-site project inspections and verification; and
- Delivering financial incentives and requiring a customer co-payment

Through this Program, the Trust is setting a goal of upgrading lighting in 80% of Small General Service (SGS) electricity customers in the state over the next 10 years. As described in the marketing strategy below, the Trust will employ a phased approach that starts around the periphery of the state and works

[71] Assuming $0.13/kWh as the blended rate.

in, toward the denser markets. This “outside-in” strategy will be complemented by occasional geotargeted initiatives used to enhance grid reliability.

Marketing

This Program model offers the small business owner an initial free, on-site assessment of select efficiency opportunities, a proposal with recommended energy-efficient upgrades, and the installation of the chosen measures.

Repeating a strategy that was successfully employed during Triennial Plan II, Efficiency Maine will create a local “buzz” in targeted towns by leveraging local resources such as Chambers of Commerce, economic development groups, community leaders, regional media outlets, and well-known local businesses. For example, in FY15 the Program was launched in Fort Kent in collaboration with the local Chamber of Commerce and the Northern Maine Development Commission. Local businesses were invited to a kick-off event hosted by Efficiency Maine, the Chamber, and the Development Commission; invitations were directly mailed, shared electronically, and announced in two local newspapers. At the event, businesses learned about the program and were invited to tour a local, iconic business that had already completed an upgrade. As more businesses in Fort Kent participated in the program, awareness spread through word of mouth as well as through traditional outreach channels. This approach proved successful and the Trust anticipates replicating it through the Triennial Plan III period by collaborating with key business and professional groups in targeted regions.

As noted above, the Trust envisions a 10-year initiative to bring energy savings to Maine’s small businesses in the SGS customer class. In Phase 1 — corresponding to the period covered by Triennial Plan III — the Trust will begin this initiative by marketing the program to towns located outside the state’s most densely populated markets. This “outside-in” strategy may be complemented by occasional geotargeted initiatives used to enhance grid reliability. In Phase 2 — corresponding to Triennial Plan IV — the Trust will focus on towns located within the most densely populated areas with high concentrations of small businesses. In Phase 3 — corresponding to Triennial Plan V — the Trust will return to the areas targeted in Phase 1 to address cost-effective savings opportunities that were unable to be harvested in Phase 1 or newly emergent, cost-effective opportunities.

Technical Assistance

As noted above, the Program provides technical assistance to customers directly through on-site energy assessments and discussions of potential solutions and projected energy savings. The Program supports field personnel with a customized tool that evaluates project energy savings cost-effectiveness on-site. Projects that are not cost-effective are eliminated from the scope of work before the proposal is presented to the customer.

The field teams are typically local contractors who are also Efficiency Maine Qualified Partners. They are familiar with Trust programs and lighting projects, and they are guided to offer information on other energy saving opportunities at the business, including HVAC and refrigeration, even if they are not eligible for incentives under this particular program.

Financial Incentives

The cost of each project is partially covered by the Trust. During this Program's initial pilot, contractors stressed that a one-year payback period was extremely effective in "selling" business owners on the program and the upgrades. To achieve this goal during FY15, Efficiency Maine covered an average of 75% of project costs. Going forward, this Program will continue to offer incentives calibrated to ensure a high level of participation in a given region. As noted above, the Program also plans to incorporate the option of financing the balance of project costs for qualified customers.

The Program will continue to use procurement mechanisms to ensure the lowest costs possible for the direct installation of efficiency measures. These could include competitive bidding on set fixture and labor prices for a given region. In the past, all participating contractors have agreed to deliver the Program at set per-fixture costs.

Quality Assurance/Quality Control

Potential participants must present a utility bill to verify load and eligibility for participation in the program. Each project must be entered into a customized calculator tool that evaluates the cost-effectiveness of every measure proposed in each project; measures that are not cost-effective on their own will be screened out of the project. Each project will be given a subsequent desk review by Program Staff to ensure eligibility and cost-effectiveness criteria are met before the incentive is processed. A random number of projects will be inspected on-site with a focus on ensuring that inspections verify the work of each participating contractor. In addition, participants will be asked about their experience through a customer satisfaction survey.

5.5 Consumer Products

5.5.1 Overview

This Program offers incentives for residential and commercial consumer products through retail stores and wholesalers. This is the channel that the Trust generally uses to provide incentives for high-efficiency lights, appliances or electronics. For purposes of this Triennial Plan, this Program will focus on measures that sell in relatively high-volumes and achieve relatively predictable net savings when properly installed. The Trust provides incentives through this Program in the form of markdowns, in-store coupons, and mail-in rebates. This Program supplements the other Trust programs that engage the expertise of trade allies; it reaches the largest number of Maine customers through popular retail and wholesale channels.

5.5.2 Objectives

- Increase consumer awareness and use of energy efficient products
- Offer all customers, regardless of geographic location or income level, a reasonable opportunity to participate in a conservation program
- Reduce peak load demand for electricity
- Reduce total energy costs

5.5.3 Opportunity

Market Barriers

As described above, there are a number of barriers to the wide-spread adoption of high efficiency consumer products. Many, like higher first costs and the confusion surrounding efficient options, are consistent across products. Some are unique to typical consumer buying habits for lighting, appliances, water heaters, and more. Barriers commonly faced include:

- For CFLs, first cost is the primary barrier, but concerns about mercury, delayed start, flickering, light color and fixture fit also have been concerns. The program has demonstrated that first cost is the primary barrier.
- For LEDs, first cost is the primary barrier, but there is significant consumer interest in LED technology.
- The diversity of lighting choices can also present a barrier for market adoption: customer lack of familiarity with color temperature and lumens can lead to choosing incandescent or halogen options.
- Bad initial customer experience with non-ENERGY STAR or inferior products can also be a barrier; for example, some early CFLs had a long warm-up time and flicker that caused many customers to move back to incandescents.
- For appliances, first cost is the primary barrier. Lack of awareness about efficient options is also a barrier.
- For water heating systems, the primary barriers are first cost and the short window of time for replacement; water heaters are most frequently replaced within one day of their failure.
- Some retailers do not stock the highest efficiency options and products.

Electric

Market

One of the primary challenges faced by the Consumer Products Program is the diversity of consumer products and inefficient product options available on the market. The program incentivizes a number of products that are in high demand in the Maine market where the customer can achieve significant energy savings through installation of the high-efficiency model option. The market for the Consumer Products Program described below includes lighting and appliance measures purchased at retail stores and distributors across the state. These purchases are made because the existing bulbs and appliances have reached the end of their useful lives or have otherwise failed. Since these purchasing decisions take place due to equipment failure they are categorized as replace-on-burnout. The efficient measures offered by the Trust help minimize the purchases of low-efficiency equipment that merely meet minimum codes and standards.

The Program also provides Maine residential customers the opportunity to receive several retrofit measures. These measures are classified as retrofit because the existing product does not need to have failed in order to be replaced with an efficient alternative by the Trust. Retrofit measures achieve savings equal to the difference between the efficient technology and the previously existing product.

These measures target the water heating end use and include measures such as pipe insulation to conserve electric water heating consumption.

The Consumer Products Program targets a broad range of sectors including single family, multifamily, new construction, and low income households.[72] Commercial customers may also participate in the program through the offering of efficient screw-in lightbulbs at participating retailers and wholesalers.

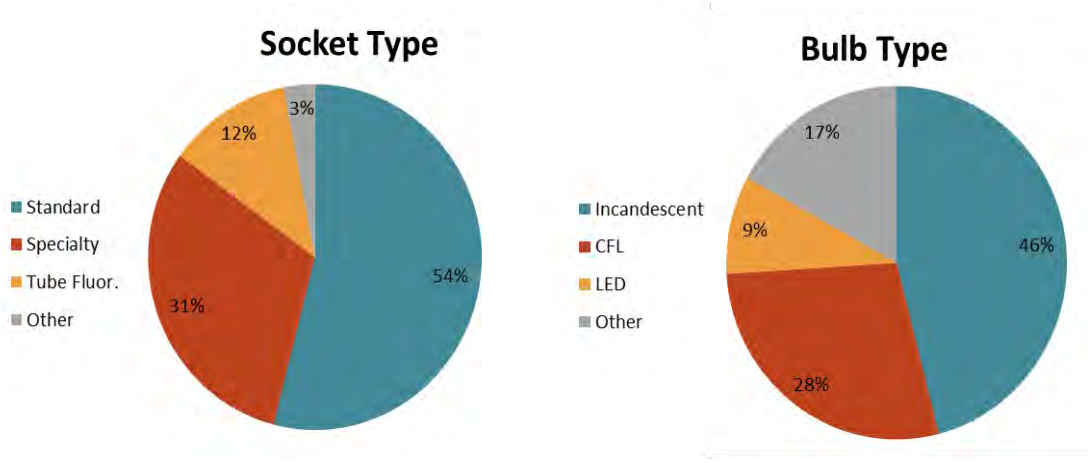
Based on a recent evaluation of the Program, the Trust has determined that 80% of customers at retail channels (e.g., Home Depot, Lowe's, and Walmart) are non-low income residential customers (80%), followed by low income residential customers (16%),[73] with 4% going to commercial customers.[74] Bulbs purchased at distributors that cater to electricians (e.g., Gilman Electric Supply, Rockingham Electric Supply Company, and Graybar) report that 69% of the high-efficiency bulbs they sell are installed in commercial settings and 31% are installed in residential homes.[75]

Because the program is primarily a point-of-purchase program, the baseline is a less expensive and less efficient bulb or appliance that meets minimum codes and standards. Every time a customer purchases a bulb or appliance from a retailer or distributor, regardless of what is being replaced, wherever there is an efficient model commercially available there also is an opportunity to incentivize the purchase of an efficient bulb or appliance. These opportunities will exist due to the availability of a choice between less expensive and less efficient standard bulbs or appliances and higher efficiency model options.

The residential lighting evaluation, completed in 2015, found that the average residence in Maine has approximately 69 lighting sockets.[76] 54% of sockets are standard screw-based bulbs, 31% are considered specialty bulbs, 12% are tube fluorescents, and 3% are other or unknown bulb types. According to the *2015 Maine Single-Family Residential Baseline Study*, CFLs are installed in 28% of residential sockets.[77] An additional 9% of sockets have LED lighting.

[72] Note that some low income participation in the Consumer Products Program is reflected in this description. The opportunity described separately in the Low Income Initiatives section of this Plan reflects only opportunities expected to be met using a "direct install" strategy.
[73] NMR Group, Inc. and Nexant, Efficiency Maine Retail Lighting Program Overall Evaluation Report, April 16, 2015, Table A-12.
[74] Cadmus, Efficiency Maine Trust Residential Lighting Program Evaluation: Final Report, November 1, 2012, Figure 59.
[75] Based on interviews with distributors July 2015.
[76] NMR Group, Inc. and Nexant, Efficiency Maine Retail Lighting Program Overall Evaluation Report, April 16, 2015.
[77] NMR Group, Inc., Maine Single-Family Residential Baseline Study – Draft, August 6, 2015.

Figure 5.5-1: Residential Lighting by Socket Type and Bulb Type



Using the information from the lighting evaluation study, the energy efficiency potential study estimated that approximately 6,000,000 light bulbs could be replaced each year in Maine.[78] This estimate is based on a two-step calculation which first takes the number of homes in Maine multiplied by the number of eligible bulbs per home to determine the total number of bulbs installed. Then the number of bulbs assumed to be eligible for replacement each year is estimated by dividing the total number of bulbs installed by an assumed replacement cycle of five years for the standard efficiency incandescent or halogen bulb.[79] This replacement cycle is a conservative estimate, which accounts for the potential longer life of EISA-compliant halogen bulbs that are already installed or will be installed during the time frame of the study. It also accounts for the longer life of CFL and LED bulbs, which results in fewer bulbs being sold each year. This calculation yields the estimated number of bulbs that could be replaced in the technical and economic potential scenarios. The achievable potential scenario includes an additional calibration adjustment that factors in historical participation levels in the Program.

$$Bulbs\ eligible\ for\ replacement\ per\ year = (Homes\ \times Bulbs\ per\ home) \div Replacement\ cycle$$

Bulbs burning out each year could be replaced with either an efficient CFL/LED bulb or a standard efficiency halogen/modified incandescent bulb. Therefore the market for efficient light bulbs remains robust.

Figure 5.5-2 shows the current estimated baseline market penetration for program-specific appliance measures for the existing single-family market. The table also depicts the percentage of equipment that is already ENERGY STAR rated. For example, the baseline study found that 30% of homes have electric water heating units. Of those homes, 15% have electric water heaters considered to be high-efficiency units. The estimates of baseline and energy efficiency market saturation were derived primarily from the *2015 Maine Single-Family Residential Baseline Study*. Additional equipment penetration data was

[78] This total number of bulbs includes the low-income and non-low income sectors. Low-income residents can acquire bulbs either through the Consumer Products Program or the Income Eligible Lighting and Appliance Measure Program.
[79] The replacement cycle for efficient bulbs was assumed to be 12 years.

developed from the *2010 Central Maine Power Saturation Study* and the *2008 Maine Residential New Construction Technical Baseline Study*.[80]

Figure 5.5-2: Existing Single-Family Market Baseline and Energy Efficient Penetrations[81]

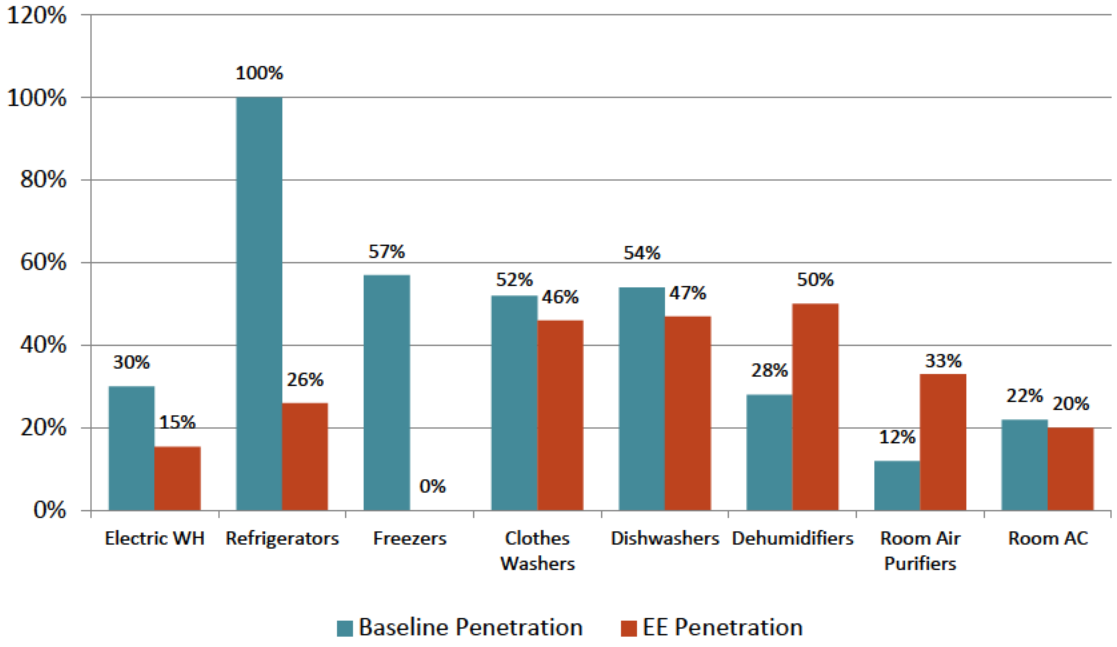


Figure 5.5-2 above illustrates that there is a sizable market for a range of appliances. Every home in Maine has a refrigerator, and more than half of the homes have freezers, clothes washers, and dishwashers (note that estimated baseline market penetration refers to the percentage of homes that currently contain the identified appliance). In the case of refrigerators and room air conditioners, homes may be equipped with more than one of each appliance type. In order to capture the total potential for electric energy savings, the analysis accounted for homes having multiple appliance types. The saturation of efficient models for each appliance type shows that not one of the eight appliances in the chart is found to be efficient in more than half of the homes that have that type of appliance installed. Both of these factors highlight the opportunity that can be seized to transform the appliance market in Maine.

Using the information from the two baseline studies noted above, the energy efficiency potential study estimated that approximately 20,000 electric water heaters, 50,000 refrigerators, 30,000 freezers, 30,000 clothes washers, 35,000 dishwashers, and 10,000 room air purifiers will fail (or "burn out") each year in the state of Maine. These estimates are based on the same two-step calculation used to estimate the opportunity for high-efficiency bulbs, above. For example, the estimate of approximately

[80] VEIC, Maine Residential New Construction Technical Baseline Study, 2008.

[81] The Maine residential baseline study found 15% of electric water heaters to be heat pump water heaters. The potential study assumed that 3% of electric water heaters in Maine are heat pump water heaters, based on other more robust baseline studies in nearby states and historical heat pump water heater installations in Maine. This assumption did not change the achievable potential results.

20,000 electric water heaters expected to fail each year equals the number of homes (615,285) times the saturation (30%) divided by a 10-year replacement cycle. The achievable potential scenario includes an additional calibration adjustment which factors in historical participation levels for each appliance.

$$Appliances\ eligible\ for\ replacement\ per\ year = (Homes \times Saturation\ of\ appliances) \div Replacement\ cycle$$

Each appliance that fails could be replaced with either an inefficient model or an efficient model. The market for efficient appliances as incentivized by the Program is expected to remain strong throughout the time frame of the Triennial Plan.

Technical Potential

Technical potential represents the reduction in energy use that would occur if all technologically available energy efficiency measures are immediately adopted in all feasible instances. This is a theoretical quantification of savings which does not account for practical considerations such as cost-effectiveness or the willingness of customers to participate in the Program.

Table 5.5-1 provides a summary of the estimated costs and savings associated with the technical potential for the Consumer Products Program found by the Market Potential Study.[82] The Program could displace 1,443,486 MWh of electric energy and 242.1 MW of electric demand across the FY2017–FY2026 time frame at an average annual cost of $54,073,645 if technical potential were the sole criterion.

Table 5.5-1: Consumer Products Program – Technical Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$540,736,454	$54,073,645
MWh Savings	1,443,468	144,347
MW Savings	242.1	24.2

Economic Potential

Economic potential accounts for cost-effectiveness constraints. Table 5.5-2 provides a summary of the estimated costs and savings associated with the economic potential for the Consumer Products Program found by the energy efficiency potential study.[83] The Consumer Products Program would be expected to

[82] The costs associated with technical potential only include estimated incentive costs. Delivery costs are only included in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

[83] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only included in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

displace 1,395,606 MWh of electric energy and 214.9 MW of electric demand across the 2017-2026 time frame at an average annual cost of $28,154,010 under the study's assumptions for economic potential.

Table 5.5-2: Consumer Products Program – Economic Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$281,540,097	$28,154,010
MWh Savings	1,395,606	139,561
MW Savings	214.9	21.5

The economic potential excludes measures which are not cost-effective. This is reflected by the decrease in the 10-year technical potential from 1,443,486 MWh to 1,395,606MWh in the economic potential scenario. The small decrease from technical potential to economic potential indicates that most measures were found to be cost-effective. Residential occupancy sensors, solar water heaters, and room air conditioners were found to be not cost-effective. The primary driver in cost reductions stemmed from the removal of solar water heater retrofits from the technical potential to the economic potential. The potential for water heating savings was shifted to the cost-effective heat pump water heater alternative.

Achievable Potential

The achievable potential for the Consumer Products Program accounts for cost-effectiveness constraints as well as other practical considerations such as customer's willingness to participate and the resources needed to market the program. Achievable potential also recognizes that participation in a program is a function of program awareness, historical performance, and the Trust's ability to ramp up activity over time. Table 5.5-3 provides the achievable potential savings and costs for the Program during the FY2017–FY2019 time frame of the Triennial Plan.

Table 5.5-3: Consumer Products Program – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-Year Totals
Total Efficiency Maine Trust Costs	$13,822,325	$12,666,728	$11,806,794	$38,295,847
MWh Savings	113,049	115,982	119,310	348,341
MW Savings	19.8	20.0	20.3	60.2

The estimated MWh savings increases from 113,049 MWh to 119,310 MWh across the FY2017–FY2019 time frame. This change is primarily a function of the anticipated increase in program participation as market barriers erode over time. The increase is not dramatic, as the lighting portion of the program is expected to remain fairly flat because the retail lighting portion of the program is already mature. There remains more opportunity for growing participation among some of the appliance measures.

Table 5.5-4 provides an overview of the annual estimated costs and savings associated with the achievable potential for the Consumer Products Program found by the energy efficiency potential study. In addition to electric benefits, select appliances (i.e., clothes washers and dishwashers) would also

provide additional benefits, including 599 million gallons of water savings in the estimate of achievable potential over the next 10 years. The program would also be expected to increase non-electric consumption by 371,012 MMBtu due to the reduced waste heat associated with efficient lighting installations.

Table 5.5-4: Consumer Products Program – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$13,822,325	113,049	19.8
FY2018	$12,666,728	115,982	20.0
FY2019	$11,806,794	119,310	20.3
FY2020	$10,029,977	122,537	20.6
FY2021	$8,850,715	57,224	8.1
FY2022	$8,342,156	66,418	9.4
FY2023	$8,546,236	68,678	9.5
FY2024	$8,750,999	70,935	9.6
FY2025	$8,960,854	73,209	9.8
FY2026	$9,188,929	75,542	9.9
10-Year Totals	**$100,965,714**	**882,886**	**137.2**
Annual Average	**$10,096,571**	**88,289**	**13.7**

The decrease in savings across the 10-year time frame is primarily a function of the backstop provision of the federal EISA standards. The EISA standards essentially make a CFL bulb the standard for baseline efficiency in 2020. The study assumed the backstop provision will take effect in FY2021 to allow for a six month sell-through period. The backstop provision does not eliminate savings for standard bulbs because there are still savings associated with the difference in efficiency between LEDs and CFLs. There also are expected to be savings opportunities among specialty bulbs because there are several specialty bulb types which are exempt from the EISA standards. Exempt bulbs include candelabra bulbs, reflector lamps, and three-way bulbs. Once the backstop provision takes effect, the incremental savings opportunities each year from new installations will be based on the savings that can be achieved by replacing any remaining incandescent bulbs with LEDs or CFLs. High efficiency bulbs installed prior to the backstop provision will provide cumulative annual savings each year equal to the difference between the consumption of a standard bulb and the efficient alternative. Once the backstop provision is enacted, this difference decreases significantly and annual savings decrease.

Measures

Achievable potential also provides an estimate of the non-incentive costs (marketing, program management, implementation, etc.) needed to operate the program.

The constraints limiting the adoption of measures over time are included in the analysis of MACE in order to reflect historical program performance for measures currently offered by the Trust and to account for the time needed to ramp up adoption of measures that have not historically been offered by

the Trust. Two key assumptions were made in order to estimate the long-term adoption of each measure. First, the study made an assumption, primarily informed by recent program performance, regarding what percentage of the available market could be captured in the first year of the Plan. For measures that have been incentivized for a long time such as efficient lighting, the starting point is higher than other options such as heat pump water heaters that are newer to the residential market.

For efficient lighting, the initial year market adoption rate was calibrated to 43% of all bulbs estimated to turn over annually so that the quantity of incentivized bulbs in FY17 is similar to recent program years, whereas the calibrated initial year market adoption of heat pump water heaters is only 16% of electric water heater units replaced annually.[84] While heat pump water heater adoption is initially only 16%, the study assumes that this market will be pursued aggressively compared to other appliances and is assumed to achieve nearly 50% rate of market adoption by the end of the 10-year time frame of the study.

The second key assumption in the estimation of MACE was an estimate of the expected long term market adoption rate that could reasonably be expected over time given the level of incentive offered by the Trust. This analysis relied on secondary data to determine the long term market adoption rate at a range of incentive levels based on two data points: 1) a base value determined by industry review of utility reports with available information on incentive levels and achievable market adoption, and 2) an industry analysis of EIA data on the elasticity between incentive levels and savings. Based on publicly available assessments, industry research indicated that roughly 50% adoption rate can be achieved at an incentive level of 50% of the incremental cost. The EIA regression analysis determined that every 1% increase in incentives would yield two-thirds of a percent increase in year-over-year market adoption.[85] The varying first-year measure adoption rates, incentive levels, and estimated time needed to reach target market adoption, yielded measure-specific annual market adoption rates for the appliance measures. Specific to this program, the methodology discussed above was used to estimate the long-term market adoption of only the heat pump water heaters measures. For lighting, the measure market adoption rate was assumed to stay constant over time due to the maturity of the program and relatively consistent performance over the last several program years.

The majority of measure savings in the Program are driven by LED bulb and CFL bulb savings. Over the course of the plan, the study assumes that LEDs will become a larger percentage of the Program as prices fall. Heat pump water heaters are also expected to contribute significant savings. Table 5.5-5 provides an overview of the estimated electric energy and demand savings associated with the programs most impactful measure types.

[84] The plan also assumes a gradual shift toward LED bulbs over the next several years in anticipation of the CFL becoming the federal baseline around FY2021.
[85] Achievable Energy-Efficiency Potential Assessment. Submitted to Georgia Power Company, Nexant, 2015.

Table 5.5-5: Consumer Products Program – Top Measures

Description	MWh Savings	MW Savings	MWh Savings	MW Savings	MWh Savings	MW Savings
	2017		2018		2019	
Standard CFL Bulbs	27,123	4.9	25,740	4.7	21,039	3.9
Standard LED Bulbs	59,615	11.4	61,541	11.7	67,203	12.7
Specialty CFL Bulbs	11,260	1.9	9,992	1.7	8,800	1.5
Specialty LED Bulbs	4,963	0.8	6,401	1.1	7,732	1.3
Heat Pump WH	5,397	0.4	6,450	0.5	7,494	0.6
Totals	**108,358**	**19.5**	**110,125**	**19.7**	**112,268**	**20.0**
% of Program	**96%**	**98%**	**95%**	**98%**	**94%**	**98%**

A total of 152 measure iterations were included in the technical potential analysis of the Program. The benefit-cost screening identified 138 of these measures to be cost-effective. Standard and specialty CFL bulbs were found to be the most cost-effective lighting measures. ENERGY STAR freezers, room air purifiers, and low flow kitchen aerator measures also were found to be highly cost-effective, while residential occupancy sensors, solar water heaters, and room air conditioners were found to be not cost-effective. All measures were assessed individually rather than as bundled in a package of measures.

5.5.4 Budget and Metrics

Table 5.5-6: Consumer Products Budget and Metrics

FY	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	Cost per kWh	MMBtu Savings	Cost per MMBtu	Lifetime Benefit	B:C Ratio
2017	$13,822,325	$0	$0	$13,822,325	113,049	19.8	$0.12	0	N/A	$64,117,472	3.79
2018	$12,666,728	$0	$0	$12,666,728	115,982	20.0	$0.11	0	N/A	$56,249,733	3.78
2019	$11,806,794	$0	$0	$11,806,794	119,310	20.3	$0.10	0	N/A	$53,977,861	4.05

5.5.5 Program Design

The Program leverages relationships with retailers and distributors of energy efficient products to discount products on the shelf or distribute rebate information to customers at the point of purchase. The program relies on extensive use of Memoranda of Understanding (MOUs) with the major vendors of energy efficient products. The Trust uses these MOUs to negotiate discounted prices for Maine customers. In the case of appliances, customers apply for rebates after purchase. The Trust works with retailers to ensure availability of high-efficiency appliance models. The Trust, through a program delivery contractor, also maintains point-of-purchase materials and verifies in-store pricing. Maine retailers and distributors are recruited to the program by the Trust; major retailers of energy efficient products are targeted as well as retailers in key geographic areas. The Trust also invites retailers and distributors to participate in the program through the Trust's website.

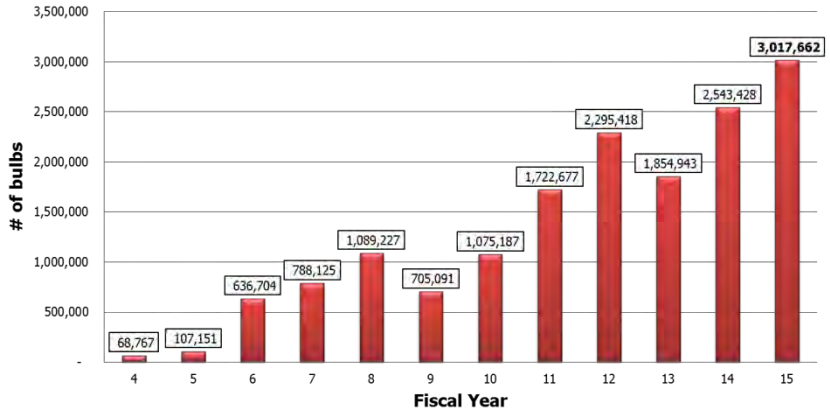
The Trust has significantly grown the network of participating retailers and distributors over the Triennial Plan II period. To date, there are 300 retailers and distributors offering discounts to their

customers. The Trust does not anticipate a significant focus on adding more stores or distributors to the program in the next Triennial Plan period.

Program History

The Trust's lighting markdown program is a long-standing program and was one of the earliest Efficiency Maine programs administered by the PUC. The Program has achieved among the highest penetrations of CFLs in the country.[86] As demonstrated by Figure 5.5-3, the program has incentivized a growing number of bulbs annually. Nonetheless, the majority of lighting sockets in Maine are still filled with inefficient bulbs.

Figure 5.5-3: Efficient Bulb Sales, by Fiscal Year



This Program largely follows the national model for consumer product program design and prioritizes markdowns over coupons wherever possible. Coupons have certain drawbacks, such as increased administrative cost and added hassle for the customer and store employees. In Triennial Plan II, the Program added a number of LED bulbs to the portfolio. This has caused the overall incentive average per bulb to increase due to LEDs' higher first costs.

The Trust also has incentivized a number of appliances and products over the Program's history including advanced power strips, room air purifiers, clothes washers, dehumidifiers, electric water heaters, freezers, refrigerators, and room air conditioners. In 2013, the Trust added heat pump water heaters to this Program. Currently the Trust incentivizes air purifiers, dehumidifiers, and heat pump water heaters.

Measures Promoted

Measures promoted through this channel may include measures such as:

- High-efficiency lighting;
- Appliances;
- Water heating systems and controls; and

[86] Consortium for Energy Efficiency, *Residential Lighting Program Summary,* 2015.

- Other self-installed energy-saving products.

The Trust evaluates products for inclusion in the Consumer Products Program based on cost-effectiveness, demand, and availability. The Program generally prefers to rely on third-party standards (e.g., ENERGY STAR-certified heat pump water heaters) to establish which energy efficient products eligible for incentives. Increasing efficiency standards in the appliance industry has resulted in a reduced incremental energy savings between baseline and ENERGY STAR models as appliances have become more efficient; this positive market transformation has resulted in some consumer products being removed or excluded from the Program. By way of example, the energy savings between an ENERGY STAR television and the baseline model is now so small that the Trust has found that incentive investments were better made in other efficient products.

The Consumer Products Program has been impacted by (EISA) standards regulating the energy efficiency of the lighting industry. EISA has caused efficiency programs to assume a more efficient bulb set as the baseline when making energy saving calculations (improving from the old incandescent bulb baseline to a halogen bulb baseline). These changes have dropped the energy savings claimed per bulb compared to assumptions of the last Triennial Plan. Nonetheless, as described above, energy efficient lighting remains a cost-effective energy efficiency investment. The Trust is carefully monitoring how the national standards impact local markets over time and the implications on the cost-effectiveness of lighting investments. It is likely that some energy efficient lights will be phased out of the Consumer Products portfolio in the Triennial Plan IV period.

The Program encompasses a more complete consumer products program than in the past and could include a range of other products commonly sold at retail stores. Although this Program traditionally has been used as an investment channel to reduce residential electricity consumption, it is also a channel that could be used to promote the sale of measures that save natural gas or heating fuel where appropriate. The Trust anticipates including more water heating and heating-reduction measures including controls and tank wrap.[87]

Marketing

The purchasing decision for most energy efficient consumer products is made at the store. In order to influence the customer to make an energy efficient choice, the Trust focuses marketing efforts for this program on point-of-purchase materials including in-store displays, customer demonstrations, and training for store personnel. In particular, in-store personnel can significantly impact the number of energy efficient models sold and training personnel has become a focus for the Trust over the last Triennial Plan period.

Some energy efficient product choices are researched by consumers in advance of reaching the store. This is particularly applicable for customers of water heaters and large appliances, where the price point is higher than it is for light bulbs and small appliances. The Trust will continue its practice of investing in educational and resource materials to ensure that information about energy efficient options ranks high

[87] In the event that the Trust decides to promote self-installation of measures currently described in the HESP, the Consumer Products Program would likely be employed as a delivery channel for such an initiative.

for Maine customers conducting online research for high-efficiency appliances and water heaters. Additional marketing channels, including advertising, direct mail, digital advertising, social media, and cooperative marketing also will be considered. The Efficiency Maine website will be used to drive site visitors to retailers and wholesalers participating in the program.

Over the course of the next three years, specific marketing goals of this Program include increasing the focus on specialty bulbs and doing more to make these measures accessible to low-income households and homes in underserved locations.

Education and Training/Workforce Development

Field representatives of this Program will conduct trainings for in-store personnel as well as for in-store visitors. These trainings will constitute a significant part of the Trust's marketing strategy in order to guide customers to energy efficient options at the moment that a purchasing decision is made. The Trust trained 4,000 retail personnel in more than 400 retailers on incentivized technologies in FY2015. In addition, the Trust will provide educational materials, installation guidelines, and technical information to the Residential Registered Vendor community. The Trust will continue to attend trade association workshops and visits to wholesalers to educate contractors, in particular plumbers, about high-efficiency alternatives. The Trust also will focus training on new technologies unfamiliar to customers and contractors, including heat pump water heaters.

Technical Assistance

As noted above, the Trust will provide consumer education resources on its website and social media platforms about lighting technology, lighting choices, heat pump water heaters, and more. These web-based resources include calculators, purchasing guides, usage tips and videos. The Efficiency Maine website also lists participating retailers and the "best deals" in the state. The Trust will focus technical assistance and educational efforts on new and transformational technologies.

Financial Incentives

The Program will incentivize the purchase of energy efficient lighting by discounting energy efficient models to prices lower than inefficient models, or in the case of LED bulbs, at a price low enough to drive consumer action even if the bulbs are priced higher than conventional bulbs. The Trust bases incentives for appliances and other consumer products on the incremental price difference between conventional and high-efficiency models. Incentives generally are set at a percentage of this incremental difference in order to guide customer choice to the high-efficiency model.

The Trust will consider providing tiered incentives for various models of a given product to maximize savings per rebate dollar. For example, in certain cases the Trust will offer a modest rebate for the purchase of light bulbs that achieve the ENERGY STAR standard and a higher rebate for bulbs meeting the very highest standards of efficiency.

This program will deliver financial incentives to participating Maine residents and businesses through four different mechanisms:

- Markdown – The Trust will enter into MOUs with retailers and/or manufacturers; MOUs typically describe that stores will be reimbursed if high-efficiency products are sold at agreed, discounted prices according to program guidelines.
- Buy Down – The Trust will enter into MOUs with wholesale lighting distributors to provide rebates per bulb sold.
- In-Store Coupons – Smaller retailers, who do not have the point-of-purchase systems to track and report marked-down sales, will be reimbursed for in-store coupons. The purchase will be discounted at the time of purchase.
- Mail-In Rebates – for larger items, such as water heaters or appliances, consumers will make the purchase, pay full price, and then mail a rebate claim form to the Trust. The Trust will then mail a rebate check to the participant.

Quality Assurance/Quality Control

Program field representatives will visit stores to ensure that agreed upon markdown prices and discounted products match MOU terms and that point-of-purchase materials are being used properly. Program field representatives conducted 9,000 stores visits in FY2015. All payments to participating retailers will be verified against ENERGY STAR and MOU lists to ensure that high-efficiency bulbs are being incentivized. Retailers will be required to receive a waiver for any purchases exceeding quantity limits as described in the MOU; a Maine address is required as verification for larger purchases.

All rebate claims will be reviewed to ensure that the product and participant are eligible. Contractors hoping to be listed on the Efficiency Maine Registered Vendor List as a heat pump water heater installer must demonstrate a state plumbing license, proof of insurance, and signed code of conduct.

The Trust will continue to conduct consumer satisfaction surveys with participants in the program in order to develop educational materials and streamline the program. In addition, the Trust will actively collaborate with other energy efficient consumer product programs nationwide as best practices in program delivery significantly rely on trends in consumer behavior and energy efficient products.

The Trust will carefully monitor product pricing and rebate amounts to ensure that program participants are influenced by rebate availability. Past program evaluations revealed that some participants were not aware of the program at the time of purchase. The program has since prioritized point-of-purchase materials in order to ensure that program participants are aware of available rebates and has made adjustments to the models that are eligible for the Program. Moving forward, the Trust anticipates that it will conduct consumer satisfaction and participant surveys closer to the time of purchase in order to solicit more accurate information about consumer choices and the customer decision-making process.

5.6 Home Energy Savings Program

5.6.1 Overview

The HESP is the umbrella program for all residential home-based thermal energy efficiency activities. Generally speaking, this program is not the channel through which the Trust pursues savings from lighting, appliances or electronics. (The Consumer Products Program of the prior section presents the

modeling of achievable potential for lighting, appliance and electronics measures and the program designs by which those measures will be promoted.)

HESP leverages its budget for loans and financial incentives to encourage Maine residents of all income levels to improve the heating energy performance of their homes. Home energy improvements made under HESP are designed to reduce thermal energy consumption in a manner that is safe, durable, and cost-effective. Program activities beyond providing/processing rebates and financing include operating targeted marketing, deploying web-based information and tools to help customers compare equipment options, and maintaining listings of the network of energy contractors practicing weatherization industry best practices.

5.6.2 Objectives

- Invest in measures that lower residential heating energy demand and reduce GHG emissions
- Significantly advance the statutory goal of weatherizing substantially all homes whose owners or occupants are willing to participate in and share the costs of cost-effective home weatherization
- Significantly advance the statutory goal of achieving 20% heating fuel savings across the state by 2020, recognizing for these purposes the savings from market effects not attributable to the Trust, as well as efforts by other organizations, including federally funded low-income weatherization programs
- Significantly advance the statutory goal of achieving at least 20% electricity and natural gas savings through the Trust's programs by 2020
- Increase consumer awareness of cost-effective options for conserving conventional heating fuels, including natural gas
- Promote sustainable economic development and reduce environmental damage through the more efficient use of all fuel types

5.6.3 Opportunity

Customer Market Barriers

The market barriers for residential thermal energy improvements are many. Most homeowners face multiple competing uses for their income and savings. Since weatherization and heating system replacements routinely cost several thousand dollars, with comprehensive projects costing more than $10,000, these high upfront costs pose the chief impediment to implementing home energy upgrades. Customers also can be uncertain about the amount and timing of energy savings from any improvements.

Homeowners also tend to find it intimidating to identify, schedule and work with contractors. This barrier is compounded by the confusing range of options and complicated choices they face. Another barrier is that segments of the homeowner market find it difficult to access traditional financing. Even when they do, they also often find it difficult to translate efficiency upgrades into higher resale value of homes as there has not been broad adoption of mechanisms to communicate value of efficiency to

realtors, banks, and home buyers. Finally, in rentals, the split incentive that exists between landlords and tenants creates yet another barrier to making capital investments for energy upgrades.

Market – Generally

The American Community Survey, conducted by the U.S. Census Bureau, calculates that there are 722,760 housing units, or dwellings, in Maine. This includes all single family homes, apartments, mobile homes, and vacation homes. Of this total, 517,000 are single family homes (either detached or attached), 65,000 are mobile homes, and 77,000 units are part of buildings containing between two and four units. This is the universe of homes served by HESP. An additional 62,000 residential units are found in buildings containing five or more units — homes not served by HESP but rather are eligible for measures offered through the C&I Prescriptive Program.

The census data indicate that approximately 120,000 units are limited to seasonal, recreational or occasional use, but does not indicate how many of these are found among the 1-to-4-unit buildings served by HESP versus those housing five units or more. Dividing these seasonal units pro rata across the various types of homes, the Trust estimates that the universe of homes eligible to participate in HESP is approximately 550,000.

Maine's homes commonly use more than one type of energy to keep their homes warm. For example, a boiler may burn heating oil as its primary fuel, but may also require a small amount of electricity to power a circulator pump. A furnace may burn natural gas as its primary fuel, but will also use electricity to power the blower that pushes hot air through the ductwork. Both boilers and furnaces also use motors on their burners. A high-efficiency ductless heat pump saves electricity compared to a less efficient heat pump model, but when used as a supplemental heater will also displace the heating oil that is typically used in the central heating system.

As a result, even homes that are principally heated with fossil fuels may save a small amount of electricity when they perform efficiency upgrades. A better-insulated building envelope will reduce the operation of associated fans and/or pumps. When fans, pumps or motors run less, there is a modest but not insignificant savings of electricity.

This section presents the information about the multi-fuel market potential for saving thermal energy through HESP. First, it provides basic information about the number and general condition of homes in Maine. Information about the general condition is assumed to be applicable to the 70% of homes heated with unregulated fuels such as heating oil, propane or kerosene. It is also assumed to be applicable to the cost-effective, achievable potential for saving electricity either directly by installing a higher-efficiency heat pump, or indirectly by reducing ancillary electric use of pumps, fans and motors associated with central heating systems.

Because the ancillary electricity savings principally are driven by the customers' decisions to pursue thermal, all-fuels savings, the Trust assumes that customers would not pursue these measures for their electricity savings alone. As such, the opportunity for this Program to promote thermal, all-fuels measures and the associated electricity savings will be limited by the funding available to the Trust for such purposes, not by the limit of what is cost-effective, reliable and achievable. Nonetheless, the Trust

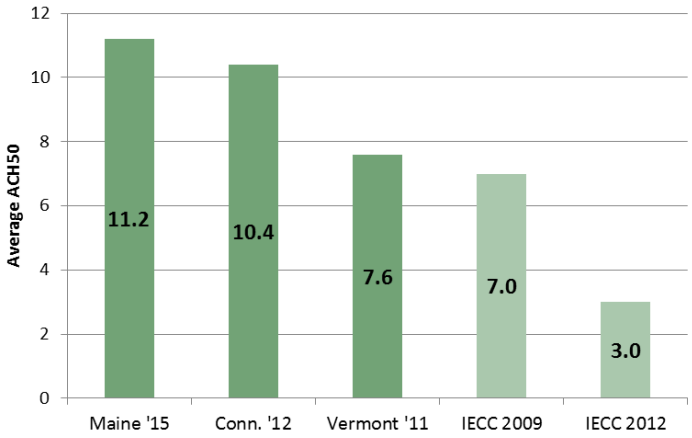
has modeled here the potential size of the thermal savings as a function of the types of thermal, all-fuels measures that are cost-effective and achievable with the allocation of RGGI funds as proposed. The size of the ancillary electricity savings will be a function of the size of the thermal savings.

Second, this section presents market potential analysis specific to natural gas. A separate baseline study and analysis of MACE potential for natural gas was performed in 2014 in geographic areas already served by natural gas utilities or forecasted to be served by these utilities in the coming decade. These areas tend to be in more densely populated regions of the state, including Bangor, Waterville, Augusta, Brunswick, Lewiston, Falmouth, and Portland. There are slight differences between the baseline and market potential findings of the general, statewide conditions compared to the areas that are now or may later be served by natural gas. For purposes of developing the HESP program design, budgets and metrics, the Trust applied the general, statewide conditions to the expected savings through electricity and unregulated fuels (or "all-fuels") measures and applied the natural gas area conditions to estimate the expected savings and achievable potential from natural gas conservation measures.

All-Fuels and Electricity

The Trust's Residential Baseline Study (2015) found that when depressurized to 50 Pascals, the average single family home in Maine experienced 11.2 air changes per hour (ACH50). On average, homes in Maine are more leaky than homes in Connecticut and Vermont, and significantly more leaky than new homes that are built to either the 2009 version of the building energy code (currently in effect in Maine), and an ACH50 reading significantly more than three times higher than the 2012 version of that code.

Figure 5.6-1: Average ACH50 Results and Comparison



The Trust's analysis indicates the following number of cost-effective opportunities (not mutually exclusive) for retrofitting the building envelope on existing homes:

- 488,000 air sealing improvements
- 390,000 basement wall insulation upgrades
- 150,000 attic insulation upgrades
- 135,000 wall insulation upgrades

Most Maine homes can benefit from targeted air sealing; increases in attic, wall and basement insulation; as well as space and water heating system upgrades.

This program facilitates the opportunity for Maine residents to purchase heating equipment that is more efficient than standard technologies. These purchases are made when a system or piece of equipment is being installed in a home for the first time, or when the existing equipment has reached the end of its useful life or has otherwise failed. These purchasing decisions are categorized as a "lost opportunity." The efficient measures promoted by the Trust help minimize the purchases of standard efficiency equipment that merely meet minimum codes and standards. An example of this type of measure is a high-efficiency ductless heat pump.

The program also helps Maine homeowners pursue the opportunity to retrofit their building envelope or to install controls on their heating systems. These measures are considered retrofit because the existing measure does not need to have failed in order to be replaced with an efficient alternative. These measures achieve savings equal to the difference between the efficient measure and the previously existing condition. An example of this type of measure is a comprehensive air sealing project to reduce leakage.

The baseline for lost opportunity measures is the standard efficiency alternative for a new piece of heating equipment. For a retrofit situation, the baseline is the existing condition of the building shell, including insulation levels, prior to the intervention of the program.

The potential HESP program savings were estimated using the latest available baseline study data. Table 5.6-1 provides a summary of the typical ceiling, exterior wall, and foundation wall insulation levels found by the recent baseline study. These levels of insulation and air leakage were used to define the energy efficiency measures and to model typical home characteristics when evaluating building shell and equipment savings.

Table 5.6-1: HESP – Typical Building Shell Characteristics

Efficiency Level	Average R-value	Percentage of Homes
Ceilings		
Less than R-22	12.3	29%
R-22 of greater	31.5	71%
Overall	***26.0***	***100%***
Exterior Walls		
Less than R-10	4.6	25%
R-10 of greater	15.9	75%
Overall	***13.1***	***100%***
Foundation Walls		
Less than R-4	1.2	80%
R-4 of greater	12.1	20%
Overall	***3.3***	***100%***
Air Leakage		
Most Efficient	5.6	20%
Middle Efficient	10.8	60%
Least Efficient	22.9	40%
Overall	***11.1***	***100%***

Homes having less than R-22 ceiling insulation, less than R-10 wall insulation, and less than R-4 foundation wall insulation were considered to be eligible for cost-effective upgrades to their insulation levels. Homes categorized as being anything other than the most efficient in terms of air leakage were also considered eligible for cost-effective air sealing projects. Homes with greater than R-22 ceiling insulation, R-10 wall insulation, and R-4 foundation wall insulation were accounted for in the technical potential, but this potential was found not to be cost-effective and is therefore excluded from the economic potential and achievable potential. The same is true of the 20% of homes that already have the most efficient levels of air sealing.

Table 5.6-2 provides the average primary heating system type and efficiency, among homes included in the baseline study. More than three-quarters of homes have boilers, and the overall average heating efficiency across all primary heating units surveyed is 82.6 AFUE. In addition to primary heating equipment, approximately two-thirds of homes in Maine have supplemental heating equipment. Wood stoves and electric space heaters are the most common types. On average these supplemental heating systems account for 26% of installed heating capacity.

The electric potential study accounted for homes with and without supplemental heating systems. Homes with furnaces were considered eligible for cost-effective efficient furnace fan motors. Homes currently equipped with electric supplemental heating systems or forecasted to install standard ductless mini-split systems were considered eligible for cost-effective high efficiency central ASHPs or ductless heat pumps. Homes with primary electric heating were also considered eligible for cost-effective high

efficiency central ASHPs and ductless heat pumps. These equipment measures are considered lost opportunity installations for the HESP, with the exception of the efficient furnace fan motors.

Table 5.6-2: HESP – Typical Primary Heating Equipment Characteristics

	Average Efficiency	Percentage of Homes
Boilers	83.3	78%
Furnaces	81.2	22%
All Fuel-fired primary heating	82.6	100%

Table 5.6-3 provides the average central cooling system type and efficiency among homes included in the baseline study. 31% of homes were found to have any form of electric cooling.

Table 5.6-3: HESP – Typical Primary Central Cooling Equipment Characteristics

	Average SEER	Percentage of Homes
Ductless mini-splits	21.5	7.3%
Central air conditioners	10.0	2.5%

The energy efficiency potential study estimated that attic insulation upgrades would be cost-effective in approximately 150,000 homes in Maine. The potential study also found that wall or basement wall insulation upgrades would be cost-effective in 135,000 homes and 390,000 homes, respectively. Additional opportunities include an estimated 366,000 homes that were found to be moderately leaky for which an air sealing project would be cost-effective, and 122,000 more homes that were found to be extremely leaky that could also receive a cost-effective air sealing project. In addition to weatherization measures, the potential study estimated that 132,000 furnaces could be cost-effectively retrofitted with an efficient furnace fan motor.

The Trust is forecasting that the market for ductless heat pumps and ASHPs will grow during the time frame covered by the Triennial Plan as Maine citizens decide to switch away from oil to heat pumps. In FY2015, the Trust incentivized 6,000 ductless heat pump installations in Maine to ensure that they were the highest efficiency models. The Trust anticipates that the demand to switch away from oil will continue and that it will have the opportunity to incentivize 7,000 to 10,000 Maine residents to install the highest efficiency units annually across the FY2017–FY2019 time frame.

These estimates are based on a two-step calculation which first takes the number of homes in Maine multiplied by the saturation of each baseline condition to determine the total number of applicable homes. Then the number of measures assumed to be eligible for replacement each year is estimated. For retrofit measures, the estimate is made by dividing the total number of homes by either the time frame of the study, or the expected useful life of the measure (whichever is less). This calculation yields the estimated number of measures that could be installed in the technical and economic potential scenarios. For example, the estimate of approximately 15,000 homes that could receive a cost-effective attic insulation upgrade each year equals the number of single-family homes (529,145) times the

percentage of homes with inadequate levels of attic insulation (30%) divided by the 10-year time frame of the study. The achievable potential scenario includes an additional calibration adjustment which factors in historical participation levels for each measure.

Weatherization measures eligible for replacement per year =
(Homes x % of home needing to be weatherized) ÷ Time frame of the study

Technical Potential (Electrical)

This section only covers the electrical portion of what is technically achievable. Technical potential represents the reduction in energy use that would occur if all technologically available energy efficiency measures are immediately adopted in all feasible instances. This is therefore a theoretical quantification of savings which does not account for practical considerations such as cost-effectiveness constraints or the willingness of customers to participate.

Table 5.6-4 provides a summary of the theoretical costs[88] and savings associated with the technical potential for the HESP found by the energy efficiency potential study.

Table 5.6-4: HESP – Technical Potential 10-Year Costs and Savings (Electrical)

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$669,929,904	$66,992,990
MWh Savings	739,711	73,971
MW Savings	28.2	2.8

Economic Potential (Electric)

This section only covers the electrical portion of what is technically and economically achievable. Economic potential accounts for cost-effectiveness constraints.

Table 5.6-5 provides a summary of the estimated costs[89] and savings associated with the economic potential for the HESP found by the energy efficiency potential study.

Table 5.6-5: HESP – Economic Potential 10-Year Costs and Savings (Electrical)

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$260,282,384	$26,028,238
MWh Savings	665,009	66,501
MW Savings	12.2	1.2

[88] The costs associated with technical potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

[89] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

The economic potential excludes several measures which are not cost-effective. This is reflected by the decrease in the 10-year technical potential from 739,711 MWh to 556,009 MWh in the economic potential scenario. Several weatherization measures and equipment measures that are included in the technical potential did not pass the cost-effectiveness test and are removed from the economic potential. These include high efficiency central air conditioners and ENERGY STAR windows.

Achievable Potential (Electric)

The achievable potential for the HESP accounts for cost-effectiveness constraints and limited availability of all fuels incentives. Because of this, this is the only section that also includes the budget for and savings associated with all fuels. Table 5.6-6 provides the achievable potential savings and costs for the HESP during the FY2017–FY2019 time frame of the Triennial Plan. The incentive costs are calculated by calibrating the total costs for measures which save both non-electric fuels and electricity so that only the portion of the costs allocable to electricity savings are included.

Table 5.6-6: HESP – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-Year Totals
Total Efficiency Maine Trust Costs	$5,549,687	$6,319,038	$7,866,542	$19,735,267
MWh Savings	15,892	17,980	22,260	56,133
MW Savings	0.4	0.4	0.5	1.4

Table 5.6-7 provides an overview of the annual estimated costs and savings associated with the achievable potential for the HESP found by the energy efficiency potential study.

Table 5.6-7: HESP – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$5,549,687	15,892	0.4
FY2018	$6,319,038	17,980	0.4
FY2019	$7,866,542	22,260	0.5
FY2020	$7,923,278	22,813	0.6
FY2021	$7,972,973	23,344	0.6
FY2022	$8,021,056	23,870	0.6
FY2023	$8,068,846	24,392	0.6
FY2024	$8,120,028	24,921	0.6
FY2025	$8,182,214	25,480	0.6
FY2026	$8,269,367	26,107	0.6
10-Year Totals	**$76,293,029**	**227,058**	**5.4**
Annual Average	**$7,629,303**	**22,706**	**0.5**

The estimated MWh savings increases from 15,892 MWh to 22,260 MWh across the FY2017–FY2019 time frame. The estimated MACE savings and budget are closely tied to the availability of incentives to drive participation in the HESP weatherization and the consumer uptake in ductless mini splits. In the event that there are more incentives available for all fuels measures with associated electric savings or there is a more dramatic switch to ductless mini splits, the Trust would see greater opportunity for electric savings through this program.

MACE Measures

The constraints limiting the adoption of measures over time are included in the analysis of MACE in order to reflect historical program performance for measures currently offered by the Trust and to account for the time needed to ramp up adoption of measures that have not historically been offered by the Trust. Two key assumptions were made in order to estimate the long-term adoption of each measure. First, the study made an assumption, primarily informed by recent program performance, regarding what percentage of the available market could be captured in the first year of the Plan. For measures that have achieved high levels of participation historically such as ductless heat pumps, the starting point is higher than other options that have gained less traction in Efficiency Maine programs. For ductless heat pumps, the initial year market adoption rate was calibrated to target the population of ductless heat pumps anticipated by the Trust which have been added to the statewide sales forecast. The calibrated initial year market adoption for improved air sealing and duct sealing is only 2%. The low first year adoption for shell measures is a result of the expected funding from RGGI for non-electric savings and the cost sharing between electric and non-electric savings.

The electricity measure savings of the HESP are being driven by ductless heat pump, air sealing and insulation savings. These measures account for more than 90% of the electric energy savings each year. Table 5.6-8 provides an overview of the estimated electric energy and demand savings associated with the programs most impactful measure types.

Table 5.6-8: HESP – Top Measures

Description	MWh Savings	MW Savings	MWh Savings	MW Savings	MWh Savings	MW Savings
	2017		2018		2019	
Ductless Mini Splits	13,374	0.4	15,274	0.4	19,060	0.5
Air Sealing	623	0.0	674	0.0	797	0.0
Insulation	1,040	0.0	1,124	0.0	1,327	0.0
Totals	**15,037**	**0.4**	**17,072**	**0.4**	**21,184**	**0.5**
% of Program	**95%**	**90%**	**95%**	**91%**	**95%**	**91%**

A total of 104 measure iterations were included in the technical potential analysis of HESP. The benefit-cost screening identified 78 of these measures to be cost-effective. Attic insulation, wall insulation, basement insulation and air sealing measures were also found to be cost-effective, while high efficiency central air conditioners and ENERGY STAR windows were found to not be cost-effective measures for

saving electricity. The study did not apply any packaging or "bundling" of measures to allow not cost-effective measures to be included in the calculation of MACE.

Natural Gas

Market

HESP is also a vehicle for deploying the residential share of the Natural Gas Conservation Fund. The target market is the same in all ways as the market for measures that use funds dedicated for saving electricity, except that projects eligible for Natural Gas Conservation Funds must use gas to heat their homes and must be ratepayers of a natural utility. The natural gas portion of HESP will serve homes that use natural gas or have chosen to convert to natural gas. The residential sales forecast from Maine's natural gas LDCs include aggressive expansion plans. The LDCs are forecasting an 11% annual increase in the number of Maine homeowners using natural gas. A large portion of the expansion will be driven by Summit's forecasts of new residential customers who are currently exempt from Trust programs. Despite Summit's exemption, there is a growing natural gas market in Maine and the Trust will look to service new customers. (Also, if Summit were to change its approach to delivering efficiency and conservation to its residential customers, the Trust's HESP program could expand to accommodate these additional potential program participants.) The 2014 natural gas potential study found expansion customers account for a significant portion of the energy efficiency potential In Maine. Through HESP, the Trust has the opportunity to ensure homes converting to natural gas install higher efficiency equipment than they would have otherwise.

Table 5.6-9 shows the residential sector's technical potential and economic potential for natural gas conservation, by end use. Technical potential estimates the total savings potential if all technically feasible measures are installed. Economic potential, a subset of the technical potential, only includes cost-effective measures. The potential study identified 2,309,351 MMBtu of technical potential and 1,823,180 of economic potential in the residential sector.

Table 5.6-9: HESP – Residential Technical and Economic 10-Year Savings Potential (MMBtu)[90]

	Technical Potential		Economic Potential	
End Use	Existing Customers	Expansion Customers	Existing Customers	Expansion Customers
Appliances	8,006	15,748	7,701	15,577
HVAC Envelope	243,980	448,401	175,940	396,277
HVAC Controls	217,456	362,730	217,456	362,730
HVAC Equipment	133,012	491,188	95,551	349,928
Water Heating	137,585	251,245	67,739	134,281
Total	**740,039**	**1,569,312**	**564,387**	**1,258,793**

[90] The table includes Summit's residential customers. Summit's residential customers were removed for the achievable potential estimates.

The three year budget and savings forecasts proposed by the Trust are based on the achievable potential identified in the Natural Gas Potential Study completed in 2014. The achievable potential takes into account potential barriers for market adoption and the level of incentives offered by the Trust. The study identified two achievable potential scenarios:

1. A High Case - This scenario assumes the Trust pays incentives equal to 75% of the incremental cost and that the Trust can reach an 80% market penetration within 10 years.
2. A Low Case - This scenario assumes the Trust pays incentives equal to 50% of the incremental cost and that the Trust can reach a 50% market penetration within 10 years.

The Trust is basing its proposed Triennial Plan III budget on the low case from the potential study. Table 5.6-10 shows the 3-year estimated savings potential under the low case.

Table 5.6-10: HESP – Low Achievable Potential 3-Year Costs and Savings (MMBtu)

	Low Case Potential		
Description	Existing Customers	Expansion Customers	All Customers
Total Efficiency Maine Trust Costs	$2,427,903	$1,165,930	$3,593,834
MMBtu Savings	45,845	22,016	67,861

Residential natural gas baseline conditions assumed by the Triennial Plan III are based on data gathered by the 2014 natural gas potential study. The potential study collected data on-site from 25 homes with natural gas connections and 25 homes without natural gas connections but in areas where natural gas expansion is expected to occur over the next 10 years. The on-site data collection was supplemented by data from the natural gas LDCs and phone surveys.

Figure 5.6-2 shows the primary heating fuel type for homes with natural gas and homes without natural gas. The overwhelming majority of homes with natural gas use it as the primary heating system.

Figure 5.6-2: Primary Heating Type for Maine Homes

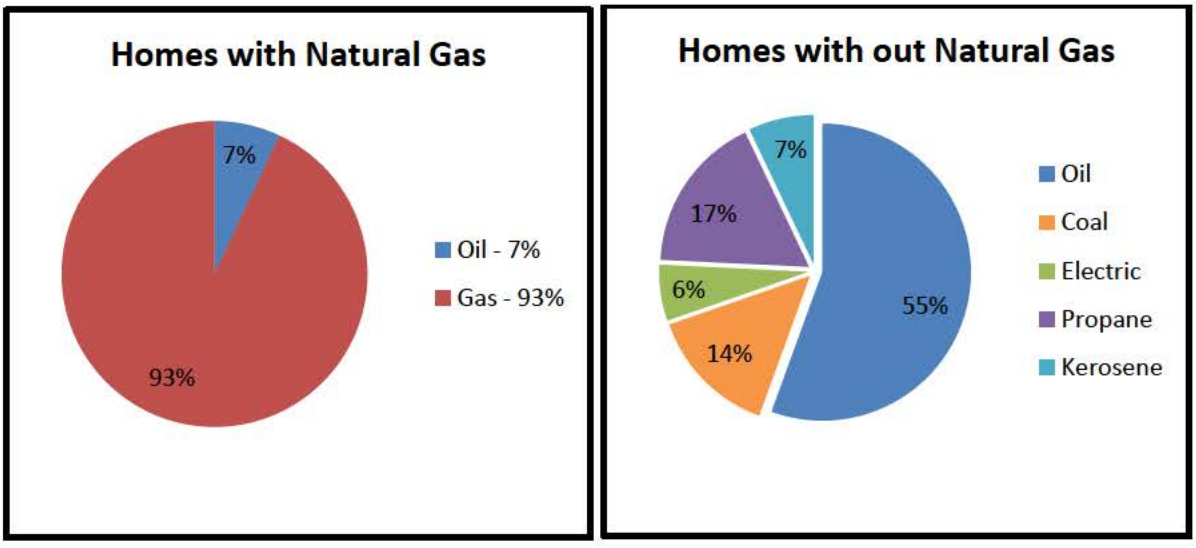


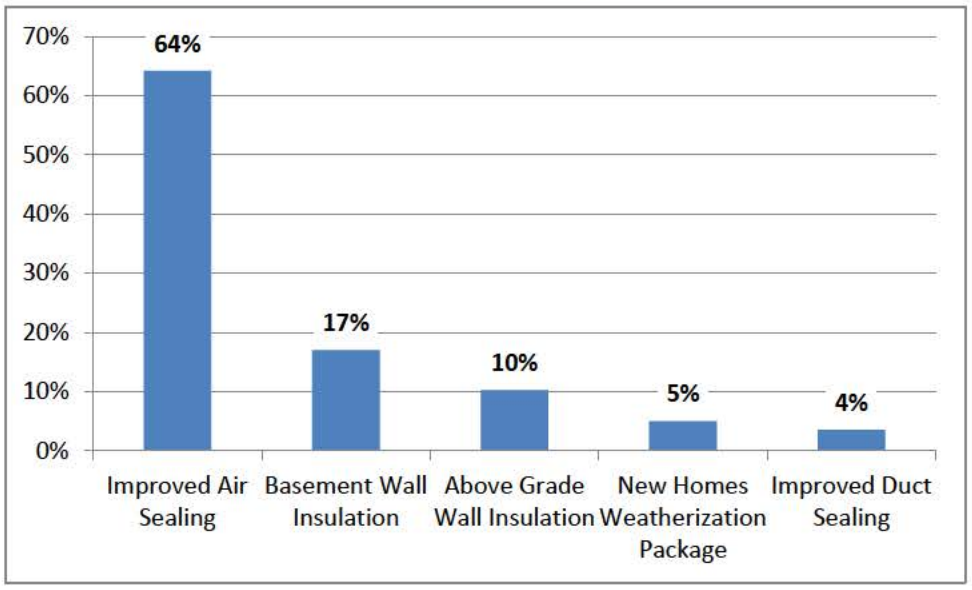
Table 5.6-11 shows the estimated savings potential by end use in the low case scenario used by the Trust to set its proposed natural gas conservation budgets. The table shows that a majority of natural gas savings potential in the residential sector comes from the HVAC Envelope and HVAC Controls end use categories. The HVAC Controls measures included in the potential study include programmable thermostats, wi-fi thermostats and boiler reset controls.

Table 5.6-11: 10-Year Low Achievable Savings Potential by End Use (MMBtu)

End Use	Existing Customers	Expansion Customers	All Customers	Percent of Total
Appliances	1,624	815	2,440	1%
HVAC Envelope	55,562	27,891	83,452	33%
HVAC Controls	57,188	28,291	84,650	34%
HVAC Equipment	38,949	19,269	57,654	23%
Water Heating	14,367	7,108	21,267	9%
Total	**167,690**	**83,373**	**249,463**	**100%**

Improved air sealing has the most potential within the HVAC Envelope end use category. For HVAC Envelope, improved air sealing was the measure with the most savings potential. Figure 5.6-3 shows that 64% of the savings opportunity for residential HVAC Envelope measures comes from cost effective improved air sealing projects.

Figure 5.6-3: Percent of Savings Opportunity by HVAC Envelope Measure



5.6.4 Budget and Metrics

Table 5.6-12: HESP Budget and Metrics

FY	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	Cost per kWh	MMBtu Savings	Cost per MMBtu	Lifetime Benefit	B:C Ratio
2017	$5,549,687	$1,090,845	$5,522,646	$12,163,178	15,892	0.4	$0.35	132,598	$49.88	$96,976,311	2.19
2018	$6,319,038	$1,196,711	$5,957,171	$13,472,920	17,980	0.4	$0.35	143,401	$49.89	$105,098,142	2.21
2019	$7,866,542	$1,306,277	$6,979,976	$16,152,795	22,260	0.5	$0.35	166,183	$49.86	$124,107,539	2.24

5.6.5 Program Design

In the period covered by Triennial Plan III, the Trust will continue operating HESP using a market-based approach (including rebates and incentives) to promote home energy upgrades using the same basic framework that was developed during the prior Triennial Plan. The Trust takes the view that a market-based approach, leveraging HESP program incentives to achieve significant private investment in home energy improvements, is essential for the purposes of meeting the participation and savings goals by 2030 and for principles of fairness. Given the scale of the challenge — improving the energy performance of 550,000 dwellings through upgrades that commonly cost thousand dollars or even tens of thousands of dollars — property owners and/or heating customers, whose bills will be reduced and whose buildings' value will be enhanced, will need to carry the bulk of the load.

Another important feature of the program design will be to accommodate the average Maine homeowner's tendency to address home improvement projects piecemeal, over time, rather than all at once.

HESP's market-based framework consists of two pathways for customers to perform energy upgrades and earn a financial incentive. One pathway is to develop a custom project and demonstrate through modeling that the project achieves minimum savings to make it eligible for an incentive. The other pathway uses a prescriptive menu of measures — ranging from air sealing with an assessment, to adding insulation, to installing best-in-class central or supplemental heating systems — in order to receive fixed incentives associated with each menu item.

While the immediate objectives of this program are to help Maine residents reduce their heating demand, lower their heating costs and cut GHG emissions, HESP also plays an integral role in advancing the statutory goal of:

> ... weatherizing substantially all homes whose owners or occupants are willing to participate in and share the costs of cost-effective home weatherization to a minimum standard of weatherization by 2030.

This goal was newly established with passage of the Omnibus Energy Bill in 2013. It has not been the subject of discussion in any prior Triennial Plan, and the definitions and standards for the term weatherization, for the purposes of advancing this goal and guiding the Trust's programs, have not been established until now.

For purposes of this goal, the Trust will use a four-pronged approach to defining weatherization and tracking progress toward the goal.

First, the Trust will use a simple metric of participation. Working from the definition crafted for the Maine State Housing Authority programs, weatherization generally is:

> The process of reducing energy consumption and increasing comfort in buildings by improving the energy efficiency of the building and maintaining health and safety.[91]

The Trust has tracked the number of home energy improvement projects that have taken advantage of an Efficiency Maine incentive to reduce energy consumption by improving the energy efficiency of the building. It will continue to track and report this number, including within this reporting the number of heating systems that were upgraded. It is useful to think of home weatherization comprising four elements: (1) air sealing; (2) insulation; (3) space heating (or cooling); and (4) water heating. The Trust will continue to track and report the number of homes that have made *any* improvements meeting the minimum requirements of the HESP program, or the associated loan program, sufficient to have received some form of financial assistance from the Trust. It will also work with contractors, vendors, realtors and others to discuss ways in which a more comprehensive, periodic report could be generated to reflect all home energy upgrades performed in Maine where the owners or occupants were willing share the costs, in whole or in part.

Second, the Trust will establish, update, and refer to a range of standards that relate to each of the four elements of weatherization.

For air sealing, the Trust will continue to encourage Maine homeowners of every income level to take the preliminary step of performing six hours of air sealing on their dwelling. A dwelling having completed this will be considered to have achieved "Six Hours Air Sealing." (The names given here to characterize levels of weatherization are placeholders, for illustrative purposes only, and may be changed during implementation.) For existing homes built prior to the effective date of the Maine Uniform Building Energy Code (MUBEC), a home that achieves an ACH50 rating of 7 will be considered to have "Very Good Air Sealing." Newly built homes that were subject to MUBEC at the time of construction will be designated as having "Very Good Air Sealing" if they can demonstrate that they comply with the air exchanges required by the code.

For insulation, the Trust will set two standards for existing homes (that were not subject to MUBEC when they were built). The first standard will define a home that will be considered to have "Basic Insulation" if the home is shown to have at least R-4 in the foundation wall, R-10 in the walls, and R-22 in the attic. The second standard will define a home that will be considered to have "Very Good" Insulation if it is shown to have of at least R-10 in the basement, R-21 (or fully filled bays with cellulose or foam) in the walls, and R-49 (or fully filled bays with cellulose or foam) in the attic.

[91] Maine State Housing Authority, "Maine Weatherization Standards, Low-Income Weatherization Assistance Program," January 2005, p. 162.

For space heating, the Trust will establish a set of minimum standards or criteria for heating systems. For systems converting electricity to heat, the Trust will assume efficiencies starting at the source of the generation, through the utility distribution system, and at the end use. Where practical, the Trust will also consider efficiencies within the heating distribution system in the home. Homes operating a space heating system that meets these standards or criteria will be considered to have a "High-Efficiency Heating System." Homes that have installed a high-efficiency supplemental heating system, such as a ductless heat pump or a pellet stove, will be considered to have a "High-Efficiency Supplemental Heating System."

The Trust will establish a minimum standard for water heating systems. "High Efficiency Water Heating Systems" will be those with heat pump water heaters, advanced purge control boilers, condensing instantaneous, or solar water heating systems.

Third, the Trust will establish a goal of bringing the statewide envelope tightness across all Maine single-family homes to an average level of 7.0 ACH50 by the year 2030. The current average across all single-family homes in Maine is 11.2 ACH50; an ACH50 reading of 7.0 is required for newly constructed single-family homes built to meet the 2009 IECC standards. The Trust further proposes to set interim milestones of achieving a statewide average of 10 ACH50 in 2020, 8 in 2025, and 7 in 2030. The Trust plans to conduct a survey of single-family homes every five years to, to 80-10 levels, every five years and report its progress.

Fourth, the Trust will move forward with the establishment of a voluntary home energy information label. When homeowners are considering investments in their home, they often place some amount of financial justification on the ability to recoup the cost of a project though increased resale value. Efficiency Maine will seek to document and quantify increases in sale value of homes that are more efficient, and also trends that homes have upgrades completed just prior to sale to bring them into compliance with buyer expectations. The perceived barrier to increased use of efficiency in gauging home value is often linked to a lack of a uniform efficiency certification platform. In the third triennial plan period, Efficiency Maine will move toward establishing and promoting a statewide platform for certificates of efficiency project completion and building labels to be accessed by groups associated with the residential real estate industry.

Program History

The HESP was initiated in 2010 with a $10 million ARRA- SEP grant providing rebates toward the completion of 3,200 home upgrades in 18 months. This initial 18 month period is referred to as HESP 1. During HESP 1, the program design was built on the holistic "whole-house" approach, which included the pre-requisite of a comprehensive energy audit, modeling of potential energy savings for each individual home, and financial incentives based on what level of energy savings was modeled for the completed projects. The minimum overall energy savings required in order to receive an incentive was 20%, and higher incentives were given for projects that modeled an overall energy savings of 40% or more. At the end of this initial period, the federal funds were exhausted and the incentives for home performance projects based on modeled savings were discontinued.

In 2012 and 2013, a separate source of federal funds enabled the Trust to offer the Residential Direct Install (RDI) initiative. As noted above, the RDI initiative provided $600 toward the combination of an energy assessment and basic air sealing meeting specified minimum standards. During the first two years of the initiative, participants achieved an average reduction in heat loss from air leakage of 17%.

On a parallel track, the Trust provided more than $14 million in financing between April 2011 and July 2015 to fund more than 1,300 weatherization projects and home heating system upgrades statewide at an average cost of $10,800.

In the fall of 2013, in response to the policy directive of the Omnibus Energy Bill enacted by the Maine Legislature, the Trust reintroduced the HESP (sometimes referred to as HESP 2). The revised program retained the original concept of providing tiered incentives for modeled levels of savings, but added the option for customers to pick, "à la carte," from a menu of pre-approved, best-in-class heating and envelope upgrades. Under this "prescriptive list" option, the pre-requisite of an energy audit with modeling and a full report and was dropped. For projects involving upgrades to the building envelope, the full audit was replaced with a less intensive requirement to perform an energy assessment, involving a certified energy auditor, but not requiring time consuming modeling or a comprehensive report. For projects involving only a central heating system or a supplemental heating system, no audit or assessment was required. Using either the modeled savings path or the prescriptive path, customers could receive rebates up to $1,500 per residential building (having no more than four units) on their qualifying home energy upgrades.

The Trust also provided enhanced rebates for certain specific customers through the use of rebate "adders." In the case of residential customers of the Unitil gas utility, weatherization or qualifying natural gas heating systems were eligible to receive a rebate adder under HESP 2 using funds from the Natural Gas Conservation Fund (to which Unitil ratepayers were the only contributors at the time). In the case of residential customers of Summit Natural Gas of Maine, qualifying measures were eligible to receive a different set of adders that were prescribed and paid for through Summit's rates as approved by the Maine PUC. In the case of customers participating in the Low Income Heating Energy Assistance Program (LIHEAP), weatherization upgrades were eligible (starting in FY2016) for a rebate adder using funds earmarked in the settlement of the Maine Power Reliability Program (and additional rebate adders if they are customers of a natural gas utility contributing to the Natural Gas Conservation Fund).

Over the course of FY2014 and FY2015, a total of 14,600 homes participated in HESP 2. These projects received a total of $12 million in financial incentives from the Trust, leveraging more than $63 million in private investment for home energy upgrades. The Trust estimates that the projects undertaken during these two years will provide in excess of $140 million in energy savings over the life of the measures installed.

Measures Promoted

Air Sealing and Energy Assessment: Basic air sealing guided by blower door testing and thermal camera analysis will continue to be among the most cost-effective and drastically needed weatherization measures in Maine's housing stock. Reducing air leakage toward ASHRAE recommended levels will

reduce heating and cooling load. It also will have the effect of lowering draftiness that contributes to occupants' sensation of feeling cold, and reducing infiltration of moisture (and pests). This upgrade will lower the risk of poor indoor air quality from mold, viruses, and mildew.

Common techniques and materials used in the basic air sealing of basements, attics and outside wall penetrations include applying spray foam and caulk to seal basement sill joints, sealing electrical and plumbing chases, applying fire resistant caulk and metal flashing to seal chimney penetrations in the basement and attic. It also includes sealing and insulating air distribution ducts, boxing and sealing lighting penetrations into walls and attics, weather stripping, insulating and proper fitting of attic hatches and wall junctions, and insulating shim spaces around door and window frames.

Requirements for this measure will include addressing all issues in the building envelope deemed to have the largest impact on air leakage and that can be accessed and sealed conventionally (i.e., without dense-pack or foam insulation). Buildings where no reasonable means exist of providing benefit through basic air sealing strategies without introduction of controlled ventilation, as determined by blower door testing to be approaching Building Tightness Limits, may substitute any manner of insulation labor to qualify for the air sealing and assessment incentive.

Insulation: Eligible insulation measures will include application of loose- or dense-pack cellulose or fiberglass in attics and wall bays, and spray or rigid foam insulation applied to roof decks and bays. Spray or rigid foam insulation is also appropriate for basement wall perimeters using Maine Fire Marshall approved thermal and ignition barriers.

Space Heating: Best-in-class heating systems will include conventional fuel ENERGY STAR furnaces and boiler upgrades with advanced controls and features including modulation, thermal purge and heat exchangers designed to condense flue gasses; whole home automated pellet boilers and geothermal heat pump systems; and efficient supplemental space heating using either EPA certified wood and pellet stoves or very high-efficiency ductless ASHPs designed to function in cold climates.

Water Heating: Accounting for nearly 25% of residential household energy use, high-efficiency water heating can be included in financing as well as modeled projects under the HESP, but are not directly incentivized through the prescriptive rebates in HESP. Elimination of tankless coils and boilers without cold start capability is a priority in Maine; existence of these features will disqualify a heating system for eligibility under HESP. Heat pump water heaters continue to improve and gain popularity across the state, but will, for the foreseeable future, be incentivized as an appliance through retail channels in the Consumer Products Program. Installation of pipe insulation and tank wrap will be encouraged as part of broader upgrades to heating systems but may be considered as stand-alone measures along with other water saving fixtures.

Renewable Energy: Solar electric photovoltaics (PV), solar hot water, and solar hot air system installations have been eligible for financing through certain loan products offered by the Trust. However, HESP has not promoted these technologies with rebates to date due to concerns about cost-effectiveness under typical situations. However, the Trust realizes that the cost-effectiveness of these technologies has been shifting rapidly. It is also aware that under certain circumstances, such as when

delaying or displacing the need for new electricity transmission and distribution systems, the benefits associated with these technologies can be higher than normal. In a situation where PV or solar hot water (or solar hot air) proved cost-effective, the Trust would most likely use the HESP program as the channel for promoting these technologies and issuing incentives for qualifying installations in residential dwellings.

Marketing

Digital marketing channels will be the first option for marketing the Program. Digital marketing has been increasingly important to cost effective messaging about this Program and typically includes web ads, search engine optimization, online radio, video ad spots, and use of social media platforms for high volume viewing or to engage potential participants directly. As a secondary option, marketing efforts will likely include print advertising, speaking at local informational forums, and brochure insertion into property tax bill mailings in participating municipalities as has been done the past four years running in more than 100 municipalities statewide. A third option, less frequently used due to its cost, is to pay for conventional radio or TV ad campaigns

In addition to media outreach initiatives, the program will engage the network of Residential Registered Vendors. This vendor community has grown to more than 750 residential contractors, vendors, and energy professionals who have been trained to provide services to homeowners ranging from weatherization and heating system upgrades to basement moisture treatment and installation of solar PV panels. Energy advisors with certification from the Building Performance Institute (BPI) continue to provide consulting services to homeowners allowing them to make informed choices about the measures they want to include and can afford to include in projects. Other contractor firms that constitute the community of participating trades include HVAC installers, insulators, electricians, solar installers, and builders. Efficiency Maine has built, maintained, and will continue to offer online locator tools to enable homeowners to easily locate energy service professionals.

The program will also seek to engage networks — such as mortgage lenders, insurers, or realtors — that can influence homeowner decisions to make energy upgrades. The program will work with the home sale industry partners to pursue label and certification platforms that will enable home buyers to gauge the relative energy efficiency of homes before they purchase them.

Education and Training/Workforce Development

The voluntary label initiative will involve collecting, processing and tracking data about home energy systems and system performance. One potential use for the label will be to help consumers — prospective home buyers — better understand basic information about the home's air tightness, levels of insulation, and heating system upgrades. At the same time, it will help homeowners marketing their homes for sale, enhancing the return on their investment in energy upgrades. This will raise the bar for other homes on the market and for homeowners thinking of selling their homes in the future, which will in turn promote higher levels of private investment in the kind of upgrades needed across Maine's residential building stock. Developing and maintaining this home energy information label will require a modest budget commitment and, by itself, is unlikely to achieve measurable energy savings. It will, however, help transform the market, persuading homeowners to invest in energy upgrades. This will

also facilitate the Trust's efforts to advance the statutory goals around weatherization and heating fuel savings and to track progress toward those goals.

Regarding the goal of weatherizing substantially all homes whose owners are willing to contribute to the cost, the Trust will use the labeling initiative to track and report on the number of homes having achieved (a) "Six Hours Air Sealing" or "Very Good Air Sealing" plus, (b) "Basic Insulation" throughout the home. The Program will design a label customized for Maine that contains elements of the Sample Building Label illustrated in Figure 5.6-4.

Figure 5.6-4: Sample Building Label

Monthly webinars and technical training for participating contractors are available throughout the year and help to maintain continuity in installations standards and to provide updates on changes to program rules and rebate availability. Training is provided periodically and on an as needed basis for topics ranging from building science to specific HVAC trade areas that appear to require additional training support. Softer skills training is periodically offered to increase customer experience satisfaction and increase closing rates for project sales. Training offerings in coming years will prioritize methods to improve installation outcomes, promote best practices, improved customer service, and deliver information about weatherization and heating upgrades to homeowners.

For consumers, the Trust's website will offer tools (such as the energy cost calculator tool and the screening tool to determine which homes are good candidates for weatherization) to help them choose

among energy saving options. Informational pages will be kept up to date with information about emerging trends in energy saving technology and may also include new multi-media content to increase ease of use and depth of understanding of energy saving options.

The Trust will continue to expand the offerings on its website to provide more comprehensive consumer information about options of products and services to help save energy in the home. Attention will be paid to information about insulation high-efficiency heating and cooling systems, and new construction design.

Technical Assistance

The Trust will offer technical assistance to weatherization contractors and homeowners as needed. Each project that is financed through the Trust's programs will be reviewed for feasibility as it relates to best practices and projected savings. Opportunities to improve contractor workmanship will be taken in as appropriate with random inspections of work.

Financial Incentives

Financial incentives include both (1) rebates to entice and lower costs associated with the uptake of higher efficiency equipment and envelope upgrades than would normally be selected in the marketplace; and (2) attractive financing options to homeowners who do not have funds on hand to pay for upfront costs not covered by rebates, nor have access to or interest in conventional lending sources.

Rebates will be made available to eligible homes for a suite of prescribed heating system and building envelope measures. In recent years, the basic cap on rebates has been (e.g., up to $1,500 per home. A higher cap (e.g., $5,000) will remain available for eligible Ultra Low Greenhouse Gas central heating systems, which currently include automated pellet boilers and Energy Star Most Efficient Geothermal heat pumps. Funding for rebates made available through electric and gas conservation rates and RGGI are anticipated to continue through Triennial Plan III. Before the end of FY2016, all natural gas utilities are expected to be contributing to the Natural Gas Conservation Fund, making homes in those areas eligible for an enhanced rebate.

In order to be eligible to participate in HESP, a building may not have more than four dwellings and must serve as the legal principal residence for its occupants. While energy saving opportunities exist in second homes and seasonal and vacation rentals, priority for limited conservation funds is allocated to defray essential heating costs for year-round housing stock.

Efficiency Maine will also continue to provide financing for loans. Loans are currently available in amounts as small as $1,000 and up to $25,000 for terms of 5-, 10- and 15-years. The interest rates vary by customer creditworthiness and the costs to administer the loans, and have historically ranged between 4.99% or 5.99% APR. Projects for which this financing may be used include weatherization and heating upgrade projects that include a minimum scope of approved prescriptive measures or are projected to save more than 20% of whole home energy consumption. As of FY2016, secured loans that have a second position lien placed on the property can have terms as long as 15 years, while unsecured loans with amounts up to $15,000 can have terms up to 10 years. The interest rates on Efficiency Maine

loans have been effectively subsidized by the availability of federal funds from the 2010 DOE ARRA Better Buildings Grant to help administer and market the loans, but as the original loan pool is fully loaned out, additional capital may require either higher interest rates or direct subsidy of interest rates with funds that would otherwise be utilized for rebates.

During the second half of the Triennial Plan II period, the program began offering incentives for a wide range of heating and envelope measures. Promotion of the program was moderated to increase participation without over-extending the budget or having gaps in availability of rebates. The Trust will continue this strategy through the Triennial Plan III period, balancing the need to increase participation with the imperative to minimize disruption to the contractor community that occurs when significant changes are made to measure eligibility or program incentives. Where additional funding is made available to the HESP, incremental changes to marketing, incentives and workforce development will be made to drive demand toward meeting long term objectives and energy savings goals.

Quality Assurance/Quality Control

The program has an established QA/QC process that includes in-home inspections conducted by highly experienced and certified building analysts. The inspection regiment includes three components: (1) random selection across all projects submitted to Efficiency Maine for processing, (2) targeted inspection on the initial projects completed by newly added vendors, and (3) elevated rates of inspection on contractors whose work has generated credible consumer complaints or concerns about consistency of high quality workmanship.

The focus of site inspections is to ensure that projects are completed as reported and to verify satisfaction of program rules including equipment specifications and configuration, satisfactory workmanship and customer experience. Any discrepancies are recorded and brought to the attention of the participating contractor to remedy and to make improvements in future work. Contractors with unsatisfactory inspections experience an increased rate of inspection until the delivery team is satisfied that workmanship concerns have been alleviated. Before any project is approved for financing, the program delivery contractor verifies that the proposed scope of work meets minimum energy saving program criteria. Financed projects are included with pool of rebate project random inspections.

The Trust will continue to employ the following mechanisms, as appropriate, to help promote and ensure quality work:

- Registered Vendor Code of Conduct
- BPI certification
- Requirement for proper licensing by the Maine Fuel Board
- Completion of forms submitted to the Trust establishing eligibility of the home and the measures
- Signatures by the customer and the contractor attesting to the information represented in the eligibility forms
- Reminders at monthly webinars

- Possible removal of vendors from the Registered Vendor list for failure to comply with the Code of Conduct or Program Guidelines

5.7 Low Income Initiatives

5.7.1 Overview

Efficiency Maine Trust delivers energy-saving opportunities to low-income (LIHEAP-eligible customers through four initiatives: Consumer Products (rebates and markdowns); HESP (weatherization and heating systems); Food Pantry Light Bulb Distribution; and Supplementation of Community Action Agency direct installation initiatives. As a general rule, not less than 10% of electricity and natural gas program budgets are allocated to programs that benefit low-income customers. In the case of electricity programs, this amount is approximately proportionate to this consumer group's share of the statewide load.

Measures that help these consumers save energy include: high-efficiency lights, water heaters, heat pumps, appliances/electronics, and weatherization (air sealing and insulation). Small loans are also available for LIHEAP-eligible customers through retail stores, food pantries, Community Action Agencies, and the market-based efforts of registered trade allies.

The Trust receives funding for these initiatives from the Electricity Efficiency and Conservation Fund, the Natural Gas Conservation Fund, the RGGI, and the Maine Power Reliability Program settlement.

5.7.2 Objectives

- Target at least 10% of funds for electricity conservation collected under §10110(4-A) or $2,600,000, whichever is greater, to programs for low-income residential consumers
- Apportion at least 10% of funds from the Natural Gas Conservation Fund to programs for low-income residential consumers
- Weatherize substantially all homes whose owners or occupants are willing to participate in and share the costs of cost-effective home weatherization
- Increase consumer awareness of cost-effective options
- Reduce total energy costs
- Help reduce arrearages and "bad debt" associated with customers who fail to pay their utility bills by providing information on energy usage and targeted options for lowering overall energy costs.

5.7.3 Opportunity

The target market for this program includes all residential dwellings in Maine occupied by low-income households, regardless of whether these units are owner-occupied or rented. This program allocates funding from the Natural Gas Conservation Fund to eligible customers of the state's natural gas LDCs for measures that save natural gas. It limits the use of its allocated funding from the Electric Efficiency and Conservation Fund to customers of the state's electricity utilities for measures that save electricity or

reduce electricity demand. The Trust defines eligible low-income participants as households eligible for Low Income Home Energy Assistance Program ("LIHEAP" or "Fuel Assistance").

Customer Market Barriers

- First cost
- Lack of access to capital
- "Split incentives" between building owners and tenants[92]Lack of information

Electric

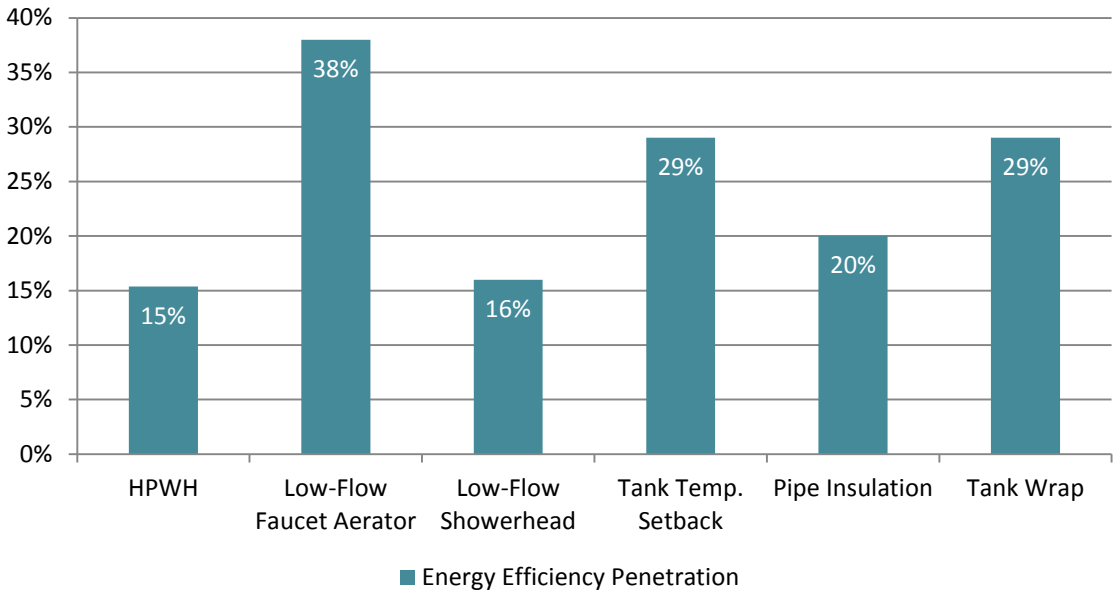
The Market Potential Study applied a factor of 18%[93] to all Maine households to determine to the total number of low income households.

All of the measures are considered retrofit because the existing technology is not assumed to have failed before it may be replaced with an efficient alternative by the Program. Therefore all of the measures that are installed by the program achieve savings equal to the difference between the efficient measure and the previously existing condition. As part of its distribution of high-efficiency bulbs to low-income families, the Trust considers all food pantry customers to be presumptively low-income and eligible for measures (e.g., high-efficiency bulbs) distributed through that channel.

The appliance component of the program focuses on direct installation of heat pump water heater retrofits and the installation of other water heating retrofits such as low-flow faucet aerators, low-flow showerheads, and pipe insulation. Consistent with the findings of the residential baseline characterization, the Market Potential Study assumed that 30% of low-income households in Maine have electric water heating. Figure 5.7-1 depicts the percentage of equipment that is already retrofitted with efficient upgrades. The estimates of energy efficiency market saturation were derived primarily from the *Maine Single-Family Residential Baseline Study*. Additional equipment penetration data was developed from the *Central Maine Power Saturation Study* (2010) and the *Maine Residential New Construction Technical Baseline Study* (2008).

[92] In cases where energy costs are paid directly by tenants, building owners have few incentives to invest in efficient building systems. In buildings where energy expenses are paid by the owner, tenants have little motivation to conserve energy. This barrier to energy efficiency is commonly referred to as the "split incentive."
[93] NMR Group, Inc., Maine Single-Family Residential Baseline Study – Draft August 6, 2015.

Figure 5.7-1: Low-Income Existing Energy Efficient Appliance Retrofits[94]



Using the information from the two studies noted above, the Trust's electric Market Potential Study estimated that, under both technical and economic potential scenarios, approximately 4,000 heat pump water heaters could be installed each year in the state of Maine in the low-income sector. These heat pump water heater installations are only those that can be acquired through direct install initiatives. (In addition, the Trust estimates that 16% of heat pump water heaters purchased through Consumer Products Program are installed in low-income households.) Additionally, the study found that 9,000 showerheads and 14,000 faucets could cost-effectively be retrofitted with low-flow devices each year through a direct install initiative. Approximately 8,000 homes will be able to receive other water heating saving measures such as tank wraps each year.

These estimates are based on a two-step calculation which first takes the number of homes in Maine multiplied by the saturation of electric water heaters to determine the total number of water heaters installed. Then the number of water heaters assumed to be eligible for replacement each year is estimated by dividing the total number of water heaters installed by either the time frame of the study, or the expected useful life of the measure. This calculation yields the estimated number of water heaters that could be replaced in the technical and economic potential scenarios. For example, the estimate of approximately 4,000 electric water heaters that could be installed each year equals the number of low-income homes (123,057) times the saturation of electric water heaters (approximately 30%) divided by the 10-year time frame of the study. The achievable potential scenario includes an additional calibration adjustment which factors in historical participation levels for each appliance.

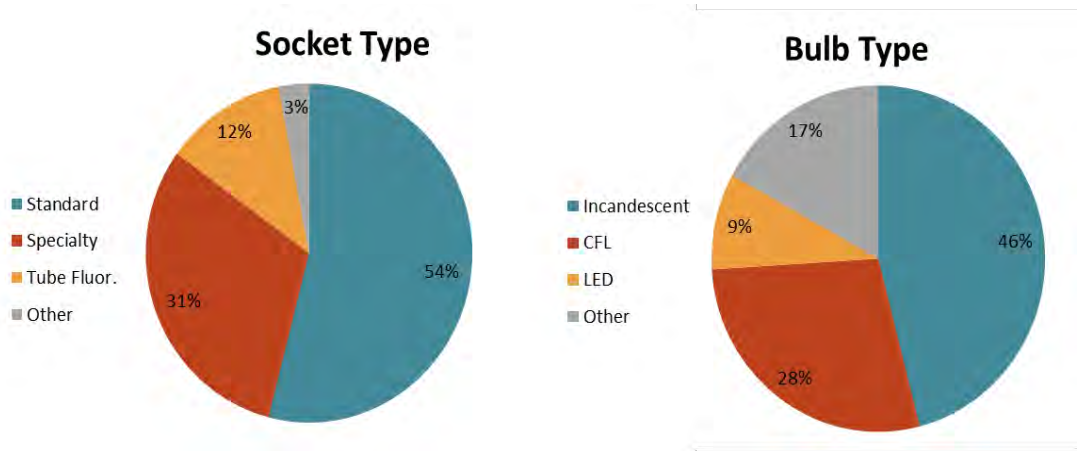
[94] The Maine residential baseline study found 15% of electric water heaters to be heat pump water heaters. The potential study assumed that 3% of electric water heaters in Maine are heat pump water heaters, based on other more robust baseline studies in nearby states and historical heat pump water heater installations in Maine. This assumption did not change the achievable potential results.

$$Water\ heaters\ eligible\ for\ replacement\ per\ year = (Homes \times Saturation\ of\ appliances) \div Replacement\ cycle$$

Each appliance that fails could be replaced with either an efficient model, or a standard efficiency model. The market for efficient appliances is expected to remain strong throughout the time frame of the Triennial Plan.

The baseline characteristics of lighting for this program are consistent with the Consumer Products Program. To reiterate, based on the latest Efficiency Maine residential lighting evaluation study, completed in 2015, the average residence in Maine has approximately 69 lighting sockets. 54% of sockets are considered to have standard screw-based bulbs, 31% are considered specialty bulbs, 12% are tube fluorescents, and 3% are other or unknown bulb types. According to the *2015 Maine Single-Family Residential Baseline Study* 28% of sockets currently have CFL bulbs installed; an additional 9% of sockets use LED lights. The energy efficiency market potential study accounts for the longer life of CFL and LED bulbs which results in fewer bulbs being sold each year.

Figure 5.7-2: Residential Lighting by Socket Type and Bulb Type



Using the information from the lighting evaluation study, the energy efficiency potential study estimated that approximately 1,200,000 light bulbs could be replaced each year in Maine in the low-income sector in addition to those bulbs replaced through the Consumer Products section.[95] This estimate is based on a two-step calculation which first takes the number of homes in Maine multiplied by the number of eligible bulbs per home to determine the total number of bulbs installed. Then the number of bulbs assumed to be eligible for replacement each year is estimated by dividing the total number of bulbs installed by an assumed replacement cycle of 5 years. This replacement cycle is a conservative estimate which accounts for the potential longer life of EISA-compliant halogen bulbs that are already installed or will be installed during the time frame of the study. This calculation yields the estimated number of bulbs that could be replaced in the technical and economic potential scenarios, but the achievable

[95] This total number of bulbs excludes those bulbs purchased by low-income customers through the Consumer Products Program.

potential scenario includes an additional calibration adjustment which factors in historical participation levels for the rebate lighting program.

$$Bulbs\ eligible\ for\ replacement\ per\ year = (Homes\ \times Bulbs\ per\ home) \div Replacement\ cycle$$

The bulbs that are burning out each year could be replaced with either an efficient CFL or LED bulb or a standard efficiency halogen/modified incandescent bulb. Therefore the market for efficient light bulbs remains robust. The information provided by the evaluation study and the baseline study reveals that nearly 90% of sockets could have an efficient CFL or LED screw-in bulb installed, but that only 37% of bulbs are currently efficient. This demonstrates that a significant portion of the low-income lighting market can be transformed through the distribution of efficient light bulbs.

Technical Potential

Technical potential represents the reduction in energy use that would occur if all technologically available energy efficiency measures are immediately adopted in all feasible instances. This is therefore a theoretical quantification of savings which does not account for practical considerations such as cost-effectiveness constraints or the willingness of customers to participate.

Table 5.7-1 provides a summary of the estimated costs and savings associated with the technical potential for the low-income direct install initiatives found by the energy efficiency potential study.[96]

Table 5.7-1: Low-income Direct Install Initiatives – Technical Potential 10-Year Costs and Savings[97]

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$104,495,671	$10,449,567
MWh Savings	261,417	26,142
MW Savings	33.8	3.4

The study reveals a future decrease in savings across the FY2020–FY2022 time frame, which is primarily a function of the backstop provision of the EISA standards, which essentially makes a CFL bulb the standard for baseline efficiency in 2020 (the study assumed the backstop provision will take effect in FY2021 to allow for a six month sell through period). The details of the impacts of EISA on the potential for cost-effective lighting measures are further discussed in the section on Consumer Products.

Economic Potential

Economic potential accounts for cost-effectiveness constraints. Table 5.7-2 provides a summary of the estimated costs[98] and savings associated with the economic potential for the low-income direct install initiatives found by the energy efficiency potential study.

[96] The costs associated with technical potential only include estimated incentive costs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost. Delivery costs are included in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs.
[97] Low-income Direct Install Initiatives includes lighting measures distributed at no-cost to low-income households through food pantries and other channels.

Table 5.7-2: Low-income Direct Install Initiatives – Economic Potential 10-Year Costs and Savings

Description	10-Year Totals	Annual Average
Efficiency Maine Trust Costs	$104,495,671	$10,449,567
MWh Savings	261,417	26,142
MW Savings	33.8	3.4

Achievable Potential

The achievable potential for the low-income direct install initiatives accounts for cost-effectiveness constraints. Table 5.7-3 provides the achievable potential savings and costs for these initiatives during the FY2017–FY2019 time frame of the Triennial Plan.

Table 5.7-3: Low-Income Direct Install Initiatives – Achievable Potential 3-Year Costs and Savings

Description	2017	2018	2019	3-Year Totals
Total Efficiency Maine Trust Costs	$4,396,332	$4,479,168	$5,009,564	$13,885,064
MWh Savings	15,848	16,573	18,207	50,628
MW Savings	2.4	2.5	2.7	7.6

Table 5.7-4: Low-Income Direct Install Initiatives – Achievable Potential Annual Costs and Savings

Fiscal Year	Total EM Trust Costs	MWh Savings	MW Savings
FY2017	$4,396,332	15,848	2.4
FY2018	$4,479,168	16,573	2.5
FY2019	$5,009,564	18,207	2.7
FY2020	$2,462,129	10,193	1.5
FY2021	$2,938,108	4,783	0.6
FY2022	$2,251,744	5,035	0.6
FY2023	$2,344,813	5,191	0.6
FY2024	$2,437,766	5,346	0.6
FY2025	$2,530,600	5,502	0.6
FY2026	$2,623,311	5,656	0.7
10-Year Totals	**$31,473,534**	**92,335**	**12.9**
Annual Average	**$3,147,353**	**9,233**	**1.3**

[98] The costs associated with economic potential only include estimated incentive costs. Delivery costs are only accounted for in the achievable potential scenario because achievable potential aligns with the estimated savings of the programs. For technical and economic potential, incentives were set to equal 100% of the measure incremental cost.

The estimated MWh savings increases from 12,241 MWh to 12,837 MWh across the FY2017–FY2019 time frame. This change is primarily a function of the anticipated increase in the Program's capacity to ramp up and deliver directly installed measures over time.

MACE Measures

The economic potential for low-income direct install initiatives includes all cost-effective measures included in the technical potential estimates, but the achievable potential accounts for factors which limit the adoption of cost-effective measures over time. Achievable potential also provides an estimate of the non-incentive costs (public information, program management, quality assurance, measurement and verification, etc.) needed to operate the program.

The measure savings of the low-income direct install initiatives are being driven by LED bulb and CFL bulb savings. Over the course of the plan the study assumes that LEDs will become a larger percentage of the program as prices fall. Heat pump water heaters are also expected to contribute significant savings towards the program totals. Table 5.7-5 provides an overview of the estimated electric energy and demand savings associated with the programs most impactful measure types.

Table 5.7-5: Low-income Direct Install Initiatives – Top Measures[99]

Description	MWh Savings	MW Savings	MWh Savings	MW Savings	MWh Savings	MW Savings
	2017		2018		2019	
Standard CFL Bulbs	7,417	1.3	7,417	1.3	6,743	1.1
Standard LED Bulbs	896	0.1	896	0.1	1,669	0.3
Specialty CFL Bulbs	1,724	0.3	1,724	0.3	1,567	0.3
Specialty LED Bulbs	172	0.0	172	0.0	345	0.1
Heat Pump WH	1,738	0.1	1,906	0.2	2,075	0.2
Totals	**11,947**	**1.7**	**12,116**	**1.7**	**12,399**	**1.7**
% of Program	**97%**	**90%**	**97%**	**90%**	**97%**	**88%**

A total of 36 measure iterations were included in the technical potential analysis for direct installation in low-income homes. The benefit-cost screening found all 36 of these measures to be cost-effective. Standard LEDs were found to be the most cost-effective lighting measures. Thermostatic restriction values for showerheads and low flow bathroom and kitchen aerator measures were also found to be highly cost-effective. Heat pump water heaters had the lowest TRC ratio, but these measures still passed the screening with a B:C ratio of 1.46.

Natural Gas

The Trust budgets 10% of Natural Gas Conservation funds for low-income customers. The Trust prioritizes market-based approaches as a first choice to support low-income customers, as it does for other types of customers. The Trust will invest natural gas conservation funds for the benefit of low-

[99] This table does not reflect the funding level shown in Tables 5.7-3 or 5.7-6.

income customers through the HESP, which provides low co-pays and financing for weatherization upgrades. If the Trust finds that it is unable to invest the budget allocated for low-income customers from the Natural Gas Conservation Fund through the market based channel, the Trust will invest this available budget allocation to low-income customers through a direct install initiative as described above.

All Fuels

The Trust invests funds from the Maine Power Reliability Program and from the RGGI to weatherization measures for the benefit of low-income customers. The Trust prioritizes market-based approaches as a first choice to support low-income customers, as it does for other types of customers. The Trust will invest all fuels funds for the benefit of low-income customers through the HESP, which provides low co-pays, made possible by enhanced rebates for LIHEAP customers, and financing for weatherization upgrades. If the Trust is unable to invest the full allocation of all fuels funds budgeted for low-income customers through the market based channel, the Trust will invest remaining amounts through a direct install initiative as described above.

5.7.4 Budget and Metrics

Table 5.7-6: Low Income Sector Budget and Metrics

FY2017									
Program	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	MMBtu Savings	Lifetime Benefit	B:C Ratio
Consumer Products Low Income	$2,073,349	$0	$0	$2,073,349	16,957	3.2	0	$10,258,796	3.79
HESP Low Income	$0	$329,468	$300,000	$629,468	0	0.0	6,225	$2,020,951	0.15
Low Income Direct Install	$4,396,332	$0	$0	$4,396,332	15,848	2.4	0	$10,945,312	2.78
Total Low Income Funding	**$6,469,681**	**$329,468**	**$300,000**	**$7,099,148**	**32,805**	**5.6**	**6,225**	**$23,225,059**	**2.82**
LI as a Percent of Total Funding	**13.1%**	**10.0%**	**N/A**						
LIDI as a Percent of Program Funding	**10.0%**	**N/A**	**N/A**						

FY2018									
Program	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	MMBtu Savings	Lifetime Benefit	B:C Ratio
Consumer Products Low Income	$1,900,009	$0	$0	$1,900,009	17,397	3.2	0	$8,999,957	3.78
HESP Low Income	$0	$356,483	$300,000	$656,483	0	0.0	6,733	$2,041,582	1.27
Low Income Direct Install	$4,479,168	$0	$0	$4,479,168	16,573	2.5	0	$9,891,382	2.46
Total Low Income Funding	**$6,379,177**	**$356,483**	**$300,000**	**$7,035,660**	**33,970**	**5.7**	**6,733**	**$20,932,922**	**2.59**
LI as a Percent of Total Funding	**12.7%**	**10.0%**	**N/A**						
LIDI as a Percent of Program Funding	**10.0%**	**N/A**	**N/A**						

FY2019									
Program	Electric Budget	Natural Gas Budget	All Fuels Budget (RGGI)	Total Budget	MWh Savings	MW Savings	MMBtu Savings	Lifetime Benefit	B:C Ratio
Consumer Products Low Income	$1,771,019	$0	$0	$1,771,019	17,897	3.3	0	$8,636,458	3.78
HESP Low Income	$0	$391,711	$300,000	$691,711	0	0.0	7,342	$2,179,841	1.27
Low Income Direct Install	$5,009,564	$0	$0	$5,009,564	18,207	2.7	0	$10,573,952	2.33
Total Low Income Funding	**$6,780,583**	**$391,711**	**$300,000**	**$7,472,294**	**36,104**	**6.0**	**7,342**	**$21,390,251**	**2.52**
LI as a Percent of Total Funding	**12.1%**	**10.0%**	**N/A**						
LIDI as a Percent of Program Funding	**10.0%**	**N/A**	**N/A**						

5.7.5 Program Design

The Trust relies on a number of different program designs and delivery channels to invest funds in low-income households. Many households and efficiency measures are better suited to self-installation while others are better suited to direct install. The Trust will continue to evaluate the appropriate program design and delivery channels by measure to ensure cost-effectiveness.

Program History

From 2004 to 2011, Efficiency Maine funded an Appliance Replacement Program through MaineHousing. In this program, employees of the Community Action Agencies (also known as Community Action Program, or "CAP" agencies) metered eligible residents' refrigerators to determine their efficiency. If the refrigerators were found to be inefficient, they were replaced at no cost to the resident. The Trust launched a low-income, electric heat, multi-family weatherization program in FY2013 that considered all relevant efficiency measures. The Trust reached all eligible multi-family, electrically heated properties in the Triennial Plan II period at which point it discontinued the initiative. In FY2013, the Trust piloted an approach to leverage the funds and program management of the existing MaineHousing CHIP program, which replaces inoperable heating systems in eligible homes; the Trust provided an additional incentive to ensure that the replacement heating system was a high-efficiency model. Very few households participated in the program. The Trust discontinued that initiative in FY2014 and shifted to the direct installation of other energy efficient technologies. In FY2015, the Trust worked with CAAs to directly install ductless heat pumps, heat pump water heaters, low-flow devices, and high-efficiency bulbs in eligible homes.

In FY2012, the Trust also began a partnership with the Good Shepherd Food Bank to distribute CFLs at food pantries at no charge to customers. In FY2015, the Trust began directly distributing bulbs to food pantries.

Low Income Program funding for natural gas customers in Unitil's service territory was formerly used for weatherization of multi-family residential properties in that territory. This effort was administered directly by Unitil until FY2013. In FY2016, low-income initiatives were expanded to include single- family and multifamily properties up to four units in all Maine natural gas utility territories.

Measures Promoted

All measures incentivized for residential customers may be also eligible for inclusion in low-income initiatives, but not all measures will be cost-effective through direct installation retrofits.

When low-income customers are shopping to replace an old light or appliance that has failed, all of the high-efficiency measures that are promoted through the Trust's Consumer Products Program are also cost-effective options in the low-income setting. Moreover, the Trust assumes that in this replace on burnout situation that the customer is going to contribute all of the capital cost and labor cost associated with selecting a replacement item and installing it. In this case, the Trust need only incentivize the incremental cost of a high-efficiency model compared to a standard-efficiency model in order to achieve a cost-effective savings and help the customer lower their energy bills.

By comparison, when a low-income customer's existing lighting and appliances are currently functioning, it is assumed that the customer would maintain the status quo, and therefore would not replace the functioning equipment or incur any capital costs. In this retrofit situation, the Trust's practice has been to use the direct install delivery method, using installers under contract to select the appropriate equipment and install it, and paying 100% of the costs of the equipment and the labor. Pursuing retrofits incurs significantly more program cost than facilitating a replacement on burnout. The higher cost means that the resulting savings from a retrofit measure must be high enough to satisfy the cost-effectiveness requirement.

In recent years, screening retrofit opportunities in low-income homes, especially for measures to save natural gas or electricity, has resulted in very few measures that qualify as cost-effective. The measures that do pass this screen have tended to have a relatively high price point, such as heat pump supplemental space heaters, heat pump water heaters, or building envelope improvements. . The four main elements of the implementation strategy for this Program are:

- Consumer Product Program: The Trust uses electric efficiency procurement funds to reach income-eligible consumers who make purchases decisions at more than 400 retailers across the state including Walmart, Home Depot, Dollar Tree and other stores. The Program discounts lighting at the point of purchase and offers a rebate for heat pump water heaters, dehumidifiers and air purifiers. Studies indicate that 16% of lighting customers and 8% of appliance buyers meet eligibility for LIHEAP.
- HESP: The Trust leverages RGGI and MPRP settlement funds earmarked for weatherization of LIHEAP-eligible homes through the HESP. Low-income households receive double incentives for air sealing and insulation services using the same program structure and network of contractors that competitively install energy saving measures statewide. These customers also pay a share of the project cost, which can be financed for creditworthy customers over 10 years. HESP also will use electric efficiency procurement and RGGI funds to support installation of heat pumps; the Program will combine natural gas efficiency procurement and RGGI funds to support installation of high-efficiency natural gas furnaces and boilers and additional weatherization.

- Food pantry bulbs: Using electric efficiency procurement funds, the Trust works with food pantries across the state to distribute high-efficiency bulbs at no charge to the recipients. By way of example, more than 400,000 bulbs were distributed to low-income families through food pantries in FY2015.
- Supplementation of CAA or similar initiatives: Efficiency Maine Trust may contract with the CAA agencies or others having the capability to directly install heat pump water heaters, ductless heat pumps, or other appropriate high-efficiency measures in income-eligible homes.

Low-income initiatives will be delivered through other programs, such as Consumer Products Program and HESP, as well as delivered independently through a program delivery contractor selected through a competitive bidding process. Program design will prioritize cost-effectively identifying eligible households and installing efficiency measures. In addition, blending low-income program delivery with other market-based programs reduces administrative costs.

In the Trust's experience, a blend of low-income channels helps overcome obstacles to program participation and implementation. Direct install programs, in which 100% of the installation cost is funded, overcome the first-cost and financing barriers on the part of the customer and can be cost-effective. Nevertheless, direct install programs have significantly higher costs per project and therefore reach fewer participants. Direct install projects must include significant energy savings in order to be cost-effective. Programs with customer copays can ensure competitive project costs because of market competition, but not all customers are able to overcome first-cost barriers despite available financing. Accordingly, in cases where the Trust seeks co-pay amounts for eligible low-income customers, it will, where practical, keep the co-payments low to promote access to the programs.

Marketing

Driving demand for energy efficiency services and participation in the Trust's low-income programs requires targeted messaging to eligible homeowners. Because of the sensitivity around income information and challenges in using conventional marketing to reach low-income households, direct mailing, and outreach through traditional low-income program delivery agencies remain the most effective channels. Low-income initiatives will continue to be marketed to eligible households through partner organizations including Community Action Agencies, General Assistance Program Officers, food banks, and food pantries; the Trust's contractor network; direct mail; and cooperative marketing with utilities including low-income customers in arrears. The Trust will also drive participation in low-income programs through the statewide marketing of other Trust programs including the Consumer Products Program and the HESP.

Electric: In addition to the marketing approach described in the Consumer Products Program, in particular point-of-purchase marketing, the Trust will market measures and programs that reduce electric consumption through direct marketing. The Trust may make use of lists of LIHEAP-eligible households or may market directly with electric utilities. The Trust will continue to market with partner organizations including food pantries, in-home service providers, and other community-based organizations.

The Trust also will market directly to customers enrolled in the Arrearage Management Program. In April 2015, the Maine PUC published Rule Chapter 317 Statewide Arrearage Management Program (AMP): "This Chapter establishes a process and regulations by which each electric transmission and distribution utility shall implement an Arrearage Management Program (AMP) to assist eligible low-income residential customers who are in arrears with their electricity bills. An AMP implemented pursuant to this section is a plan under which a transmission and distribution utility works with eligible low-income residential customers to establish an affordable payment plan and provide credit towards a customer's accumulated arrears as long as that customer remains in compliance with the terms of the program" (65-407 Maine PUC Chapter 317).

For eligible customers in the AMP program, utilities will upload Standard Intake Form (or equivalent information) to the Trust's secure, cloud-based server. The Trust will then review the customer's energy use pattern over a two-year period and other characteristics provided on the intake form, and send the customer an Electricity Usage Assessment Report, energy saving tips, and information on potentially relevant programs and resources. In addition, the Trust will send the customers free measures (e.g., CFLs, low-flow showerheads, and low-flow aerators), as appropriate and if available. The Trust will also consider if the arrearage program participant is a candidate for the direct install program.

Natural Gas: The Trust will market measures and programs that reduce natural gas consumption in conjunction with marketing of the HESP. See the HESP section for a complete description. In addition, the Trust will collaborate with natural gas utilities to directly market to eligible households in the utility districts. The Trust will also directly market to eligible households currently listed as LIHEAP participants.

All Fuels: The Trust will market measures and programs that reduce consumption of all fuels, in particular heating oil, in conjunction with marketing of the HESP. See the HESP section for a complete description. In addition, the Trust will also directly market to eligible households currently listed as LIHEAP participants and collaborate with CAAs and other partner organizations.

Education and Training/Workforce Development

Some low-income initiatives will be made available through the Trust's network of Residential Registered Vendors. The Trust will provide technical information and program guidance to the vendor community. In addition, the Trust will provide education and training to organizations and offices that connect low-income households with available programs including Community Action Agencies, General Assistance Program Officers, and food banks.

The Trust has a number of educational resources on its website to help low-income Mainers reduce their energy costs including no- and low-cost energy tips, home energy calculators, case studies, and vendor locators. In addition, the Trust makes Kill-A-Watt meters available at most public libraries in Maine. The Trust will collaborate with utilities and partner organizations to share information with eligible participants, including through arrearage management programs.

Technical Assistance

The Trust will offer technical assistance to contractors and residents as needed. The Trust offers a number of educational resources on best practices and usage tips on its website. If the Trust's Quality Assurance/Quality Control process reveals opportunities for installation improvements, the Trust provides additional installation and technical support to the installation contractor.

Financial Incentives

Low-income initiatives may offer financial incentives a number of different ways. The Trust may cover 100% of all costs of the efficiency project including assessing opportunity, project management, project materials, and installation costs. Initiatives may require a co-pay from participating households and couple incentives with loans. The Trust may also make efficient products available free-of-charge as it has with high-efficiency bulbs at local food pantries. Incentives will also be offered as a markdown, rebate, or in-store coupon on energy efficient lighting, appliances and other products.

Quality Assurance/Quality Control

The Trust will conduct quality assurance inspections of 15% of the HESP and direct installation projects. The Trust requires that work be completed by contractors on the Trust's Residential Registered Vendor list. The Trust also provides material and installation specifications for energy efficient technologies installed through a direct install initiative.

In addition, the Trust relies on the quality assurance/quality control process for the Consumer Products Program and HESP for low-income initiatives blended with those delivery channels. This practice will be continued.

5.8 Renewables

5.8.1 Overview

Maine statute establishes the Energy Efficiency and Renewable Resources Fund (the Renewable Resources Fund) to be administered by the Trust.[100] It also authorizes the Trust to receive voluntary contributions into this fund for the purpose of funding renewable resource R&D, community demonstration projects of renewable energy technologies, and rebates for cost-effective renewable energy technologies.[101] This section of the Triennial Plan describes how the Trust will deploy funds that are received into the Renewable Resources Fund.

The Trust expects to receive funds from voluntary ratepayer contributions and alternative compliance payments made through the Renewable Portfolio System (RPS) by competitive electricity suppliers. The Trust forecasts that the revenues from these two sources will be approximately $50,000 annually,

[100] 35-A MRS §10121(1).

[101] Section 10121(1) of the statute also authorizes the Trust to use these voluntary contributions to promote R&D, demonstration projects and rebates for "energy efficiency" measures. The Trust finds that funding from other sources that is used for promotion of energy efficiency is reasonably likely to be adequate for the duration of this Triennial Plan. By contrast, initiatives to help increase the market penetration and use of renewable energy lack significant funding in Maine. For this reason, the Trust intends to reserve funds received into the Energy Efficiency and Renewable Resource Fund for use researching, demonstrating and deploying renewable energy technologies.

consistent with revenues received during Triennial Plan II. This level of funding is insufficient to support a rebate program. Likewise, the funding level reflects the reasoning behind the omission of training for installers of solar equipment in the Triennial Plan III.[102] This section of the Triennial Plan does not address ways that the Trust might help promote customer-sited renewables using other funding streams or in conjunction with other programs. For example, the Trust supports installation of certain renewable energy resources with its suite of home energy loans and the HESP. Details of how those other programs support renewable energy resources are addressed in those sections.

The Renewable Resource Fund in FY2015 received slightly more than $50,000 in total revenues with a similar amount forecast for FY2016. Thirty-five percent of the revenues are directed by statute to the Maine Technology Institute to help promote R&D of renewables. With the limited revenue, activities over coming years will be targeted to projects that will have the greatest impact on demonstrating the lowest cost renewable energy options with the greatest end user payback in community facilities.

The Renewable Resource Fund is also positioned to resume providing rebates for residential and commercial participants for qualified renewable energy projects. Re-launch of rebates in the Triennial Plan III period would hinge on a new revenue stream.

5.8.2 Objectives

- Simplify and enhance consumer access to technical assistance and financial incentives relating to the use of alternative energy resources
- Promote community demonstration projects and support the development and commercialization of renewable energy technologies
- Increase public information and awareness of alternative energy technologies and their benefits

5.8.3 Opportunity

Market

The market for demonstration grants are focused on Maine-based projects submitted by eligible applicants. The projects must produce energy or heat from renewable sources, including, but not limited to, PV systems, solar thermal systems, biomass systems, landfill gas to energy systems, geothermal systems, wind systems, and wood pellet systems.

Homes and businesses with rooflines or other areas that have an unobstructed, good orientation to the sun and the opportunity to displace expensive heating fuels for water or space heating are good candidates for solar hot water or hot air, and also for PV.

Through the deployment of renewable resource R&D grants and through demonstration grants, Efficiency Maine is able to increase Maine consumers' access to information regarding actual projects.

[102] 35-A MRS §10113.

In the event that a utility or the Commission determines that a specific area of the electricity grid is facing a potential reliability issue, and that the high cost of solving that reliability issue through upgrades to the transmission and/or distribution system is more costly than renewable energy capacity, the market for installing new renewables could grow significantly in the targeted area. Using either a competitive procurement process or by administering rebates, the Trust could promote installation of renewables in the targeted area so long as they cost less than the transmission/distribution option.

Renewable Technologies

This program area focuses on customer-sited, renewable energy measures. Recipients of past grants have included solar electric PV, solar hot water, solar hot air panels, and biomass resources.

Customer Market Barriers

Market barriers for renewable energy technologies include the upfront cost of the improvement, access to financing, lack of information, and lack of technical expertise in broader trades.

5.8.4 Program Design

Program History

Efficiency Maine provided rebates for between 400 to 500 installations of renewable energy technologies per year for nearly a decade. This continued until the statutory authority for the funding of the rebate program expired. Funds for the rebate program were exhausted in November 2013. At that point, In December 2011, Efficiency Maine undertook a rulemaking process authorized by the Maine Legislature to establish a modified cost-effectiveness test and selection criteria for renewable energy installation rebates and demonstration grants

Under the revised rules, Efficiency Maine provided grants for 12 Community Demonstration Grants during the 2012, 2013, and 2014 fiscal years. Project proposals were awarded based on criteria established in the 2011 rule and in the RFPs.

Measures Promoted

Eligible projects will include installations of renewable energy equipment where the project demonstrates a simple payback determined by comparing the net installation costs with the value of energy generated over the life of the equipment.

Marketing

The program of funding demonstration projects is delivered through a competitive bidding process. An RFP is issued as funding allows.

The Efficiency Maine Renewable Energy webpage will also provide relevant information and links pertaining to renewable energy technology. Program information may also be distributed through the HESP marketing initiatives (see HESP description), which may include TV and radio campaigns, print advertising, local informational forums, and brochure insertion into property tax bill mailings in participating municipalities.

Education and Training/Workforce Development

The Efficiency Maine network of Participating Energy Advisors and Registered Vendors comprises over 700 contractors, vendors, suppliers, and energy professionals who have been trained to provide support to homeowners interested in energy upgrades. Approximately 35 registered members of the vendor network have an approved credential from the North American Board of Certified Energy Practitioners (NABCEP), a nationally recognized accreditation for solar installers.

Installers of each technology must demonstrate appropriate levels of insurance and training recognized by NABCEP. Monthly webinars and technical training for participating contractors may be held throughout the year to enable them to provide better information to homeowners about renewable energy.

Projects are selected, in part, on the basis of each proposal's demonstration potential. This often includes some element of education, training or other workforce development as a deliverable of the project.

Technical Assistance

Efficiency Maine offers technical assistance to contractors and customers as needed. Each project that is funded (or financed) through Efficiency Maine programs is reviewed for consistency with best installation practices.

Financial Incentives

Grants will continue to be offered contingent on available funding to stimulate best practices and projects that demonstrate novel or niche applications. The Energy Efficiency Revolving Loan fund will continue to be available to loan funds for customer-sited renewable projects in conjunction with the objectives and procedures of the HESP.

Grants are offered on a competitive basis contingent on funding.

Quality Assurance/Quality Control

The program will continue to apply its established QA/QC process. All documentation related to projects will be reviewed prior to application acceptance. In addition, site visits will be conducted on at least 15% of all projects to verify that best practices for installation are being followed.

Projects will be monitored throughout construction. This includes reviewing invoices and conducting site visits to ensure that each project is completed according to initial design specifications. Upon project completion, a site visit will be conducted to verify project installation details.

The Program will continue to seek means of sustaining the residential and small commercial renewable energy technology installation industry in Maine. However, absent any new revenue, the rebate program will remain suspended.

An increase in revenues to this Fund would allow the Trust to offer more frequent rounds of competitive solicitations and to include demonstration of a broader array of technologies or applications. If the

increase were significant, it also could enable the Trust to promote R&D of technologies or processes shown to fill a particular need or opportunity in the Maine economy and having good potential to be incorporated into Efficiency Maine's regular incentive programs.

Finally, as noted previously, the Trust will continue to analyze situations in which renewable energy technology is able to meet the same TRC that the Trust uses to gauge cost-effectiveness for traditional energy efficiency measures. In cases where renewables can meet that test, they can be eligible for promotion through the Trust's other programs. This has been the case with biomass boilers and stoves, as well as geothermal and ASHPs in the HESP and Business Incentive Programs. In particular, as the prices of PV continue to drop, the Trust will closely track the potential cost-effectiveness of PV and other solar energy resources to determine if they can be promoted through more traditional resource acquisition programs.

6. Strategic Initiatives

6.1 Evaluation, Measurement, and Verification

6.1.1 Overview

The Trust's EM&V systems encompass systematic data collection and analysis activities relating to the Trust's programs. The Trust maintains a project database that provides a critical foundation for its EM&V efforts. The Trust's EM&V systems and protocols produce key data to inform its short- and long-term program planning and delivery decisions and reporting.

6.1.2 Objectives

- To provide data-driven research, analysis and reports to inform program design and delivery strategies, verify program results, and ensure ongoing program and organizational improvement
- To meet statutory requirements for independent evaluations
- To satisfy market rules for the sale of energy-related resources
- To continuously improve the Trust's capacity to timely and accurately track the status of efficiency projects, measure energy savings, generate reports, and maintain confidential treatment of customer information.

6.1.3 Program Design

The Trust carries out evaluation tasks through contracts with independent third-parties who specialize in the evaluation of energy efficiency programs. Program evaluations conducted by these third-parties are designed to:

- Document and verify the program impacts on energy and demand savings and program cost effectiveness relative to goals;
- Understand why effects occurred and identify opportunities for program improvement;
- Assess program effects on the energy marketplace; and
- Inform adjustments in program strategies and allocation of resources.

With a focus on delivering rigorous and objective results, the third-party contractors rely on industry-standard evaluation methods and practices to evaluate the Trust's programs. Each program evaluation typically includes collection and analysis of both qualitative and quantitative data and methods, through steps such as:

- Technical Reference Manual review
- Program staff interviews
- Customer telephone surveys
- Trade ally interviews (Qualified Partners, registered vendors, participating retailers and manufacturers)
- On-site data logging and equipment verification

- Billing analysis
- Impact factors (in-service rate, realization rates) assessments
- Net impact assessment
- Cost-effectiveness assessment
- Findings review with the program manager and program director
- Findings presentation to the Executive Director and the Board
- Reassessment of TRM measures based on evaluation results, for:
  - Savings algorithms
  - Deemed parameters
  - Realization rates
  - Free-ridership and spillover rates
- Future evaluation topics and studies prioritization

EffRT 2.0, the Trust's project database, captures data on program participants, workflow processes, efficiency measures installed, and project sites. The database enables streamlined calculation of energy and demand savings, cost-effectiveness and other metrics.

Program History

Evaluation and Verification

Chapter 35-A, Section 10104 of Maine Statute describes that the Trust shall arrange for an independent evaluation of each major program at least once every five years. The law directs that the evaluation must analyze a program's effectiveness in meeting goals and be conducted by a competent professional with expertise in energy efficiency matters.

In addition to the statutory mandate, EM&V standards and protocols are also required by the ISO-NE of all parties, including the Trust, who bid energy resources into the FCM. The FCM market rules specifically require that energy savings bid by energy efficiency program administrators (such as the Trust) into the market must comply with ISO-NE Manual for Measurement and Verification of Demand Resources (M-MVDR).

The Trust's evaluation, measurement, and verification strategy works to meet these goals as well as to provide data-driven research and analysis to inform program delivery strategies, verify program results and ensure ongoing program and organizational improvement. The Trust has traditionally conducted evaluations on a two- or three-year rotating cycle. The independent evaluation projects and associated reports completed in recent years (indicating in parentheses the year the evaluation report or study was issued) include:

- Residential Lighting Evaluation (2012)
- Retro-Commissioning Pilot Evaluation (2013)
- PACE, PowerSaver, Residential Direct Install Evaluation (2013)
- Multifamily Efficiency Program Evaluation (2014)

- Residential Appliance Rebate Program Evaluation (2014)
- Retail Lighting Evaluation (2015)
- Low Income Weatherization Evaluation (2015)
- Residential Baseline Study (2015)
- Commercial and Industrial Baseline Study (ongoing)
- Business Incentive Program Evaluation (ongoing)
- Large Customer Program Evaluation (ongoing)

Measurement

Historically, the Trust maintained separate databases to track progress for each of its programs. In large part, these databases evolved independently and varied in format and sophistication. During the First Triennial Plan period, the Trust initiated a significant effort to upgrade and transform its databases into a unified system supporting multiple programs with standardized internal processes, features, and quality. This initiative built on the foundation of the successful effRT database system that historically supported the Business Programs to create a new multi-program database effRT 2.0. During the Second Triennial Plan, the Trust integrated all active programs into effRT 2.0.

The Trust maintains TRMs that document the methods and assumptions used in calculation of energy and demand savings. The Residential TRM contains all the relevant references for savings measures promoted through the Residential Programs, and the Commercial TRM does the same for measures promoted through the program serving non-residential customers. Each TRM serves as a central repository and a common point of reference for the methods, formulas, assumptions, and sources that are used to estimate savings from energy efficiency measures. The TRMs provide a common platform for analyzing energy savings across measures and programs. For each measure, the TRM provides the following:

- An overview description of the measure and documentation of algorithms used to calculate gross energy savings and demand savings;
- Efficiency assumptions for the baseline and the efficient measure;
- Deemed parameter values or instructions for inputs to savings algorithms;
- Measure life and cost; and
- Impact factors for calculating adjusted gross savings and net savings.

EM&V activities will be conducted by Trust staff as well as independent third-party evaluators. Specific activities undertaken under the heading of EM&V will include: strategic analysis of program design and implementation; independent program evaluations; measurement and verification of energy savings and related program impacts; cost-effectiveness analysis; benchmarking outcomes to goals and targets; and assessment of energy efficiency markets and opportunities. These activities rely heavily on program data maintained by the Trust, as well as primary and secondary data collected through research efforts. In turn, research activities produce key data to inform the Trust's short- and long-term program planning and delivery decisions and to meet reporting requirements.

Key EM&V activities will include program evaluation and market research, FCM analysis and reporting, technical reference manuals, research forums, targeted research and analysis, quality assurance and quality control, and database management.

Program Evaluation and Market Research

In fulfillment of statutory requirements, at least once every five years, the Trust conducts an independent evaluation of any program having an annual budget greater than $500,000. Evaluations typically include process, impact, and cost-effectiveness components. The Trust also conducts market research to assess energy efficiency baselines and opportunities. During FY2017-2019, the Trust will conduct independent evaluations of its major programs. The Trust expects to begin issuing RFPs in FY2016 to select evaluators for independent third party program evaluations. Programs most likely to be evaluated during the Triennial Plan III period include the Home Energy Savings Program, Low Income Direct Install Initiatives, Small Business Initiative, and Distributor Lighting Initiative (Consumer Products). The Trust will also implement near real-time surveys of customers in order to reduce the length of time between purchase and program feedback. These real-time surveys will allow the Trust to act on results more quickly, and pursue more focused analysis of customer decision-making.

In addition, the Trust will implement concurrent program measurement and verification for a sample of projects including installation of metering equipment at time of measure installation, billing analysis, and rolling customer surveys. The Trust also will conduct interim program evaluations, including mid-year check-ups on new programs, in order to increase opportunities for program corrections and take better advantage of independent evaluations. During FY2019, the Trust expects to conduct a study of energy efficiency market baselines and opportunities in preparation for the fourth Triennial Plan.

Forward Capacity Market Analysis and Reporting

As a participant in the ISO New England (ISO-NE) FCM, the Trust completes specific analyses and reports, including demand resource qualification packages, measurement and verification (M&V) plans, monthly performance reports, and annual certifications of compliance with M&V Plans.

Throughout the Triennial Plan III period, the Trust will complete the various analyses, documentation and reports required for its demand resources in the FCM. The Trust will contract with an independent third party to complete the required annual verification of compliance with the M&V Plan.

Technical Reference Manuals

The Trust maintains TRMs that document the methods and assumptions used in calculation of energy and demand savings. The Trust plans to issue updated versions of its TRMs at least once per year. These updates will incorporate new measures as well as new results from program evaluations and other relevant research. The Trust intends to contract for technical support for the review and updating of the TRMs.

Research Forums

The Trust participates in selected regional and national forums, contributing to data collection, and participating in joint research studies. The Trust plans to continue its participation in the CEE's Evaluation Committee. Other opportunities will be reviewed on a case-by-case basis.

Targeted Research and Analysis

The Trust performs in-house targeted research and analysis of discrete issues and questions on an as-needed and ongoing basis. The Trust will continue its practice of conducting targeted research and analysis to support program design and delivery and to respond to requests for data. In addition, the Trust will explore the creation of a group of pre-qualified research and evaluation contractors to provide a ready source of support for ongoing research and evaluation activities to complement formal program evaluations.

Quality Assurance and Quality Control

The Trust's Evaluation, Measurement, and Verification Staff will oversee quality assurance and quality control standards across all programs. The Trust will increase quality assurance and quality control activities for all programs by increasing the frequency and number of spot checks and exception reports generated for each program. QA/QC activities will focus on verification of methodology and savings estimates consistent with the TRMs, verification that eligibility criteria are applied according to program manuals and consistent with statute and Trust rules.

Database Management

The effRT 2.0 platform supports the Trust's reporting and project activity tracking. The Trust will continue to build upon effRT 2.0 to take advantages of cost savings from streamlining administrative functions and automating processes. The platform will continue to support the Trust's reporting and project activity tracking. In addition, it will continue to support the Trust's participation in the FCM by accurately reporting incremental capacity savings on a monthly basis and better forecasting FCM bids.

6.2 Innovation

6.2.1 Overview

This program provides funding to conduct pilot projects. The Trust intends for these projects to demonstrate new types of energy efficiency, conservation or alternative energy measures or new strategies for promoting such measures. The program focuses on measures that show significant potential to be cost-effective and to provide energy savings or greenhouse gas savings but are not yet well understood or established in the marketplace. The measures piloted may or may not prove to be cost-effective or popular in the Maine marketplace. Part of the purpose of the Innovation Program is to use smaller pilot projects to generate findings of cost-effectiveness and market demand before making larger investments on incentives and program delivery.

The Trust will allocate approximately 1% of its total program budgets to the Innovation Program. The Trust will issue one or more solicitations annually to target the specific opportunities and needs for developing new program measures or designs. The Trust may, in its discretion, complement this approach by self-administering certain discreet initiatives to advance the Innovation Program objectives where to do so would be more cost-effective than outsourcing the activity.

6.2.2 Objectives

- Conduct pilot projects testing new technologies or strategies to determine their potential for advancing the Trust's purpose and goals
- Increase consumer awareness of cost-effective options for conserving energy or reducing greenhouse gas emissions
- Create more favorable market conditions for the increased use of energy-efficient products and services

6.2.3 Opportunity

The Innovation Program facilitates the early stages of market transformation. The Innovation Program is not intended to target a specific customer segment of the market. By its nature, this Program is a tool or an avenue for testing out new technologies and strategies if they show significant potential for advancing the Trust's purpose and goals, regardless of which customer sector is served. In doing so, the Innovation Program attempts to transition new products and strategies from being unfamiliar or untested to the point that they can be incorporated into the Trust's resource acquisition and carbon reduction initiatives.

Traditional market barriers facing well-established energy efficiency products or processes are even more pronounced for products or processes that are new to the market. First costs tend to be even higher for newcomers that have not generated any economies of scale. Familiarity and acceptance among vendors and their customers are lower for new technologies. In many cases, a technology or process that is new to a marketplace has difficulty demonstrating that its participation in an energy efficiency program will meet the cost-effectiveness test.

The Trust has identified several areas of interest that it intends to study through the Innovation Program. These include the following.

Interval Data and Data Analytics: Recently installed "smart meters" on the homes and facilities of electricity utility customers' have enhanced capabilities. These capabilities include the ability to capture and report electricity usage data in 15 or 60 minute intervals. In the past, utility bills for most customers were limited to monthly usage data. The old meters were sufficient to compare a customer's usage from one month to the next, or between seasons, but did not provide data that allowed customers to compare usage from a week day to a weekend, or from daytime to nighttime, or from peak demand periods to off-peak periods. Moreover, the old meters could not provide data that would allow customers to identify the "footprint" of specific end uses, such as the cycling of a refrigerator's compressor or automated lights. The data from the new meters, and the advent of sophisticated data analytics, has opened multiple new opportunities for improving the use of energy efficiency, conservation and alternative energy resources.

The Trust has an opportunity through the Innovation Program to explore ways to enhance the effectiveness of marketing of energy efficiency, conservation and alternative energy resources to customers with the assistance of interval data and data analytics. It also may move beyond marketing to pilot the application of data analytics, reviewing a customers' energy usage data, to promote and implement operational (behavioral) measures to use energy more efficiently. One example of such a use is found in "pay-for-performance" programs, where customers are given a financial incentive if they can demonstrate energy savings over a period of time by altering their operations of the building. This approach can also be used to promote peak shaving or demand response, system optimization, and the use of automated controls. A third area of opportunity for the Trust is advancing understanding of ways that interval data can be used to improve the EM&V functions surrounding efficiency, conservation and alternative energy measures and programs.

Distributed Energy Resources (DERs) and the "smart grid": A significant area of opportunity for the Trust is to explore what it can do to better help Maine's electricity consumers meet their energy needs at the lowest cost through the increased use of DERs, especially when these resources are coupled with smart grid capabilities discussed in the prior section.

DERs encompass the full range of resources that can be installed and operated on the customer's side of the meter. Using the definition of the New York Public Service Commission in its ongoing initiative called "Reforming the Energy Vision," DERs include energy efficiency, demand response (DR), and distributed generation (DG).

There is rising concern about and sensitivity to prices, grid reliability and air emissions during periods of peak demand. Expanding the use of DERs, including DR and DG, by Maine customers has the potential to significantly lower individual customers' costs while at the same time depressing peak demand prices, benefiting others on the grid. Increased use of cost-effective DERs also has the potential to improve grid reliability and reduce carbon emissions. The Trust will consider pursuing two main opportunities for experimentation, demonstration and study during the Triennial Plan period: (1) new, emerging

applications uses of smart grid capabilities to increase the value of DERs; and (2) services to enhance, report and/or market the value of the DERs delivered.

An example of a potential application of smart grid capabilities to emerging end-use equipment technology is found in heat pump water heaters. In addition to being more efficient than a standard water heater, these new units also have the capability of using two-way communications and controls that allow the heater to be turned on and off, or adjusting the water temperature, remotely. One potential pilot project under consideration by the Trust is to demonstrate the ability to remotely, or through automated controls, adjust the operations of heat pump water heaters, and to measure the costs and benefits of reducing load at a given time or place. Other forms of energy storage are also emerging and may be useful objects of pilot projects under this Triennial Plan.

The second opportunity relates to the role of the Trust and others in providing services that facilitate the expanded use of cost-effective DERs. Such services may include, but are not limited to, providing information, training, and education to the supply chain and Maine customers about various technology options, costs, and benefits associated with DERs. Services to facilitate expansion of DERs also may include marketing DERs to customers, providing financial incentives and/or financing tools for customers to purchase and install (or operate) DERs. Where DERs are supported with publicly directed funds, necessary services also will entail providing M&V of the resource. Where any part of the DERs value is being sold into a marketplace (such as the FCM, the Renewable Energy Certificate market, a carbon trading market or a Non-Transmission Alternative initiative), services needed will include M&V as well as aggregation of the resource and administration of the process to bid, deliver, and report the resource into the relevant market.

Electric Vehicles: A third emerging area of opportunity for pilot projects relates to electric vehicles (EVs). If the market penetration of EVs increases significantly, this could have potential implications for the grid reliability, energy storage and demand response, and greenhouse gas emissions in Maine. Central Maine Power has initiated a pilot program to raise awareness about EVs. Efficiency Vermont has conducted studies on the comparative efficiency of different types of charging equipment and techniques.

Financing Strategies: A fourth area of opportunity for pilot projects relates to the design and marketing of financing tools for Maine customers seeking to purchase and install cost-effective equipment to deliver energy efficiency, conservation or alternative energy resources. Currently, the Trust has a small portfolio of standard loan products. Under this Triennial Plan, the Trust may consider experimenting with more refined financing products, such as leasing arrangements or unsecured micro-loans, to better serve the needs of customers while also appropriately managing risk from the Trust's perspective.

6.2.4 Program Design

Program History

In the Triennial Plan II period, the Trust selected three pilot projects to explore how customers' interval data from their electricity utility could be used to find efficiency and conservation opportunities.

The Trust worked with four businesses that held portfolios of 15 to 60 buildings each in the Building Portfolio Pilot. The pilot reviewed the portfolios managed by each business and identified buildings within the portfolio representing the highest energy saving opportunities by performing a remote energy audit on those buildings using interval data and proprietary data analytics. The team then followed up on a selection of remote audits with on-site audits. The pilot explored how interval data could enable building portfolio managers to manage energy consumption in a geographically dispersed building portfolio, as well as target energy efficiency measures. The pilot also confirmed that the remote audits using interval data and analytics proved to be very accurate when compared to the findings of on-site audits in a majority of buildings, and therefore have the potential to serve as a low-cost, faster alternative for future analysis of savings opportunities.

A second pilot — the Building Type Pilot — involved reviewing the interval data for 65 school buildings. The pilot selected the 25 schools for a remote audit using interval data and proprietary data analytics. Results of the audits were reviewed with each school's building manager via webinar. The webinars allowed the schools to see in-depth information about their energy usage. This included how the school compared to other schools, what drove the school's energy usage and energy usage patterns. For example, reviewing the interval data allowed some schools to see electricity usage during off-hours and when the building was only in partial use. This data indicated significant energy efficiency opportunity in lighting retrofits, lighting controls and HVAC scheduling.

A third pilot — the Smart Thermostats Pilot — installed 100 smart thermostats in a diverse group of the Trust's commercial customers including office buildings, convenience stores, and retail outlets. The smart thermostats displayed interval data in addition to traditional temperature control settings and were able to be accessed remotely. Using a proprietary online interface with the smart thermostats, customers were able to monitor or adjust the temperature and humidity, set the thermostats to automatically turn on and off, and monitor changes in electrical consumption. Pilot participants found these units to be an easy way to control energy usage without expensive climate control or building automation systems. The online tools also let customers view their interval data along with the temperature settings.

Measures Promoted

Eligible measures include any commercially available energy efficiency, conservation or alternative energy technology that meets the targeted criteria specified in the Trust's request for proposals and is consistent with any limitations or requirements of the revenue source that funds this program. Eligible measures typically must show that they can meet the Trust's cost-effectiveness test, on paper, and that if the pilot project is successful, that the measure has a strong likelihood of graduating into the Trust's regular program offerings. In the case of pilot projects awarded funding through the RGGI Fund, it may alternatively be necessary to demonstrate that the measure can, on paper, credibly and cost-effectively achieve greenhouse gas reductions.

The program may, on occasion, also promote limited demonstration projects for near-commercial technologies that show substantial energy savings opportunities for the state.

The program may also promote demonstration and analysis of varying program designs to help shape the ultimate program design of a full-fledged program in the Trust's portfolio.

Marketing

Throughout the Triennial Plan period, the Trust will provide outreach and networking efforts with existing public and private organizations. Given the significant opportunities represented by enhancing use of utility interval data and smart grid capabilities, the Trust expects to work closely with electric utilities in marketing future Innovation Program pilots. The Innovation Program will use competitive solicitations to screen and select pilot programs for commercialized products or new ways of delivering cost-effective measures. The fund will seek to leverage the efforts of other agencies and organizations.

Education and Training/Workforce Development

Projects bid into the competitive solicitations may include an education and training component. However, the main purpose of the Program is to demonstrate a piece of technology or a process or program design. If it is successful, the main opportunity for education and training will follow after the pilot.

Technical Assistance

Technical assistance is typically not a feature of a pilot project.

Financial Incentives

Financial assistance will be determined through the competitive solicitation process. Certain projects may offer financial incentives to customers to promote uptake of a product or process, while other projects may simply seek the Trust's investment of a portion of the costs to install the product or implement the process and then measure and report on the results.

Quality Assurance/Quality Control

Quality control features will be determined through the competitive solicitation process. If a pilot project is seeking to demonstrate a particular program design for future consideration by the Trust, QA/QC features will generally be used and tested as part of that demonstration. If a pilot is testing a particular product or process, the steps by which the results will be measured, analyzed, verified and shared should be provided in the bidder's proposal and memorialized in the contract deliverables. The Trust will maximize the use of utility interval data to help measure, verify and analyze the results of pilot projects.

6.3 Public Information and Outreach

6.3.1 Overview

The Trust targets potential customers through tailored marketing and outreach campaigns across its various programs. These efforts are complemented by the Trust's work to provide general energy information and education to help consumers considering the installation of energy efficiency measures. Through Public Information and Outreach initiatives, the Trust seeks to help boost energy savings through increased general awareness of the benefits of cost-effective, customer-sited energy resources and of specific efficient technologies, operating practices and behaviors, as well as basic guidance in how to access Efficiency Maine programs. In addition, the Trust requires appropriate licenses and certifications of trade allies and occasionally provides training opportunities to reduce market barriers to workforce development.

6.3.2 Objectives

- Increase consumer awareness of cost-effective options for conserving energy, using energy more efficiently, or using more alternative or renewable energy, as well as for financing these measures
- Create more favorable market conditions for the increased use of energy-efficient products and services
- Provide general information about the benefits of energy efficiency and distributed renewable or alternative energy
- Provide tools and resources to support the energy efficiency decision-making process including best practices, usage tips, calculators, purchasing guides, and vendor locators
- Increase access to technical training on best practices in marketing, installing and maintaining energy upgrades to maximize energy savings, cost-effectiveness and customer satisfaction

6.3.3 Opportunity

This activity is aimed at consumers and contractors or suppliers serving both the residential and business sectors.

Among the major barriers to energy efficiency is a lack of information about energy-saving options, and misinformation in the minds of homeowners, business owners, and ratepayers that energy efficiency is cost-prohibitive, inconvenient or ineffective. An additional challenge exists where home or business owners self-diagnose energy problems and solutions outside of their expertise. Relatively technical energy issues and solutions can prove challenging for customers to sort out, as can competing claims by suppliers and vendors, creating additional barriers to customer action.

6.3.4 Program Design

Program History

Since the inception of Maine's DSM programs and the establishment of Efficiency Maine, raising awareness about the benefits of efficiency and the options for taking advantage of efficiency has been a core activity. In the Triennial Plan I period, Public Information and Outreach initiatives shifted from broadcast media and printed material awareness campaigns to more cost-effective use of the website and digital ads, as well as workshops or conferences to address specific, targeted needs. Also in prior years, considerable emphasis was placed on informing students in K-12 classrooms about where electricity comes from and how it is made, and promoting the concept of conservation. In Triennial Plan I, the Trust reduced funding for the K-12 activity and shifted the focus to energy-saving projects including a pilot project that was funded to teach students, teachers, and facility managers about ways to save energy at their own schools.

In 2011, the Trust launched the "Save Like a Mainer" campaign, which used case studies and testimonials to highlight Maine homeowners, communities, and businesses that had undertaken successful energy efficiency initiatives. This campaign showed how efficiency is achievable and beneficial. The case studies provided specific energy- and money-saving information.

In 2013, the Trust invested in a new website and, since that time, has developed a number of consumer-focused web tools including a lighting savings calculator, vendor locator, heating system comparison tool, and virtual tour of energy-saving household technologies. The Trust has increased its presence on social media and has found Facebook and Twitter to be effective communication channels. While the Trust continues to share information at workshops, fairs, conferences, and trade shows, educational efforts have increasingly focused on digital resources that will reach out directly to potential customers of efficiency upgrades. As these digital resources have become more robust, the Trust has invested resources in customer service representatives that are available for customers who prefer over-the-phone support.

The Trust also has provided trainings and scholarships to overcome workforce development market barriers. For example, in Triennial Plan I the Trust collaborated with community colleges to develop weatherization and energy auditing curricula and provide discounted training to the growing residential energy efficiency workforce. Since that time, the Trust has offered customer service, sales, and marketing training to contractors who connect customers with Trust programs. More recently, the Trust has offered scholarships for advanced heat pump training to support the contractor community in effectively adopting best practices for installing this new technology.

Measures Promoted

This initiative does not pay incentives for the installation of energy efficient devices. Rather, it funds educational resources, workshops, or courses that present and discuss the benefits of energy efficiency and the options for pursuing energy efficiency or distributed renewable and alternative energy systems. The activities funded range from organizing or participating in workshops and conferences, to creation and delivery of written materials, to developing web tools or digital resources.

Marketing

Over the Triennial Plan II period, the Trust brought "in-house" the production of several Public Information and Outreach efforts. The Trust may use a competitive bidding or selection process to execute parts of the Public Information and Outreach plan.

During the period of the Triennial Plan III, the Trust will seek to build on the growing awareness of energy efficiency, managing energy costs through energy efficiency, and Efficiency Maine programs. The Trust will continue to communicate with various Maine audiences through digital, print, and video case studies; website and digital technologies; social media; seminars, symposia, and forums; workshops and trainings; print and television media; and other vehicles that make our programs and information accessible to Mainers statewide.

The Trust will evaluate how general Public Information and Outreach efforts may support more targeted customer communication made possible by interval data and control equipment. For example, a general public information campaign may accompany a Non-Transmission Alternative initiative in a specific geographic area. Similarly, customers who receive a rebate for a programmable thermostat may also be invited to receive energy saving tips or demand response alerts.

The Trust's marketing efforts are largely focused on educating potential customers about a specific energy efficient technology or energy-saving solution executed through a specific program area. However, the Trust may from time to time undertake general energy efficiency marketing campaigns or educational initiatives the scope of which extends beyond any one of the channel-specific programs.

Technical Assistance

As with marketing, technical assistance is typically discussed in the context of a specific program, such as the Commercial and Industrial Prescriptive Program or the Home Energy Savings Program. However, the Trust will continue to develop resources that are generally available and support customers in making energy efficiency investments. These resources may include web tools, educational videos, or information disseminated in-person or electronically. The Trust will continue to fund training programs for energy efficiency contractors when workforce development needs arise. In recent years Trust programs have provided technical support to and required training of contractors working with energy efficient technologies. The Trust also has provided discounted trainings for customer service, sales, and marketing and scholarships for advanced ductless heat pump installation courses. When training needs are specific to a program, training efforts will be coordinated as part of the program delivery, for example, advance lighting control training could be offered to Qualified Partners through the Commercial and Industrial Prescriptive Program; training or information needs that cut across the industry such as advanced ductless heat pump installation, could be handled through this program.

Financial Incentives

Financial incentives are typically not a feature of the Trust's Public Information and Outreach programs. However, in at least one case the Trust has offered scholarships and training discounts to energy

efficiency contractors and facility managers participating in a training curriculum on the use of new, high-efficiency equipment. Use of scholarships will be used to promote the objectives of this initiative as needed and as budgets allow during Triennial Plan III.

Quality Assurance/Quality Control

The following measurement tools will be considered when gauging the success of Public Information and Outreach initiatives:

- Web hits (number of unique visitors, time, bounce rate)
- Frequency of energy efficiency and customer success stories in the media
- Social media followers and participation
- Survey instruments
- Frequently Asked Questions and inquiries directed towards the Trust's website and toll-free number
- Course and workshop participation rates and participant assessments
- Program participation rates