FINAL REPORT

Assessment of Energy-Efficiency and Distributed Generation Baseline and Opportunities

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EXECUTIVE SUMMARY

Background

Efficiency Maine Trust (Trust) has been established to serve as an independent entity guiding and administering energy efficiency and alternative energy programs in Maine. In July 2012, the Trust entered the final year of its first Triennial Plan. This study serves as the first step in developing the Trust's second Triennial Plan.

Study Scope

This report assesses energy-efficiency and distributed generation resources for Maine. The study covers 2012–2021, encompassing the residential, commercial, and industrial sectors, and focusing on providing reasonably reliable estimates of technical, economic, and maximum achievable potential.

Baseline Data Collection

To ensure the reliability of this study's results, baseline research collected field data on building and electric equipment characteristics in Maine's commercial and industrial (C&I) sectors. Data from these surveys provided the basis for developing up-to-date assessments of current market conditions, regarding important variables, such as saturations of various electric end uses and current saturations of energy-efficient equipment and combined heat and power (CHP) applications.

Summary of Results

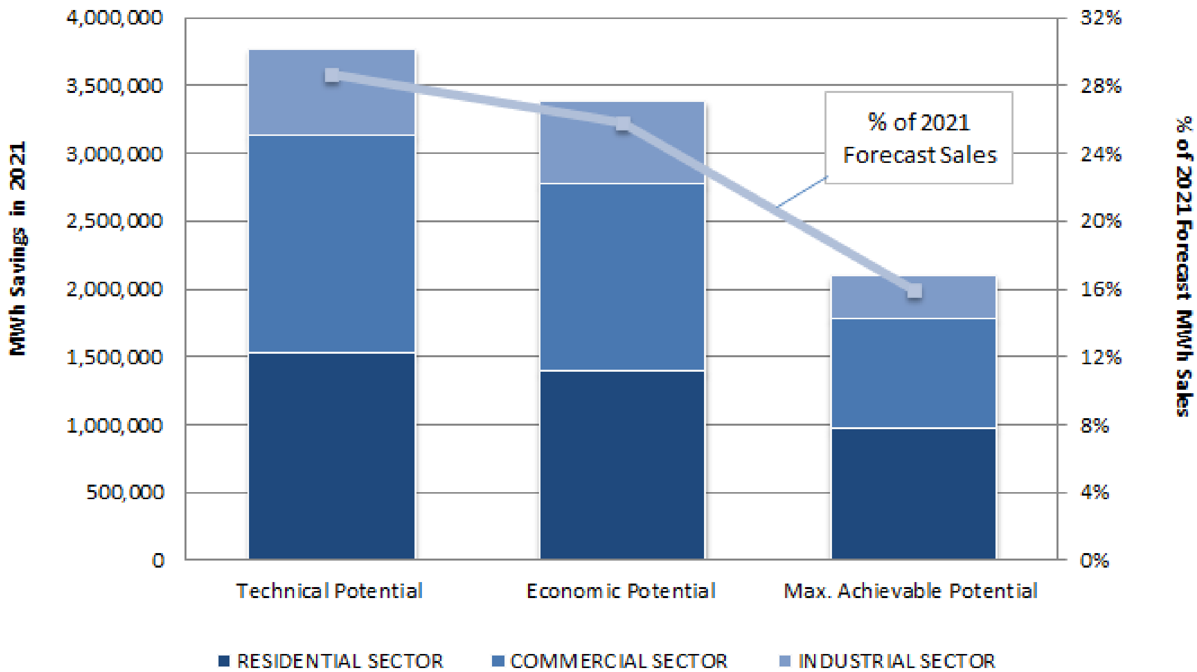
Energy Efficiency

Study results indicate cumulative technical potential of nearly 3.8 million MWh through 2021. Approximately 2 million MWh of savings reasonably could be achieved, using an aggressive acquisition scenario. The estimated maximum achievable potential equals 16% of the 2021 load forecast (Table ES-1 and Figure ES-1). The majority of achievable potential (46%) occurs in the residential sector. Commercial and industrial savings, respectively, account for 39% and 15% of the maximum achievable potential.

Table ES-1. 2021 Electric Energy-Efficiency Potential by Potential Type and Sector

Sector	Technical Potential 2021 (MWh)	Economic Potential Energy (MWh)	Maximum Achievable Potential 2021 (MWh)	Maximum Achievable Potential as a Percent of 2021 Sales
Residential	1,521,890	1,388,392	964,389	18%
Commercial	1,607,407	1,380,145	816,357	18%
Industrial	639,637	639,637	318,007	10%
Total	3,768,934	3,408,174	2,098,753	16%

Figure ES-1. 2021 Electric Energy-Efficiency Potential Summary



Assuming a constant acquisition rate, the identified maximum achievable potential represents approximately 1.6% of annual sales over the 10-year planning period. This is just slightly lower than the top annual savings rate of 1.64% for Vermont as reported by the American Council for an Energy Efficient Economy (ACEEE) in its 2011 State Energy Efficiency Scorecard.[1]

Distributed Generation

This assessment addressed three types of distributed generation resources: photovoltaics, customer-sited wind, and CHP. Of those, only the following CHP technologies proved cost-effective from the total resource cost perspective:

- Biogas-fueled:
  - Gas turbine and microturbine
  - Reciprocating engine
- Biomass-fueled steam turbine
- Natural gas-fueled:
  - Gas turbine
  - Reciprocating engine

Table ES-2 summarizes 10-year achievable potential for all distributed generation resources. Natural gas and biomass CHP units offer the largest share of CHP potential. However, due to

[1] State Energy Efficiency Scorecard, American Council for an Energy Efficient Economy, October 2011, Report Number E115, p. 17.

the substantial contributions of CHP units, these results may be sensitive to the number of CHP units installed.

Table ES-2. CHP Achievable Potential

Fuel	Number of Installations	Total Capacity (kW)
Natural gas	18	5,611
Biomass—paper/wood waste	2	6,160
Biogas—dairy farm	1	554
Biogas—landfill	1	156
Total	22	12,481

Uncertainties

Inherently, conservation potential studies are complex, requiring large amounts of data from multiple sources, and making many technical assumptions over long time periods. Thus, the study results (and, generally, results from any study of this nature) should be considered best estimates, in light of future uncertainties.

Organization of this Document

This report has been organized into seven sections:

- Section 1, following this summary, provides an introduction to the study.
- Section 2 describes the overall methodology for estimating technical, economic, and maximum achievable potential.
- Section 3 describes the market baseline study and its results, as used in estimating technical potential.
- Sections 4 through 6 describe derivations of technical, economic, and maximum achievable potential.
- Section 7 describes CHP potential methods and results.

Appendices A through C provide technical material related to data collection and measure assumptions.

INTRODUCTION

Background

Efficiency Maine Trust (Trust) has been established as an independent entity to guide and administer energy-efficiency and alternative energy programs in Maine. In July 2012, the Trust entered the last year of its first Triennial Plan. This study serves as the first step in developing the second Triennial Plan.

Study Scope

This report assesses Maine's energy-efficiency and distributed generation resources. The study covers 2012–2021, encompassing the residential, commercial, and industrial sectors, and focusing on providing reasonably reliable estimates of technical, economic, and maximum achievable potential. Figure 1 shows the relationships among the three, following types of potential:

- **Technical potential:** Savings realized upon applying energy-efficiency measures passing the qualitative screening in all feasible instances, regardless of cost.
- **Economic potential:** A subset of technical potential, utilizing measures deemed cost-effective from the Total Resource Cost (TRC) perspective, without regard to cross-subsidies.
- **Maximum achievable potential:** Savings feasibly achievable through program and policy interventions. This maximum achievable potential assumes that combining very high incentive levels (such as 100% of incremental costs) with well-designed programs (characterized by aggressive marketing, education, and outreach) generally would result in an 80% overall measure penetration rate.

Figure 1. Illustration of Energy-Efficiency Potentials

Note: Solely for illustrative purposes, Figure 1 has been adapted from the Environmental Protection Agency National Action Plan for Energy Efficiency (EPA-NAPEE) Guide for Conducting Energy Efficiency Potential Studies.

Baseline Data Collection

To ensure the reliability of this study's results, baseline research collected field data on building and electric equipment characteristics in Maine's commercial and industrial (C&I) sectors. Data from these surveys provided a basis for developing up-to-date assessments of current market conditions regarding important variables, such as saturations of various electric end uses and energy-efficient equipment and CHP applications.

Uncertainties

As complex undertakings, conservation potential studies require large amounts of data from multiple sources, and include many technical assumptions, addressing long time periods. Thus, results from this (and, generally, all studies of this nature) should be considered in light of future uncertainties. For example, the market acceptance rate provides a key determinant of potential for achievable energy-efficiency savings. Market acceptance, however, depends on difficult-to-predict behavioral factors, involving high uncertainty levels.

Estimated impacts of efficient technologies on energy consumption provide another key determinant of savings potential; yet these inputs also present uncertainty. While efficient technology options can be defined reasonably well in the near term, customer behaviors and electricity usage patterns vary widely, and can differ significantly from assumptions made to model "typical" usage profiles.

Future years may experience greater uncertainties due to insufficient information about emerging technology choices and upcoming codes and standards improvements. Consequently, the availability and magnitude of future impacts inherently must be considered speculative.

METHODOLOGY

This section describes the overall methodology used to conduct the energy-efficiency potential study, and explains general steps and methods used at each stage of the analytical process, which produced the various estimates of energy-efficiency opportunities presented. The report notes specific methodology differences between sectors. The final chapter presents methodologies and results for the study's distributed generation component.

Energy-Efficiency Potential Methodology

Measure Characterization

This study's measure portfolio only includes measures with some technical feasibility for implementation, either by substituting for or being applied to existing technologies on a retrofit or market-driven basis. In this context, "market-driven" refers to equipment replacements made normally in the market, as equipment reaches the end of its effective useful life.

For this study, retrofit measures have been limited to applications of supplemental measures (such as adding low-flow devices to showerheads or increasing insulation levels), and do not include early replacements of operational equipment.

In calculating a measure's cost-effectiveness, all measures have been treated *independently*; that is, measure savings have not been reduced or otherwise adjusted for overlaps between competing or interacting measures. By analyzing measures independently, assumptions cannot be made regarding combinations or orders in which they might be installed in buildings. This approach evaluates energy-efficient technologies on their own merits, and does not unfairly exclude one measure in favor of another.

In developing overall potential electricity savings estimates, however, the analysis took steps to account for interactive effects of measures designed to impact the same end use. Cumulative savings potential cannot be estimated by adding savings from each individual savings estimate, as this would result in double-counting some savings. For example, if a home or building improved air leakage rates, overall space heating and cooling consumption in the building would decrease. Consequently, remaining energy savings potential derived from more efficient heating/cooling equipment would be reduced.

Interactive adjustments have been addressed by ranking efficiency measures, and adjusting baseline consumption of subsequent measures by savings derived from preceding measures. Generally, measures have been ranked by cost-effectiveness. In most instances, retrofit measures, which can be implemented at any time, have been assigned priority over replace-on-burnout measures.

Where two or more technologies competed for the same electric end use in a home or business (such as high-efficiency storage water heaters, heat pump water heaters, and solar water heating in a home), analysis assigned a percentage of the available population to each measure. If a competing measure did not prove cost-effective, homes or businesses assigned that measure were transitioned to the cost-effective alternative (if available).

Number of Measures

Overall, the energy-efficiency analysis across all three customer classes (residential, commercial, and industrial) included 245 unique measures. After adjusting for different housing/building types, building characteristics, and efficiency tiers, thousands of measure permutations were considered. This report's results sections provide a more detailed breakout of measures by end use for each customer class.

Table 1. Distribution of Measures by Customer Class

Sector	Number of Unique Measures
Residential	37
Commercial	127
Industrial	81

Prescreening limited the analysis only to electric-efficiency measures currently available commercially. Thus, the analysis did not include emerging technologies or technologies with extremely low market availability.

Sources Used for Measure List Development

Lists of electric energy-efficiency measure lists drew upon the latest version of the Maine Residential and Commercial Technical Reference Manuals (TRMs) and other measures currently (or planned to be) offered through Trust programs. As necessary, these measures were supplemented to include other technology areas of interest to the Trust.

Sources Used for Measure Assumptions

Estimating savings potentials for individual energy-efficiency measures or programs—across the residential, commercial, and industrial sectors—requires significant data. Thus, the study expended considerable effort in identifying, reviewing, and documenting all available data sources.[2]

This allowed development of reasonable assumptions, for each measure, regarding the following attributes:

- Measure lives;
- Installed incremental and full costs (where appropriate); and
- Electric savings.

Savings

Estimates of annual measure savings as a percentage of base equipment usage drew upon a variety of sources, including:

2 This report's appendices provide complete data sources the study used to obtain up-to-date data on measure costs, savings, and useful lives.

- Existing technical references manuals;[3]
- Building energy modeling software and engineering analyses;
- Secondary sources, such as the American Council for an Energy-Efficient Economy (ACEEE), Department of Energy (DOE), Energy Information Administration (EIA), ENERGY STAR®, and other technical potential studies; and
- Program evaluations conducted by the Trust as well as by other program administrators and utilities.

Measure Costs

Measure costs represent the energy-efficiency measure's costs, which typically include installation costs, expressed as incremental measure costs (the difference between a standard and high-efficiency measure) or full measure costs (entire costs to install the measure).

This study held nominal measure costs constant over time, an assumption made as many measure costs (e.g., compact fluorescent lamps [CFLs]) have declined over time, while other measure costs have increased (e.g., fiberglass insulation). Residential screw-in LED lighting costs present an exception: while currently ~$30 per bulb, their costs likely will decrease rapidly over the next decade. (Some studies predict LED bulb costs will decline by 50% over the next several years, and will continue to fall to $5.00 per bulb by 2020.) Given these significant forecasted price reductions during the study period (2012–2021), the analysis accounted for expected decreases in LED bulb costs over time.[4]

Measure cost estimates typically drew from the following sources:

- Existing TRMs;
- Secondary sources (such as ACEEE, ENERGY STAR, and other technical potential studies);
- Retail store pricing and industry experts; and
- Program evaluation reports.

Measure Life

Measure life represents energy-using equipment's expected number of years (or hours) of operation (this may also be called expected useful life [EUL]). Measure life estimates drew upon:

- Existing TRMs;
- Manufacturer data;
- Savings calculators and life-cycle cost analyses from ENERGY STAR and DOE;

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3 TRMs used for this study include: Maine, Mid-Atlantic, Vermont, Massachusetts, Pennsylvania, Ohio, and Rhode Island

4 Northeast Energy Efficiency Partnerships. March 2012.*Northeast Residential Lighting Strategy*. Presentation.

- Secondary sources (such as ACEEE, ENERGY STAR, and other technical potential studies);
- The California Database for Energy Efficient Resources database; and
- Program evaluation reports.

Baseline and Efficient Technology Saturations

To assess available energy-efficiency savings, current saturations of baseline equipment and energy-efficiency measures had to be estimated. Up-to-date measure saturation data primarily derived from recent Trust program evaluation reports as well as from on-site audits conducted through this study for C&I facilities. Other equipment saturation data sources included:

- Utility appliance saturation survey data;
- Regional efficiency program evaluation reports; and
- 2009 EIA Residential Energy Consumption Survey.

Potential Analysis

Potential studies often distinguish between three different types of efficiency potential: technical, economic, and achievable. As key definitional differences occur between studies, it is important to understand the definition and scope of each potential estimate type, as applied to this study.

Figure 2. Types of Energy-Efficiency Potential

SOURCE: EPA-NAPEE, Guide for Conducting Energy Efficiency Potential Studies (for illustrative purpose only).

The first two potential types—technical and economic—provide a theoretical upper bound for energy savings. Technical potential estimates total savings assuming installation of all technically feasible measures. Economic potential—a subset of the technical potential—only includes cost-effective measures, based on the TRC perspective. However, not even the best-designed program portfolio will likely capture 100% of the economic potential. Therefore, achievable potential attempts to estimate:

- What realistically may be achieved;
- When it might be captured; and
- How much it would cost to do so.

The existing analysis did not include a fourth potential scenario: program potential.

Technical Potential Methodology

As noted, technical potential represents 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 efficiency measures). Often, this is estimated as a “snapshot” in time, assuming immediate implementation of all technologically feasible energy-saving measures, with additional efficiency opportunities assumed as they arise from activities such as new construction.[5]

Approach for the Residential Sector

To calculate the potential of energy-efficiency measures or a set of measures, this study used a “bottom-up” approach for the residential sector. This approach began with savings and costs associated with replacing one piece of equipment (measure) with its efficient counterpart. Savings potential was calculated by multiplying values for one measure by the number of measures available for installation throughout the program’s life. Often the preferred method of potential estimation in the residential sector, the bottom-up approach provided better data availability and greater homogeneity in building and equipment stock to which measures could be applied.

Figure 3 shows the core equation used in the residential sector potential analysis for each individual efficiency measure.

Figure 3. Core Equation for Residential Sector Technical Potential

Technical Potential of Efficient Measure	=	Total Number of Households	X	Base Case Equipment End Use Intensity [kWh/unit]	X	Base Case Factor	X	Remaining Factor	X	Applicability Factor	X	Savings Factor

Where:

- Base Case Equipment End Use Intensity = annual electric consumption (kWh) used per customer, per year, by each base-case technology in each market segment. This provides the consumption of electric-using equipment that efficient technology would replace or affect.

5 *National Action Plan for Energy Efficiency*. “Guide for Conducting Energy Efficiency Potential Studies.” page 2-4.

- Base Case Factor = the fraction of an end use applicable for an efficient technology in a given market segment. For example, for residential water heating, this would represent the fraction of all residential customers with electric water heating in their households.
- Remaining Factor = the fraction of applicable dwelling units not yet converted to the high-efficiency measure; that is, one minus the fraction of households already having the energy-efficiency measure installed.
- Applicability Factor = the fraction of applicable units technically feasible for conversion to the efficient technology from an *engineering* perspective (e.g., it may not be possible to install CFLs in all light sockets in a home, as CFLs may not fit in every socket).
- Savings Factor = the fraction of electric consumption reduced by applications of the efficient technology.

Approach for the C&I Sector

Developing technical potential estimates for the C&I sector utilized a "top-down" approach, as this sector contains many different building types, with various equipment stocks. The study team chose analytical models designed to accommodate the lack of detailed end-use C&I saturation data. This approach built an energy-use profile, based on sales estimates by business segments and end uses. Energy-efficiency measure savings factors could then be applied to applicable end-use energy estimates, after making assumptions regarding fractions of sales associated with inefficient equipment and the technical/engineering feasibility of each energy-efficiency measure.

For the C&I sector, savings estimates per base unit (e.g. per square foot or per widget) were determined by comparing high-efficiency equipment to:

- Currently installed equipment for existing construction retrofits; or
- Current equipment code standards for replace-on-burnout and new construction scenarios.

Figure 4 shows the core equation used in the C&I sector technical potential analysis for each individual efficiency measure.

Figure 4. Core Equation for Commercial/Industrial Sector Technical Potential

Technical Potential of Efficient Measure	=	Total End Use kWh Sales by Market Segment	X	Base Case Factor	X	Remaining Factor	X	Applicability Factor	X	Savings Factor

Where:

- Total end-use kWh sales (by segment) = the forecasted electric sales level for a given end use (e.g., space heating) in a commercial or industrial market segment (e.g., office buildings).
- Base Case factor = the fraction of end-use energy applicable for the efficient technology in a given market segment. For example, with fluorescent lighting, this would be the

fraction of all lighting kWh in a given market segment associated with fluorescent fixtures.

- Remaining factor = the fraction of applicable kWh sales associated with equipment not yet converted to the electric energy-efficiency measure; that is, one minus the fraction of the market segment with energy-efficiency measures already installed.
- Applicability factor = the fraction of the equipment or practice technically feasible for conversion to the efficient technology from an *engineering* perspective (e.g., it may not be possible to install variable-frequency drives (VFDs) on all motors in a given market segment).
- Savings factor = the fraction of electric consumption reduced by application of the efficient technology.

Economic Potential Methodology

Economic potential refers to the subset of technical potential that is economically cost-effective, compared to conventional, supply-side energy resources. Both technical and economic potential present theoretical numbers, assuming immediate implementation of efficiency measures, without regard for the gradual "ramping up" process of real-life programs. The assumption of immediate implementation also ignores market barriers (to ensure actual implementation). Finally, economic potential only considers costs of efficiency measures, and does not consider programmatic costs (e.g., marketing, analysis, or administration) necessary to capture markets.

In practice, most technical and economic potential estimates are similar, as many analysts prescreen possible efficiency technologies and practices for cost-effectiveness, and, in the interest of conserving time and effort for other analysis, future analysis excludes measures not found cost-effective.

In calculating economic potential, cost-effectiveness is evaluated using the TRC test, which includes costs such as total program costs paid by the program administrator and participants,[6] and increases in energy supply costs during periods when loads increase. Thus, the test includes all costs (regardless of who pays them) for equipment, installation, operation and maintenance, removal (less salvage value), and administration.[7]

In the TRC test, benefits include avoided electric supply costs for periods when electric load reduction occurs, and savings of other resources, such as fossil fuels and water. Avoided supply costs are calculated using net program savings (savings net of energy-use changes that would have happened in the program's absence).

Maximum Achievable Potential Methodology

Maximum achievable potential describes economic potential achieved over a given time period, following the most aggressive program scenario (e.g., providing end users with payments for

6 California Public Utilities Commission. October 2001. *California Standard Practice Manual, Economic Analysis of Demand-Side Management Programs and Projects*. Page 18.

7 Non-incentive or administrative costs were excluded during measure-level cost-effectiveness screening, and were included only for estimates of achievable potential.

entire incremental costs of more efficient equipment). In contrast to economic potential, maximum achievable potential accounts for barriers hindering consumer adoption of energy-efficiency measures (such as: financial, political, and regulatory barriers; administrative and marketing costs associated with efficiency programs; and the capability of programs and administrators to ramp up activity over time).

For this study, which primarily adopted a replace-on-burnout approach for replacing standard-efficiency equipment with high-efficiency technologies, the energy-efficiency measures' eligible market has been limited each year to measures expected to reach the end of their useful life (and thus be targeted for replacement).

For example, if a measure has a 20-year useful life, only half of the existing units would be expected to burn out during a 10-year time frame, and only one in 20 would be eligible for replacement annually. For retrofit applications (such as insulation), the study assumed all non-efficient measures would become eligible over the study period, regardless of measure lifetimes.

For computing maximum achievable potential, the analysis assumed combining very high-incentive levels with well-designed programs and aggressive, marketing, education, and outreach generally would result in an 80% overall measure penetration rate.

In the C&I sectors, analysis assumed 80% target penetration for replace-on-burnout measures could be achieved immediately, due to Maine's existing network of program allies, and their relationships with C&I businesses. For C&I retrofit measures, however, a ramp-up period was assumed, due to significant costs associated with adding insulation to an existing facility.

In the residential sector, given its lack of a trade ally network and purchasing decisions not always based on cost-effectiveness, penetration was assumed to ramp up over the next three years from existing levels, achieving 80% target penetration of annual eligible measures by 2014.

BASELINE ASSESSMENT

Purpose of Baseline Assessment

Baseline research helps utilities and other energy-efficiency program administrators, such as the Trust, make informed decisions about energy end uses and equipment that can be targeted most readily and cost-effectively through energy-efficiency programs.

For example, baseline research can be used to characterize types of energy-consuming equipment installed in homes or businesses. Resulting data can validate program-planning assumptions, and prove useful in evaluating any remaining energy-savings opportunities, once programs have been established.

According to the National Energy Efficiency Best Practices Study's *Portfolio Best Practices Report*:[8] "Objective baseline research reinforces the credibility of the portfolio and its underlying programs with diverse stakeholders and improves the accuracy of savings estimates, cost-effectiveness calculations, and goals."

For this study, the baseline assessment focused on the collection of primary field data regarding building and electric equipment characteristics in Maine's C&I sectors. Data collected from C&I site surveys informed assessments of energy-efficiency opportunities in Maine, providing key, energy-efficiency potential assessment inputs (such as saturations of various electric end uses), and the percentage of certain, already energy-efficient equipment. The on-site survey process served to provide data on energy-efficiency attitudes of businesses in Maine, and provided information on distributed generation.

Based on our prior energy-efficiency potential study work in Maine, and on our knowledge of available residential baseline data (including evaluation reports, socket surveys, and utility appliance saturation surveys), the baseline assessment of the residential sector built upon secondary data, and residential on-site surveys were deemed unnecessary for this study.

Sample Design and Recruitment

The C&I baseline assessment's on-site survey sample drew from two general, sample populations:

- All commercial business; and
- All industrial facilities.

This commercial customer population was segmented into subsectors, including all building types in the population sample, though, for sample design purposes, the industrial sector was not segmented further.

8 http://www.epa.gov/cleanenergy/documents/suca/napee_chap6.pdf

Overall, the sample design process sought to achieve the highest possible survey precision level, given project budget constraints. The resulting sample reflected the following information, drawn from prior Maine potential studies:

- The commercial sector represents a large percentage of overall C&I opportunities.
- Offices and retail represent the key segments in the commercial sector.
- Lighting, HVAC, and refrigeration represent the dominant commercial end uses.
- Refrigeration consumes a major portion of electricity in groceries and restaurants.

The final sample, composed of 103 commercial sites and 30 industrial sites, resulted in the following precision levels:

- Overall Commercial: 90/10 (90% confidence that results are accurate, with a ±10% margin of error).
- Overall Industrial: 90/15.
- Other Key Commercial Segments: ≈ 90/20.
  - Grocery
  - Office
  - Restaurant
  - Retail

The survey recruitment process began by assigning a random number to each customer on the sample population list. By following the list in order of assigned random numbers, customers were contacted until the sample goal could be attained for each subsector. Due to limited time for completing the study, customers contacted were:

- Scheduled for the on-site survey;
- Left a voice message; or
- Removed from the list, due to: lack of contact, no interest, wrong numbers, or other factors.

Customer outreach continued down the list until appointments were secured for the full on-site survey complement.

Survey Design and Implementation

The C&I on-site data collection's baseline survey instrument covered all relevant energy aspects of customer facilities and business, including:

- Building size;
- Building envelope information (such as wall and window sizes, and insulation levels); and

- Inventories of electric energy-using equipment (including lighting, HVAC, water heating, refrigeration, cooking, office equipment, motors, air compressors, and other types of process equipment).

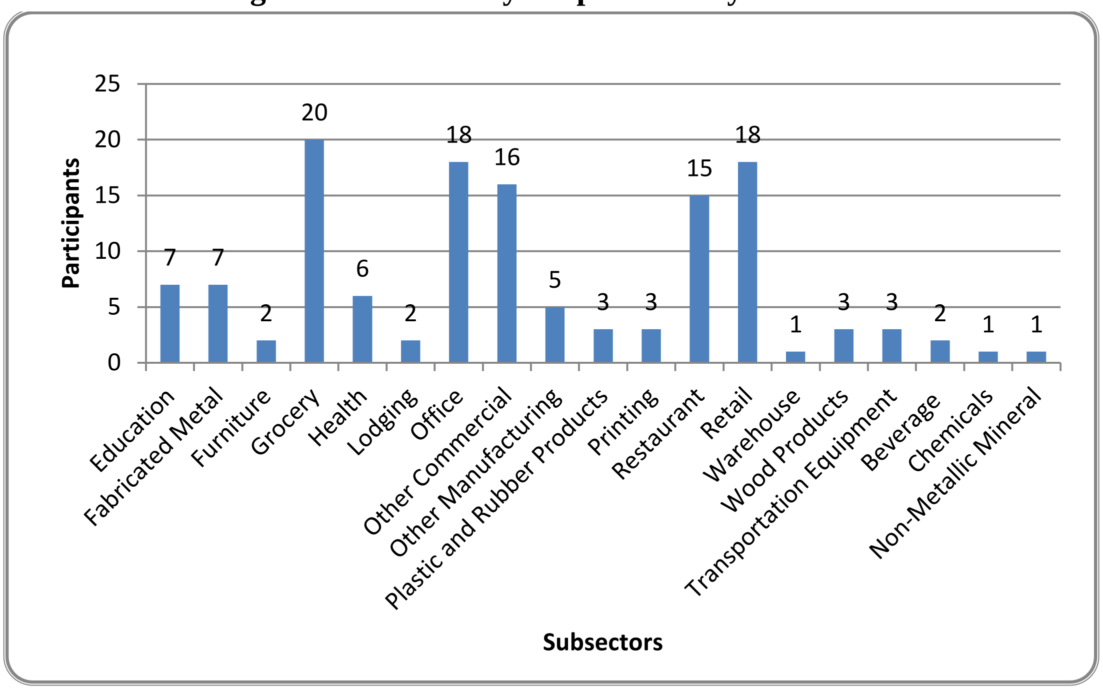
The baseline survey also included questions addressing customers' energy-efficiency attitudes regarding energy-efficient equipment purchases, while probing for customers' familiarity with distributed generation, and their interest in pursuing it at their current locations.

During on-site visits, surveys were completed using computer tablet technology (Appendix A provides a hard copy of the survey instrument). Completing surveys for commercial customers generally took one to two hours, and completing surveys for industrial customers generally took two to three hours.

Survey Respondent Profile

Figure 5 breaks down the completed on-site surveys (with 133 C&I customers surveyed).

Figure 5. C&I Survey Respondents by Subsector



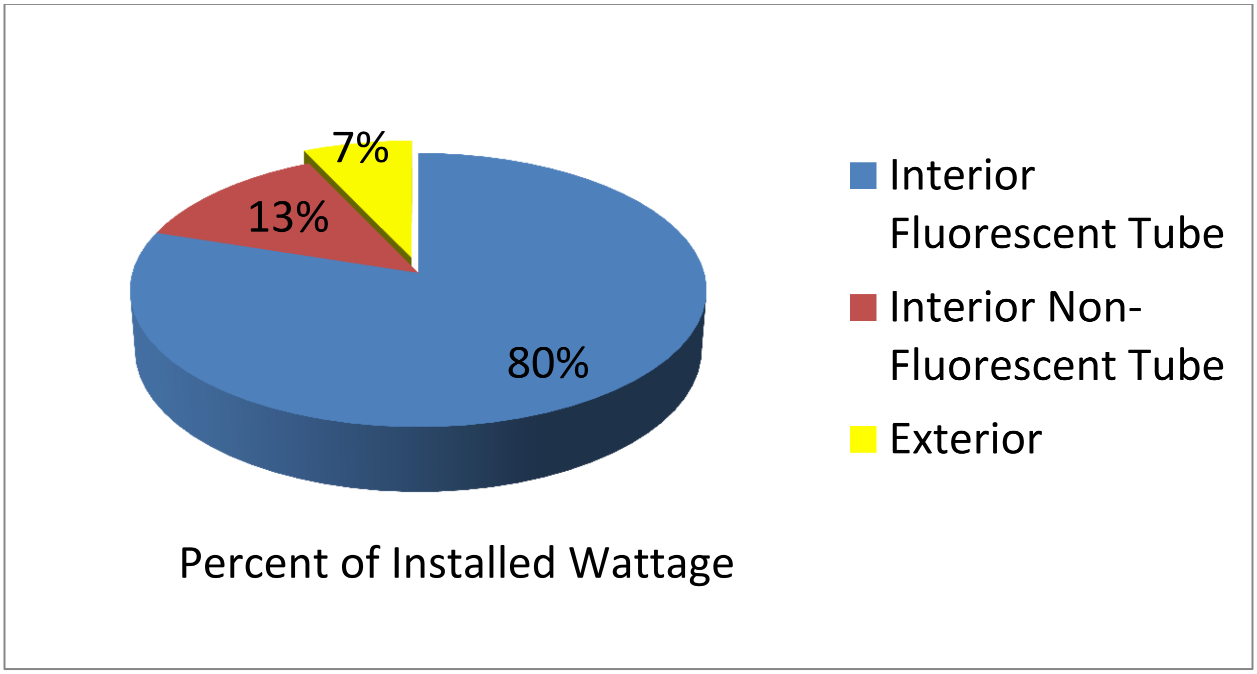
Key Observations

As discussed, the C&I baseline assessment primarily sought to collect data that could be used for assessing energy-efficiency opportunities in Maine, within project budget limitations. As such, this report does not present a full analysis of all site survey data collected. Rather, it focuses on key observations drawn from site survey data used as inputs to develop energy-efficiency potential model inputs for the C&I sector. This section presents these key observations. Appendix B provides frequencies for responses to all survey questions.

Lighting

As shown in Figure 6, interior lighting comprised 93% of commercial lighting, as measured by connected wattage, with interior fluorescent tubes (at 80%) representing the largest total of installed wattage.

Figure 6. Commercial Lighting Breakdown



As shown in Figure 7, interior, non-fluorescent tubes (such as metal halides) proved much more prevalent in the industrial sector, representing 46% of the total installed wattage.

Figure 7. Industrial Lighting Breakdown

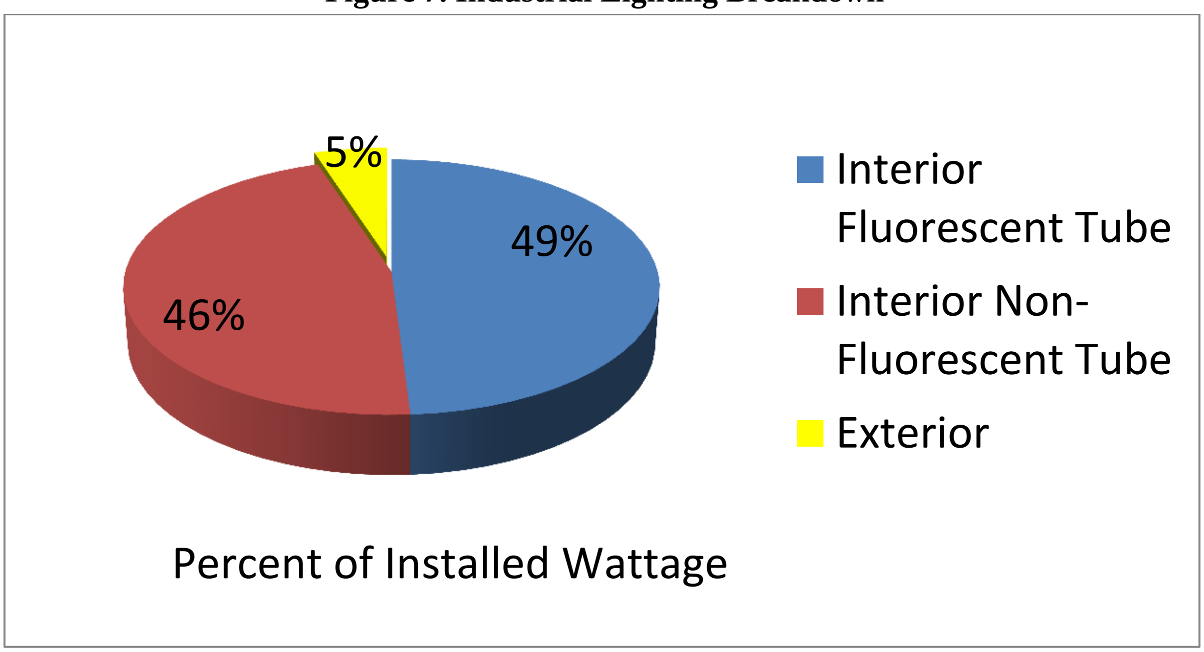
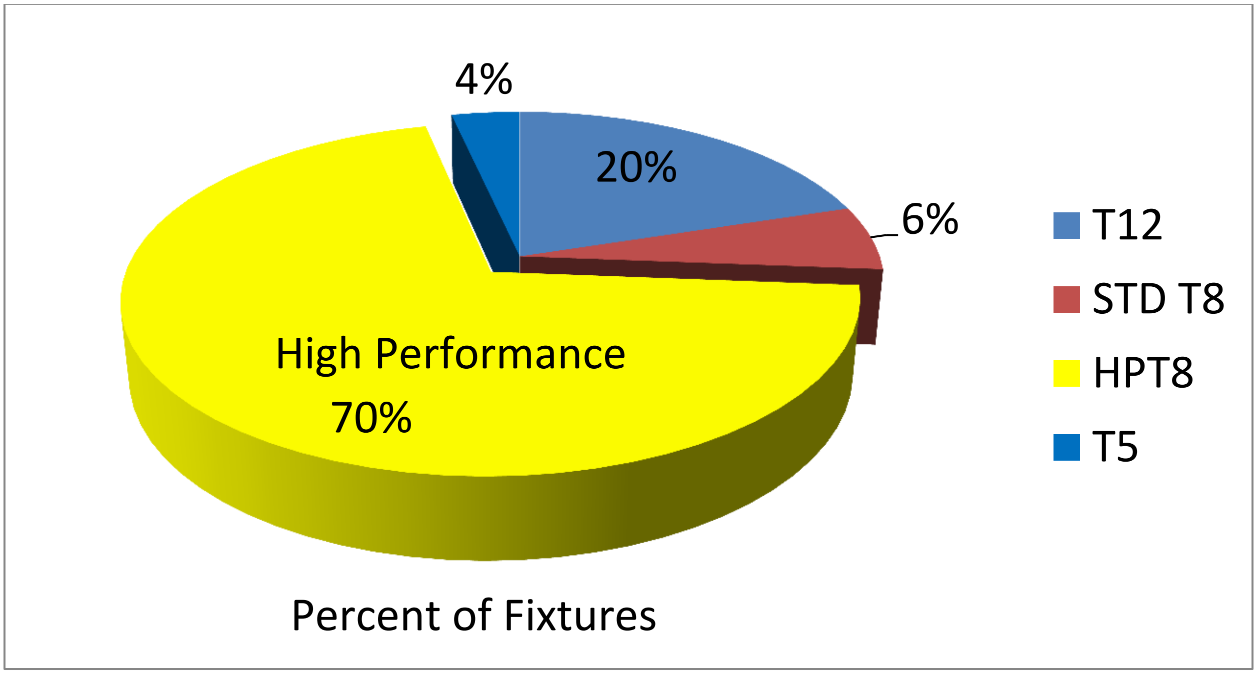


Figure 8 shows efficient, interior, fluorescent tube lighting (in the form of High Performance T8s [HPT8]) has penetrated a large share (70%) of Maine's C&I market. This suggests incentives offered to businesses by the Trust for replacing T12 lighting with HPT8 lighting have been effective, and have led to market transformation for fluorescent tube lighting. Some opportunities remain to replace existing T12 lighting with HPT8 lighting, and to replace standard T8 lighting with reduced-wattage HPT8 lighting.

Figure 8.Interior Fluorescent Tube Lighting

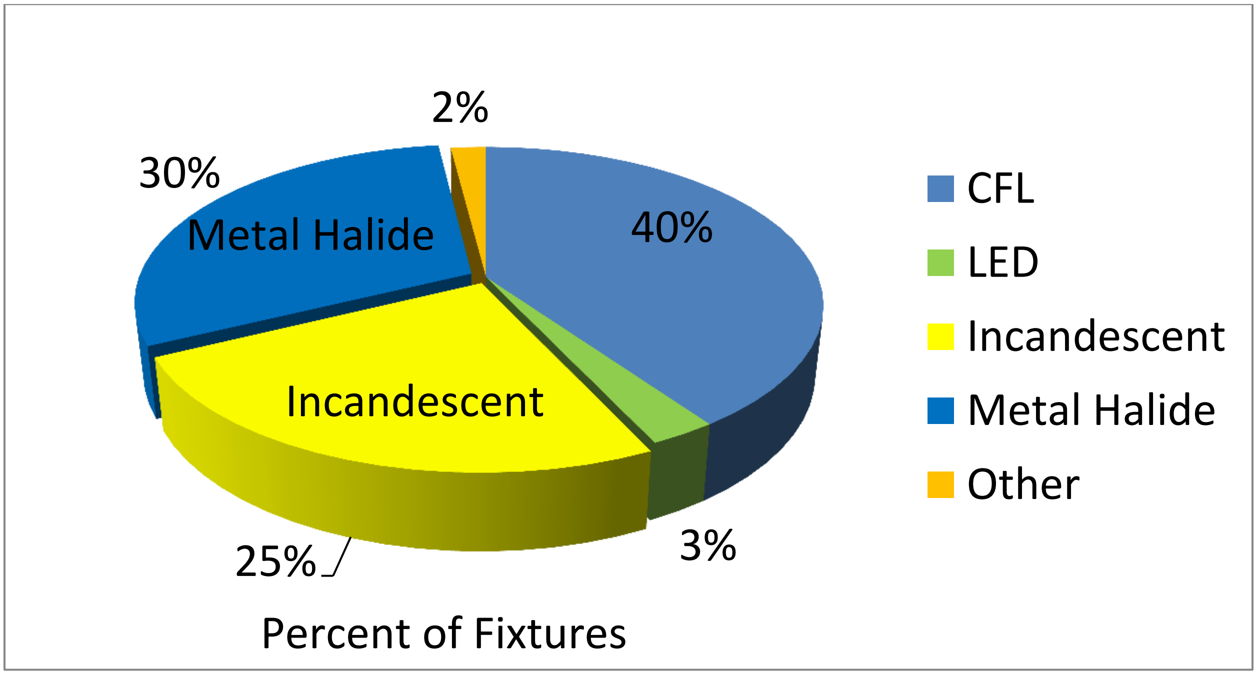


Interior, non-fluorescent tube lighting includes:

- CFLs
- Metal halide lighting
- Incandescent lamps.

At 40%, CFLs represented the largest share of interior, non-fluorescent tube fixtures. This suggests long-running CFL incentives and buy-downs offered by the Trust's Business Program have been effective. At 3%, LED lighting, which had been more recently added to the Trust's Business Program with a prescriptive lighting incentive, has just started to penetrate the interior, non-fluorescent lighting market for Maine's businesses.

Figure 9. Interior Non-Fluorescent Tube Lighting



Through on-site surveys, the study team found lighting controls represented significant savings opportunities in Maine's C&I market, as shown in Figure 10. In commercial buildings, 92% of lighting wattage was uncontrolled, while, in industrial facilities, 85% was uncontrolled. Despite significant opportunities, it should be noted controlling 100% of lighting does not prove feasible, given building occupancy and use characteristics, technical limitations, and safety issues.

Figure 10. Uncontrolled Lighting in C&I Facilities

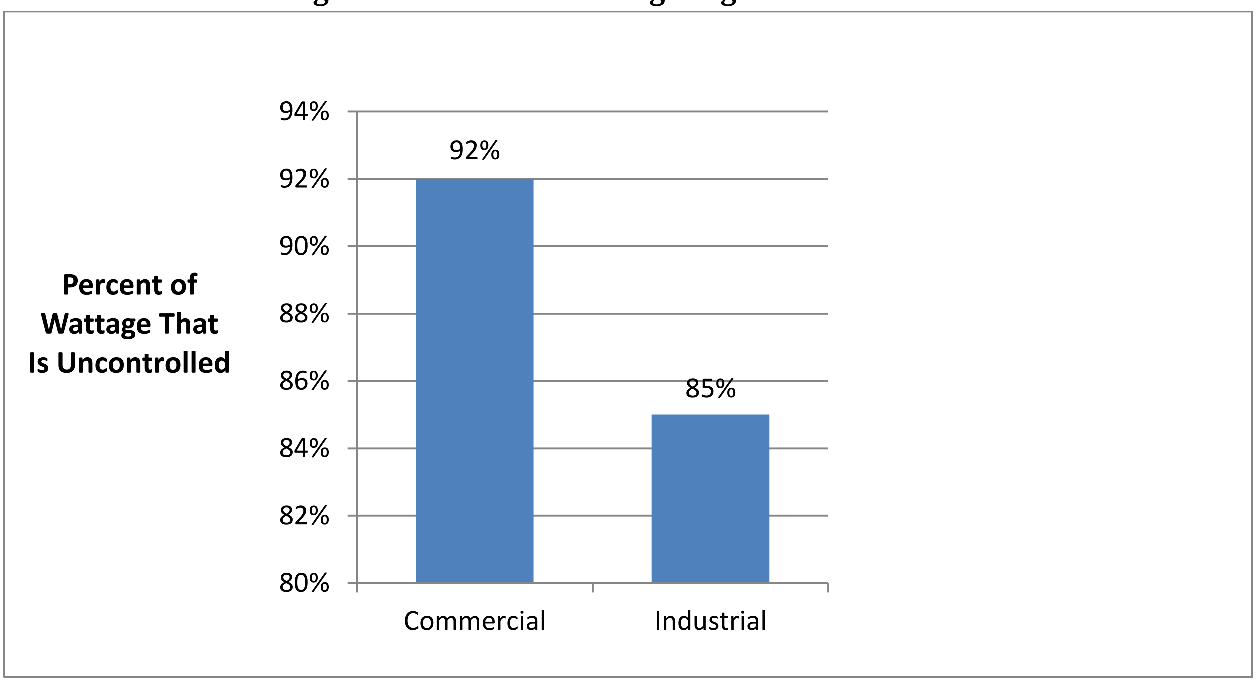
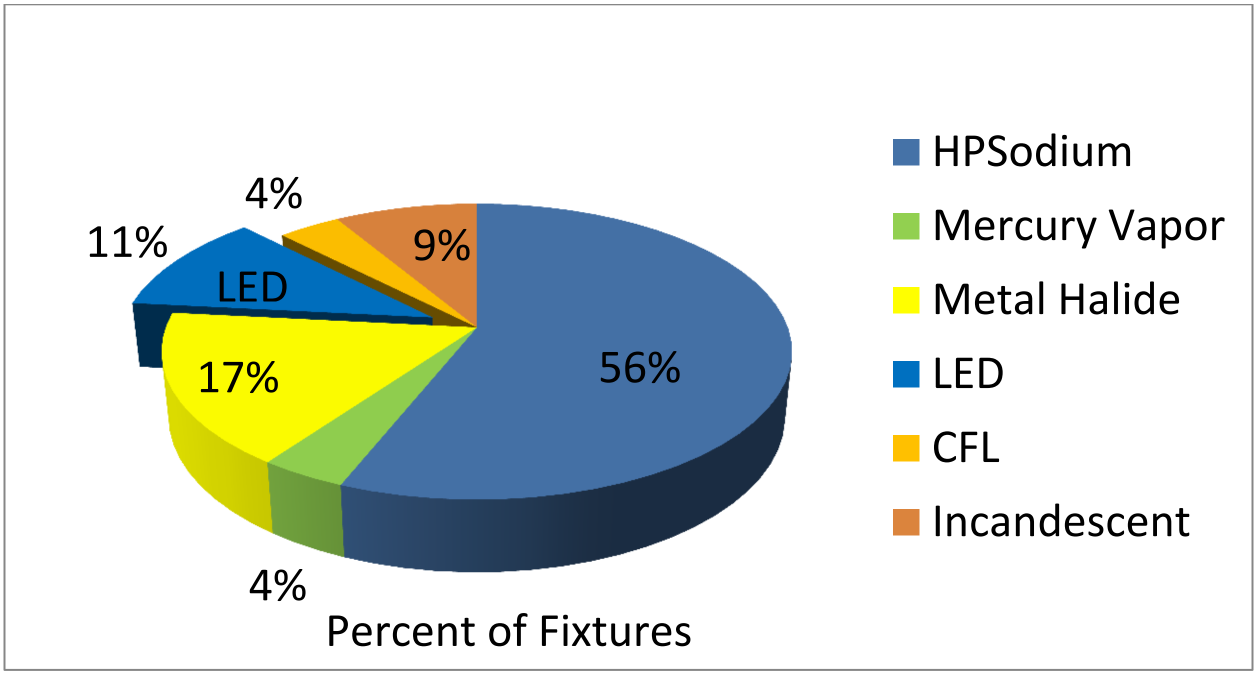


Figure 11 presents distributions of exterior lighting at C&I facilities by lighting type. LEDs have started to penetrate the exterior business lighting market, which partly may be due to significant incentives the Trust offered for LED wall packs, outdoor area fixtures, and parking garage fixtures.

Figure 11. Exterior Lighting



Cooling

Table 2 presents findings regarding installed cooling systems in C&I facilities (based on numbers of units, not unit capacities). While window A/C systems are most prevalent units (32% of installed units), they represented a much smaller portion of installed capacity.

Table 2. Types of Installed Cooling Systems

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

Other key survey findings regarding energy-efficiency measures impacting HVAC equipment include:

- 21% of facilities used programmable thermostats.
- 9% of facilities, where economizers are potentially applicable, used outside air economizers.
- 8% of facilities had energy management systems.
- 11% employed VFDs on cooling fans.
- 27% of facilities with duct work had duct-sealing processes performed.
- 64% of ducts were insulated.

Refrigeration

Table 3 presents findings on self-contained refrigeration units (based on numbers of units, not on unit capacities). As shown, glass door refrigerators commanded a dominant market share (42%) of all installed, self-contained refrigeration units.

Table 3. Types of Self-Contained Refrigeration Units

Type of Unit	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%

Other key survey findings regarding energy-efficiency measures affecting self-contained refrigeration include:

- Fluorescent tubes comprised 96% of refrigeration lighting; LEDs made up 4%.
- 12% of applicable refrigeration units had door heater controls or zero energy doors.
- Each of the following measures were installed on 4% to 5% of refrigeration units:
  - Efficient fan motors
  - Fan motor controls
  - Defrost controls

Table 4 shows percentages of remote refrigeration units with energy-efficiency measures installed. Energy-efficient compressors (Discus and Scroll) and heat recovery water heating measures were most commonly installed, at 17% and 16%, respectively.

Table 4. Saturation of Remote Refrigeration Energy-Efficiency Measures

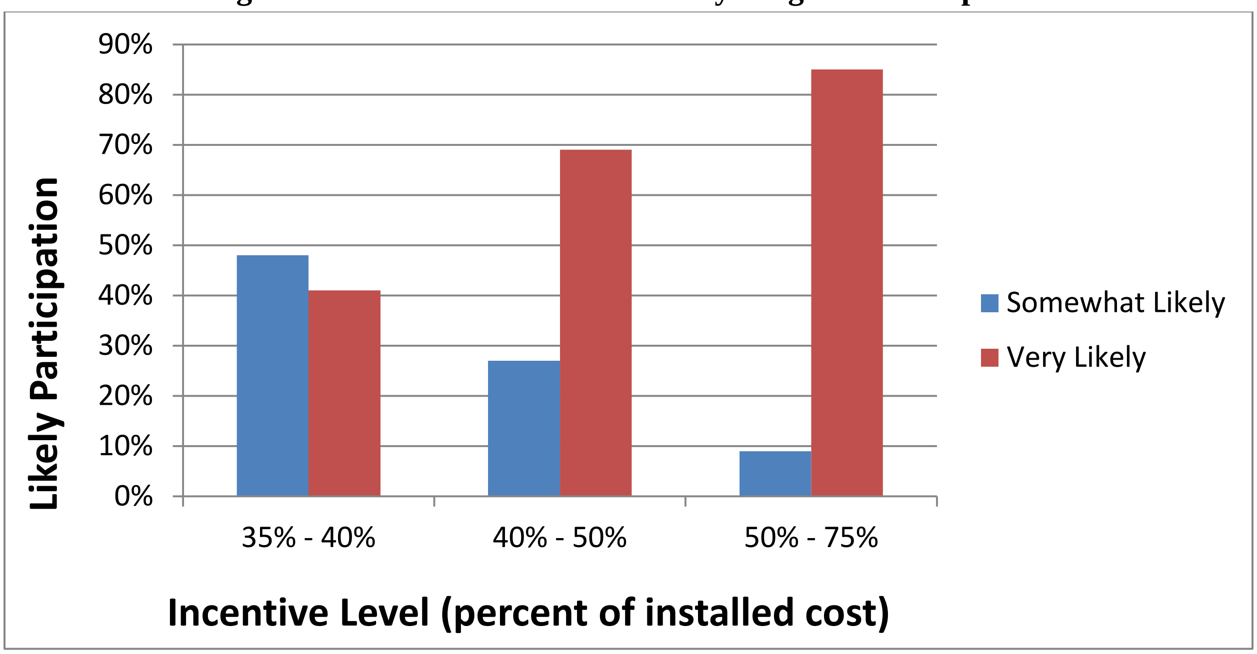
Type of Measure	Saturation (Percent of Refrigeration Units)
Discus & Scroll Compressors	17%
Pressure Controls	4%
Heat Recovery Water Heating	16%
High-Efficiency Fan Motors	4%
Condenser Fan VSD	2%
High-Efficiency Pump Motors & VSDs	2%

Energy-Efficiency Decision Making

In addition to collecting baseline equipment information, the study asked business owners and managers about factors they considered in making investment decisions regarding energy-efficient equipment, with incentives available and payback criteria the two key decision factors commonly reported.

Figure 12 shows the likelihood of program participation at different incentive levels, stated as a percentage of installed equipment costs. Higher incentives (ranging from 35%–40% of installed costs, to 50%–75%) were associated with higher reports of "very likely" participation among businesses.

Figure 12. Incentive Levels and Likely Program Participation



A majority of Maine's businesses (58%) stated they considered the payback period when making decisions regarding energy-efficient equipment. Of these businesses, 72% required payback periods under three years. Table 5 shows payback criteria businesses used when considering energy-efficiency investment decisions.

Table 5. Energy-Efficiency Investment Payback Criteria

Payback Criteria	Percent*
Less than 1 year	5
Less than 1.5 years	5
Less than 2 years	27
Less than 3 years	35

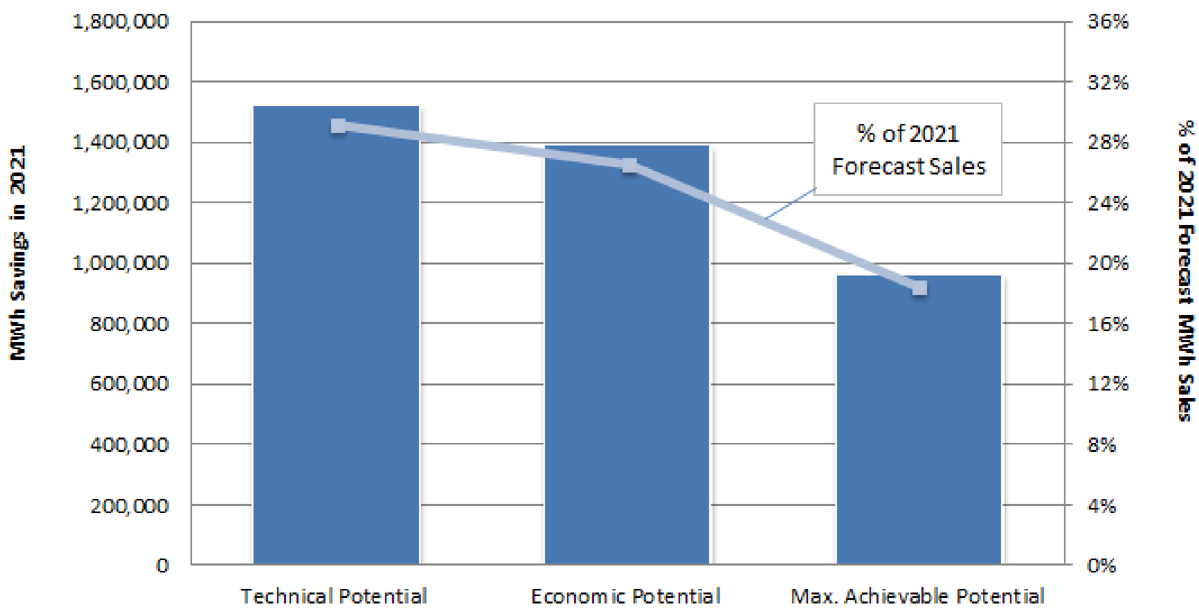
*Of businesses considering payback.

RESIDENTIAL ENERGY-EFFICIENCY POTENTIAL

Summary of Assessment Results

Figure 13 summarizes technical, economic (based on the TRC test), and maximum achievable savings potential in the residential sector in Maine by 2021. The maximum achievable potential estimate primarily was based on a market penetration scenario, targeting installation of energy-efficient equipment in 80% of the remaining eligible market by 2021.

Figure 13. Summary of Residential Energy-Efficiency Potential



Per the data shown in Figure 13, large potential remains for electric energy-efficiency savings in the residential sector. If targeted market penetration for all remaining, eligible, cost-effective measures could be achieved over the next decade, maximum achievable potential for residential electric savings by 2021 would be: 964,389 MWh, or approximately 18% of forecasted residential MWh sales in 2021.

Measures by End Use

Table 6 lists residential, electric-efficiency technologies (by end use) this analysis considered. Appendix C provides savings, useful life, costs, and equipment saturations associated with each measure.

Table 6. Residential Sector Electric Energy-Efficiency Measures by End Use

End-Use Type	End-Use Description	Measures/Programs Included
Appliances	ENERGY STAR Appliances	• ENERGY STAR Clothes Washers & Dishwashers • ENERGY STAR Dehumidifiers • ENERGY STAR Refrigerators & Freezers • Refrigerator/Freezer Pick-Up/Recycling
Consumer Electronics	Home Electronics	• Controlled Power Strips • Internal Power Supplies, Laptops, Computer Monitors • Efficient Televisions
Lighting	Interior/Exterior Lighting	• Specialty and Standard CFL Bulbs • LED Screw-In Lighting • Efficient Indoor/Exterior Fixtures
Water Heating	Domestic Hot Water	• Efficient Storage Tank WH • Heat Pump WH • Solar WH w/ Electric Back-Up • Tank & Pipe Wrap • Low Flow Showerheads & Faucet Aerators
HVAC Envelope	Building Envelope Upgrades	• Improved Attic, Wall, & Floor Insulation Levels • ENERGY STAR Windows • Improved Air Sealing & Duct Sealing
HVAC Equipment	Heating/Cooling/Ventilation Equipment	• Existing Central AC Tune-Up • Efficient Central AC Systems • Efficient Room Air Conditioners • Ductless Mini-Split Heat Pumps • Efficient Furnace Fans • Whole House Ventilation Fans
Other	Miscellaneous Efficiency Upgrades	• Two-speed or Variable Speed Pool Pump Motor

Technical and Economic Potential Savings

Technical potential represents savings that could be captured if 100% of inefficient electric equipment was replaced instantaneously (where technically feasible) with alternative, high-efficiency equipment. As shown in Table 7, Maine's residential sector has total *technical potential savings* of: 1,521,890 MWh, or 29% of forecast residential MWh sales in 2021.

Table 7. Residential Electric Technical Potential Savings by End Use

End Use	2021 Energy (MWh)
Lighting	440,074
Water Heating	277,928
Appliances	234,387
Electronics	213,295
HVAC (Equipment)	177,294
HVAC (Envelope)	122,210
Other	56,703
Total	1,521,890
% of Annual Sales Forecast	29%

As shown in Table 8, *economic potential* in the residential sector is 1,388,392 MWh in 2021. Economic potential assumes 100% installation of all eligible cost-effective measures. At this analysis stage, the economic potential only excluded measures found not cost-effective, based on the TRC Test.

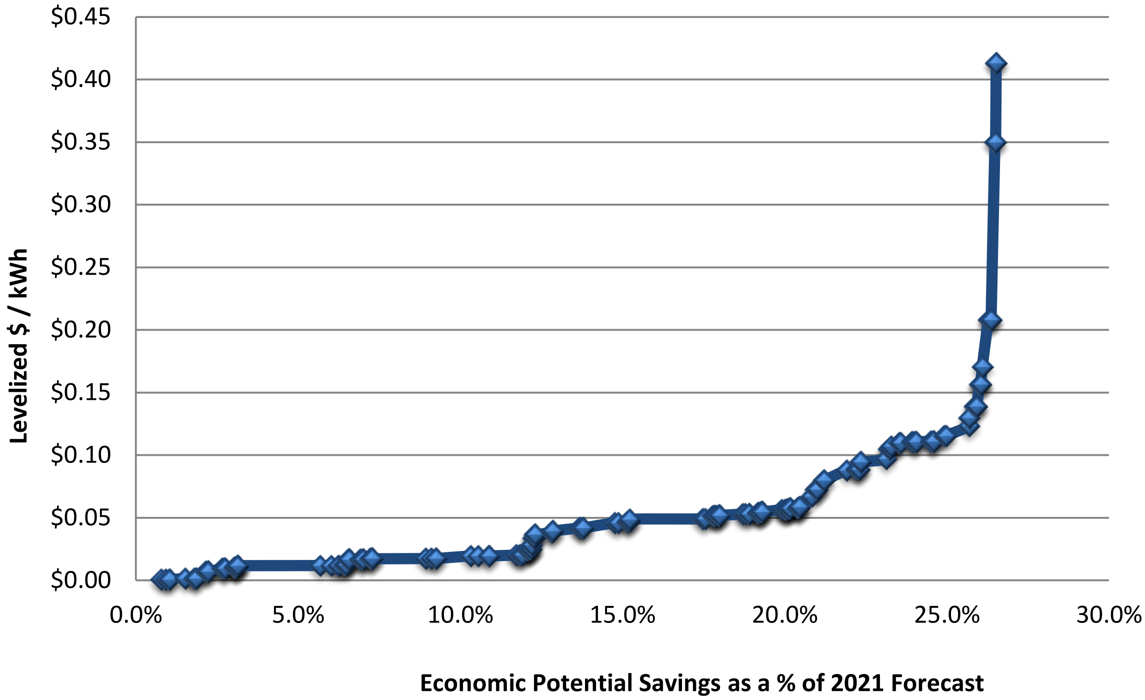
Table 8. Residential Electric Economic Potential Savings by End Use

End Use	2021 Energy (MWh)
Lighting	440,074
Appliances	234,387
Water Heating	194,930
Electronics	189,892
HVAC (Equipment)	154,249
HVAC (Envelope)	118,156
Other	56,703
Total	1,388,392
% of Annual Sales Forecast	27%

Figure 14 shows economic potential for electric efficiency for the residential sector as a supply curve (i.e., the relationship between economic potential savings [as a percentage of 2021 residential forecast sales] and levelized costs per lifetime kWh saved). For example, savings of roughly 17.5% of forecast sales can be achieved at a cost per lifetime kWh saved of $0.05 or less. To obtain increased electric energy savings from efficiency resources, one must move to the curve's right, choosing progressively more costly resources.

In this analysis, levelized costs were based only on electric savings; they did not factor in associated capacity benefits or non-electric benefits, and did not include program administrative costs. For example, insulation measures had a high levelized cost, based on cooling-only savings, but passed the economic screen due to non-electric heating fuel savings.

Figure 14. Residential Electric-Efficiency Supply Curve for Maine (Economic Potential)



Maximum Achievable Potential Savings

Maximum achievable potential serves as a subset of economic potential, limited by various market and adoption barriers. Maximum achievable potential also accounts for the capability of program administrators to ramp-up program activity over time.

This analysis assumed end users would be provided with incentives equal to the entire incremental cost of the more-efficient equipment. As residential customers would not be responsible for any incremental costs, all measures were assumed to reach targeted market penetration rates (equal to 80% of eligible measures annually) by the third year of analysis (2014). While this assumption simplifies actual adoption curves, it provides a concise method for estimating achievable savings potential over a specific time period.

Table 9 provides maximum achievable potential in the residential sector, assuming 80% market penetration. The study estimated maximum achievable potential for 2021 electric-efficiency savings at: 964,389 MWh, or 18% of residential sales in 2021.

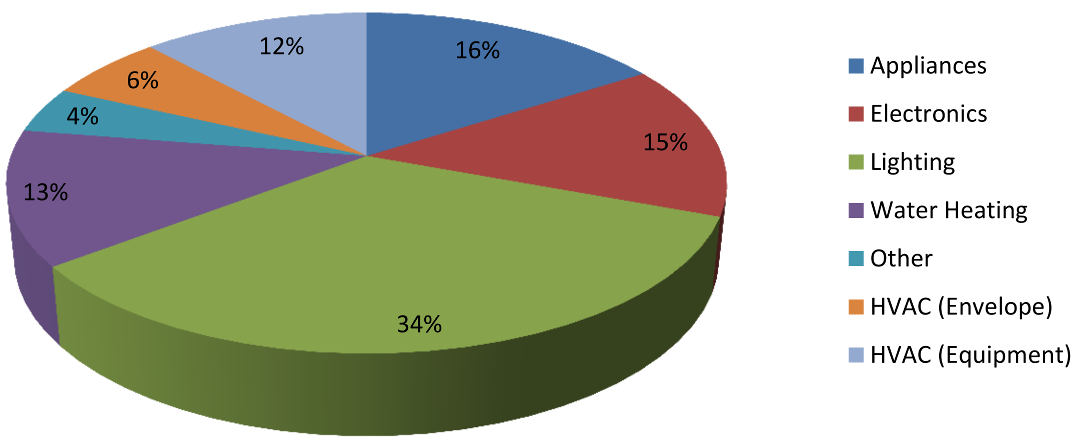
Table 9. Residential Electric Maximum Achievable Potential Savings by End Use

End Use	2021 Energy (MWh)
Lighting	328,406
Appliances	154,185
Electronics	141,156
Water Heating	123,694
HVAC (Equipment)	114,997
HVAC (Envelope)	59,857
Other	42,094
Total	964,389
% of Annual Sales Forecast	18%

Figure 15 shows maximum achievable potential by end use. Major opportunities for electric energy-efficiency savings remain in residential lighting, including:

- Continued promotion of efficient CFLs for standard and specialty lighting sockets; and
- Support for LED bulbs in residential applications.

Figure 15. Residential Sector End-Use Savings as a Percentage of 2021 Maximum Achievable Potential



Consumer electronics, including televisions, computers, and miscellaneous plug loads, present a growing residential end use: opportunities for improved efficiency in this category represent ~15% of estimated maximum achievable potential by 2021. Improved efficiency measures in this category include:

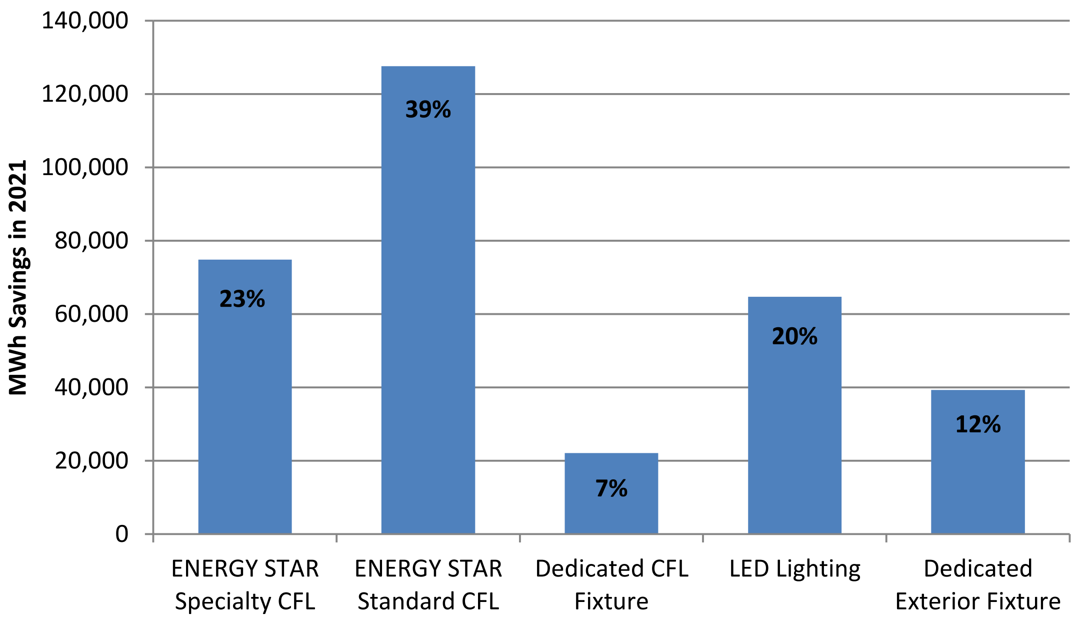
- Efficient televisions;
- ENERGY STAR-rated computers and LCD monitors; and
- Smart strip plug controls.

The remaining 50% of the estimated maximum achievable result from:

- ENERGY STAR appliances (16%);
- Improvements to water heater efficiency (13%);
- Building envelope characteristics (6%);
- HVAC equipment (12%); and
- Pool pump motors.

As noted, the lighting end use represents the largest opportunity for continued electric savings in the maximum achievable potential scenario. Figure 16 presents measure details of maximum achievable potential for the residential lighting end use.

Figure 16. Measure Detail for Residential Lighting End Use (Maximum Achievable Potential)



Standard screw-in CFL bulbs continue to represent a significant portion of the overall potential (39% of all residential lighting potential), even after accounting for impacts of the 2007 Energy Independence and Security Act, which will result in a more efficient baseline, with new halogen bulbs replacing traditional incandescent lighting as the measure baseline.

Specialty CFL sockets (including small, screw-base, three-way lighting, and other non-traditional bulbs) represent 23% of maximum achievable savings in the lighting end use.[9] LED bulb penetration was assumed to increase over the 10-year study period, reflecting the majority

[9] Specialty bulbs were assumed to represent 11% of all household sockets, as reported in the *Efficiency Maine Trust Residential Lighting Program Evaluation: Interim Report*, April 2012.

of all bulbs installed after 2018. Thus, LED bulbs represent 20% of the lighting end-use potential. Exterior and interior fixtures, requiring installation of a dedicated pin-base, were assigned a low applicability factor, representing 12% and 7% of maximum achievable savings in the residential lighting end use, respectively.[10]

Appendix C provides additional, measure-level, maximum achievable potential savings detail for the remaining end uses.

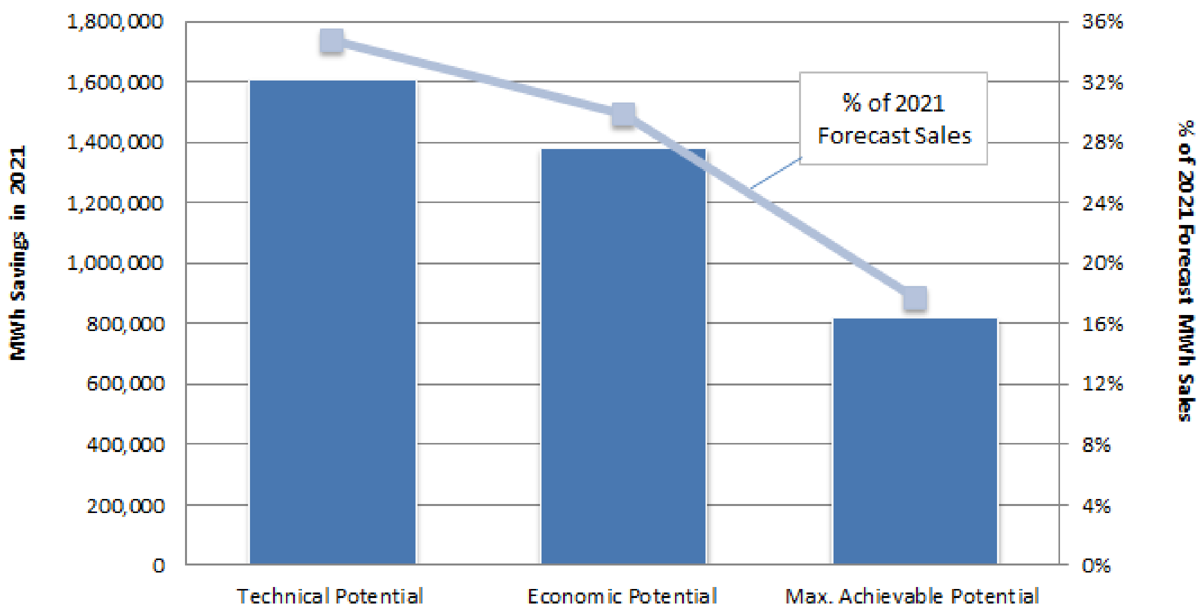
[10] Fixtures were assigned a low applicability factor, based on their current, overall share of all bulbs rebated through the Trust's Residential Lighting Program.

COMMERCIAL ENERGY-EFFICIENCY POTENTIAL

Summary of Potential Results

Figure 17 summarizes technical, economic (based on the TRC test), and maximum achievable savings potential in the commercial sector in Maine by 2021. The maximum achievable potential estimate has been based on a market penetration scenario, targeting installation of energy-efficient equipment in 80% of the remaining eligible market by 2021.

Figure 17. Summary of Commercial Energy-Efficiency Potential



As shown, substantial potential remains for electric energy-efficiency savings in the commercial sector. If targeted market penetration for all remaining, eligible, cost-effective measures can be reached over the next decade, the maximum achievable potential for commercial electric savings by the year 2021 would be: 816,357 MWh, or approximately 18% of forecast commercial sales in 2021.

Measures by End Use

Energy-savings analysis for the commercial sector included 127 commercial electric-efficiency measures. Table 10 lists commercial, electric-efficiency technologies, by end use, considered in the analysis. Appendix C provides savings, useful life, costs, and equipment saturations associated with each measure.

Table 10. Commercial Sector Electric Energy-Efficiency Measures by End Use

End-Use Type	End-Use Description	Measures Included
Space Heating & Space Cooling	Heating/Cooling/Ventilation Equipment, HVAC Controls	• Heat Pumps (High-Efficiency, Water Source) • Insulation (Wall, Ceiling, etc.) • EMS / Controls • Economizers • High-Efficiency AC and Chillers
Ventilation	HVAC, Air Quality	• Ventilation Motors and VFD's • Demand Controlled Ventilation
Water Heating	Domestic Hot Water	• High-Efficiency Tank and Booster Water Heaters • Heat Pump Water Heater • Low Flow Showerhead/Faucet Aerator • High-Efficiency Clothes Washers
Lighting	Interior/Exterior Lighting	• High-Efficiency T8 and T5 Systems • LED Lighting Systems (Indoor and Outdoor) • Lighting Controls • Refrigerated Case Lighting
Cooking	Energy Star Appliances	• High-Efficiency Cooking Equipment
Refrigeration	High-Efficiency Equipment Refrigeration Controls	• Vending Machines/Vending Misers • Reach-In Freezers • Covers for Display Cases • Evaporator Fan Controls
Office Equipment/ Computers	Energy Star Office Equipment	• Energy Star Office Equipment • Smart Power Strips / Power Supplies
Other	Industrial Processes High-Efficiency Electricity Distribution	• Machine / Industrial Processes • Air Compressors • High-Efficiency Transformers

Technical and Economic Potential Savings

Technical potential represents savings that could be captured if 100% of inefficient electric equipment was replaced instantaneously (where technically feasible). As shown in Table 11, total *technical potential savings* in Maine’s commercial sector would be: 1,607,257 MWh, or 34.8% of forecast commercial MWh sales in 2021.

Table 11. Commercial Electric Technical Potential Savings by End Use

End Use	2021 Energy (MWh)
Lighting	590,836
Ventilation	339,126
Refrigeration	248,638
Space Cooling	167,296
Office Equipment	89,293
Space Heating	92,563
Water Heating	49,185
Process	17,101
Other	9,081
Cooking	4,288
Total	1,607,407
% of Annual Sales Forecast	35%

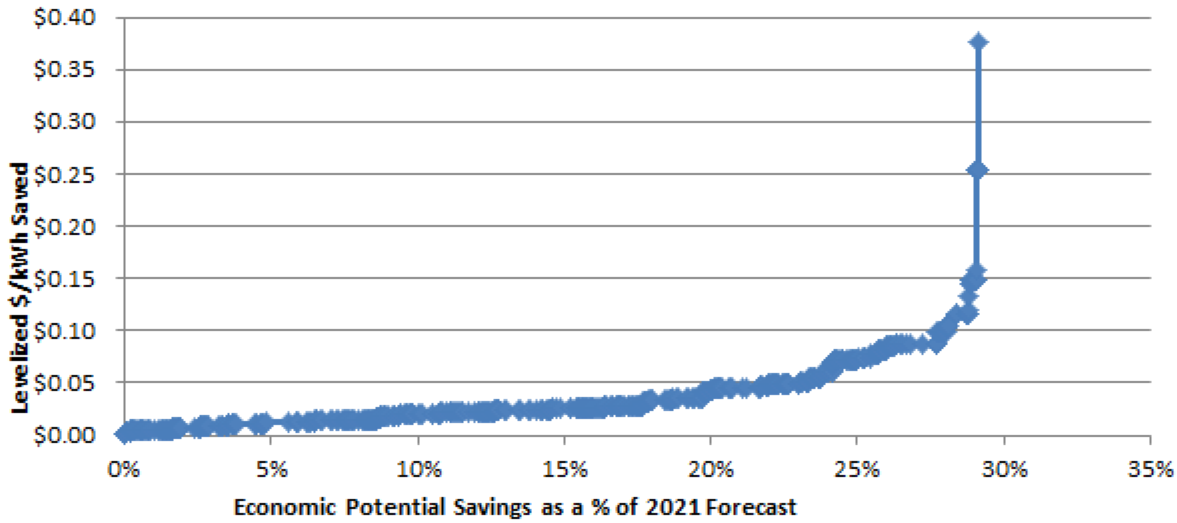
As shown in **Error! Not a valid bookmark self-reference.**, the *economic potential* in the commercial sector would be
1,380,145 MWh in 2021. Economic potential assumes 100% installation of all eligible cost-effective measures, excluding measures previously included in the technical potential, but not passing the TRC benefit/cost-screening test.

Table 12. Commercial Electric Economic Potential Savings by End Use

End Use	2021 Energy (MWh)
Lighting	466,253
Ventilation	337,946
Refrigeration	219,919
Space Cooling	152,116
Office Equipment	44,809
Space Heating	84,020
Water Heating	47,064
Process	17,101
Other	7,241
Cooking	3,677
Total	1,380,145
% of Annual Sales Forecast	30%

Figure 18 presents commercial sector economic potential for electric efficiency as a supply curve, demonstrating the relationship between economic potential savings (as a percentage of 2021 commercial forecast sales) and levelized costs per lifetime kWh saved.

Figure 18. Commercial Electric-Efficiency Supply Curve for Maine (Economic Potential)



For example, savings of roughly 23% of forecast sales could be achieved at a cost per lifetime kWh saved of $0.05 or less. To obtain increased electric energy savings from efficiency resources, one must move to the right on the curve, and choose progressively more costly resources.

In this analysis, levelized costs have been based only on electric savings, and do not include: associated capacity benefits, non-electric benefits, or program administrative costs. For example, insulation measures exhibit a high levelized cost, based on cooling-only savings, but pass the economic screen due to non-electric heating fuel savings.

Maximum Achievable Potential Savings

Achievable potential serves a subset of economic potential, limited by various market and adoption barriers. Maximum achievable potential represents attainable savings if market penetration of selected measures ramps up to replace 80% of the eligible market, turning over each year by 2015.

As discussed, this analysis assumed target penetration for replace-on-burnout measures could be achieved immediately, due to Maine's existing network of program allies and their relationships with C&I businesses. Retrofit measures assumed a ramp-up period,[11] rather than immediate adoption, due to significant associated costs (for example, costs of adding insulation to an existing facility).

11 Ramp-up rates for retrofit measures:

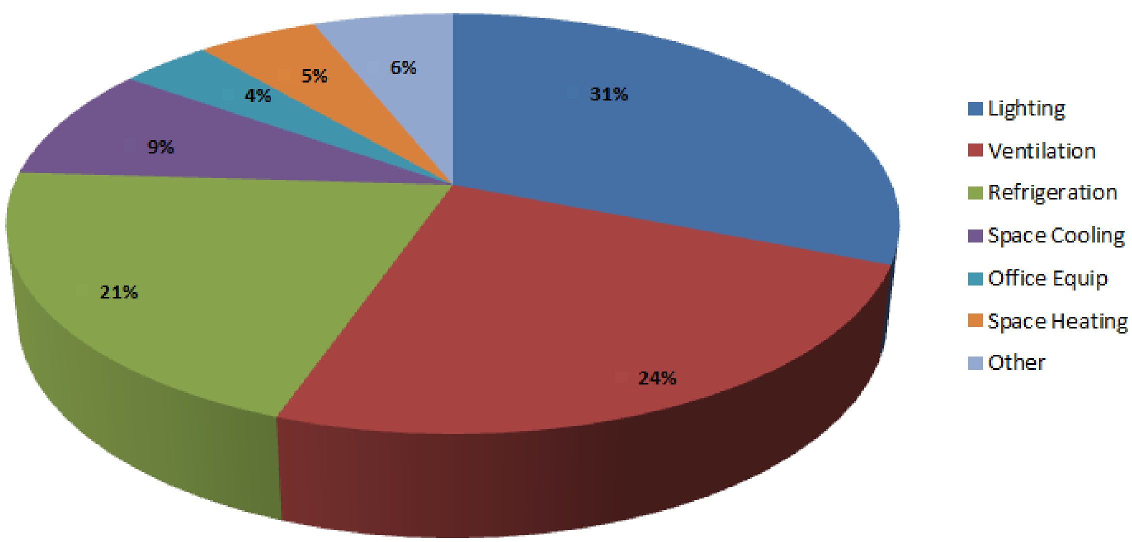
Year	1	2	3	4	5	6	7	8	9	10	Total
Ramp-Up Rate	5%	15%	20%	20%	10%	10%	5%	5%	5%	5%	100%

Table 13 and Figure 19 provide estimates of maximum achievable potential in the commercial sector by end use, with maximum achievable potential for electric-efficiency savings in 2021 estimated at: 816,357 MWh, or 18% of commercial MWh sales in 2021.

Table 13. Commercial Electric Max Achievable Potential Savings by End Use

End Use	2021 Energy (MWh)
Lighting	253,055
Ventilation	198,948
Refrigeration	168,161
Space Cooling	72,139
Office Equipment	32,007
Space Heating	42,551
Water Heating	29,869
Process	12,395
Other	5,080
Cooking	2,153
Total	816,357
% of Annual Sales Forecast	18%

Figure 19. Commercial Sector End-Use Savings as a Percentage of 2021 Maximum Achievable Potential



Major opportunities for electric energy-efficiency savings remain in commercial lighting, ventilation, and refrigeration. Together, energy-efficiency measures targeted at these end uses represented 76% of the maximum achievable potential in this sector. Specific measures include:

- LED lighting
- Occupancy controls

- Variable speed drives
- Efficient refrigeration fan motors and controls

Additional opportunities, representing 18% of maximum achievable potential, can be found in space cooling, heating, and office equipment. Table 14 provides additional measure detail on the most promising energy-efficiency opportunities in the commercial sector.

Table 14. Top Commercial Electric Energy-Efficiency Measures by End Use

End Use/Measure	% of End Use Max Achievable Potential
Lighting	
LED	31.8%
Occupancy Sensor	27.8%
Fluorescent	27.2%
Ventilation	
Dual Enthalpy Economizer	32.9%
Variable Speed Drive Control	43.2%
Demand-Controlled Ventilation	15.0%
Refrigeration	
Fan Motors	45.0%
Vending Miser for Soft Drink Vending Machines	14.2%
Zero-Energy Doors	8.0%
Space Cooling / Space Heating	
EMS install	26.6%
High-Efficiency AC	18.2%
Programmable Thermostats	13.0%
Office Equipment	
"Smart" Power Strip	56.0%
Energy Star office equipment	43.9%
Other	
Heat Pump Water Heater	25.6%
Solar Water Heating System	21.3%
High-Efficiency Air Nozzles	12.5%
Automatic Drains for Compressed Air	7.2%

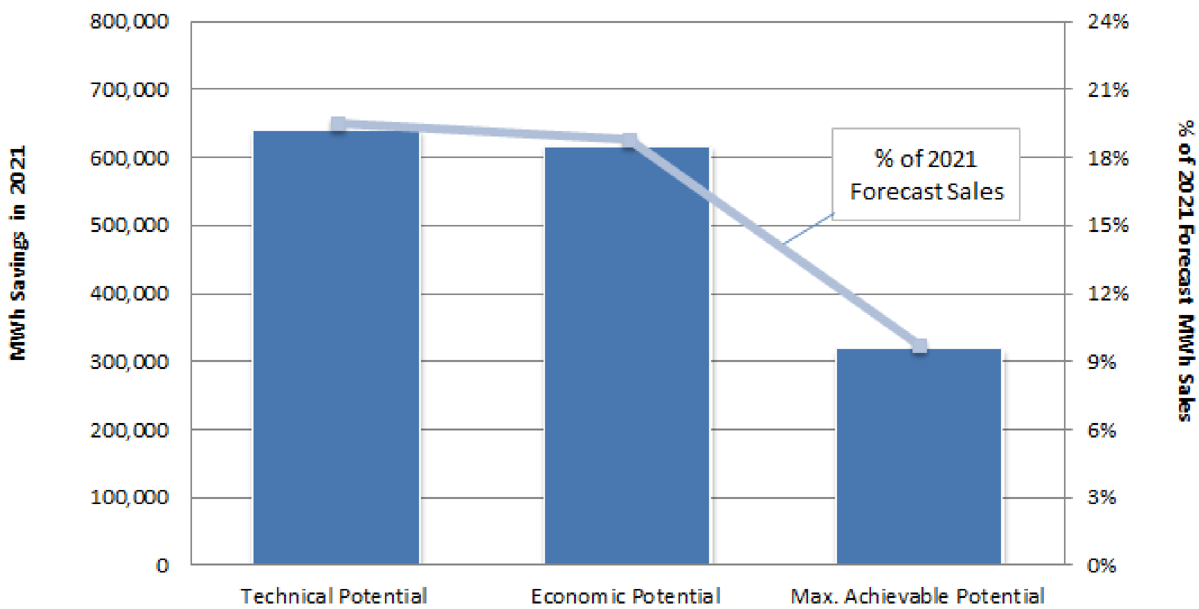
Appendix C provides additional measure-level maximum achievable potential savings details for the remaining end uses.

INDUSTRIAL ENERGY-EFFICIENCY POTENTIAL

Summary of Potential Results

Figure 20 summarizes technical, economic (based on the TRC test), and maximum achievable savings potential in the industrial sector in Maine by 2021. Maximum achievable potential estimates primarily have been based on a market penetration scenario, targeting installation of energy-efficient equipment in 80% of the remaining eligible market by 2021.

Figure 20. Summary of Industrial Energy-Efficiency Potential



As shown, large potential remains for electric energy-efficiency savings in the industrial sector. If targeted market penetration for all remaining, eligible, cost-effective measures could be reached over the next decade, maximum achievable potential for industrial electric savings by 2021 would be 318,007 MWh, or approximately 10% of forecast industrial sales in 2021.

Measures by End Use

Energy-savings analysis for the industrial sector included 81 electric-efficiency measures. Table 15 lists industrial electric-efficiency technologies (by end use) considered in the analysis.

Table 15. Industrial Sector Electric Energy-Efficiency Measures by End Use

End-Use Type	End-Use Description	Measures/Programs Included
Space Heating & Space Cooling	Heating/Cooling/Ventilation Equipment, HVAC Controls	• Insulation (Wall, Ceiling, etc.) • EMS / Controls • Economizers • High-Efficiency AC and Chillers
Ventilation	HVAC, Air Quality	• Ventilation Motors and VFD's • Demand Controlled Ventilation
Water Heating	Domestic Hot Water	• High-Efficiency Tank and Booster Water Heaters • Heat Pump Water Heater
Lighting	Interior/Exterior Lighting	• High-Efficiency T8 and T5 Systems • LED Lighting Systems (Indoor and Outdoor) • Lighting Controls
Cooking	Energy Star Appliances	• High-Efficiency Cooking Equipment
Process Cooling, Process Heating & Refrigeration	High-Efficiency Equipment Refrigeration Controls	• Improved Refrigeration (Various Measures) • Electric Supply System Improvements • Sensors & Controls • Energy Information System
Office Equipment/ Computers	Energy Star Office Equipment	• Energy Star Office Equipment • Smart Power Strips / Power Supplies
Machine Drive	Industrial Processes	• Pump System Efficiency Improvements • Motor System Optimization (Including ASD) • Electric Supply System Improvements • Sensors & Controls • Industrial Motor Management • Fan System Improvements • Advanced Efficient Motors • Energy Information System • Advanced Lubricants

Technical and Economic Potential Savings

Technical potential represents savings that could be captured if all inefficient electric equipment was replaced instantaneously (where technically feasible). Table 16 shows total *technical potential savings* in Maine's industrial sector of: 639,637 MWh, or 20% of forecast industrial sales in 2021.

Table 16. Industrial Electric Technical Potential Savings by End Use

End Use	2021 Energy (MWh)
Machine Drive	364,021
Lighting	104,381
Ventilation	35,986
Space Cooling	48,453
Process Cooling & Refrig	20,558
HVAC Controls	11,805
Office Equipment	12,082
Process Heating	8,324
Water Heating	12,246
Envelope	18,421
Other	3,360
Total	639,637
% of Annual Sales Forecast	20%

Table 17 shows *economic potential* in the industrial sector of 616,514 MWh in 2021. Economic potential assumes 100% of all cost-effective measures eligible for installation would be installed, but excludes measures previously included in the technical potential, but not passing the TRC benefit/cost screening test.

Table 17. Industrial Electric Economic Potential Savings by End Use

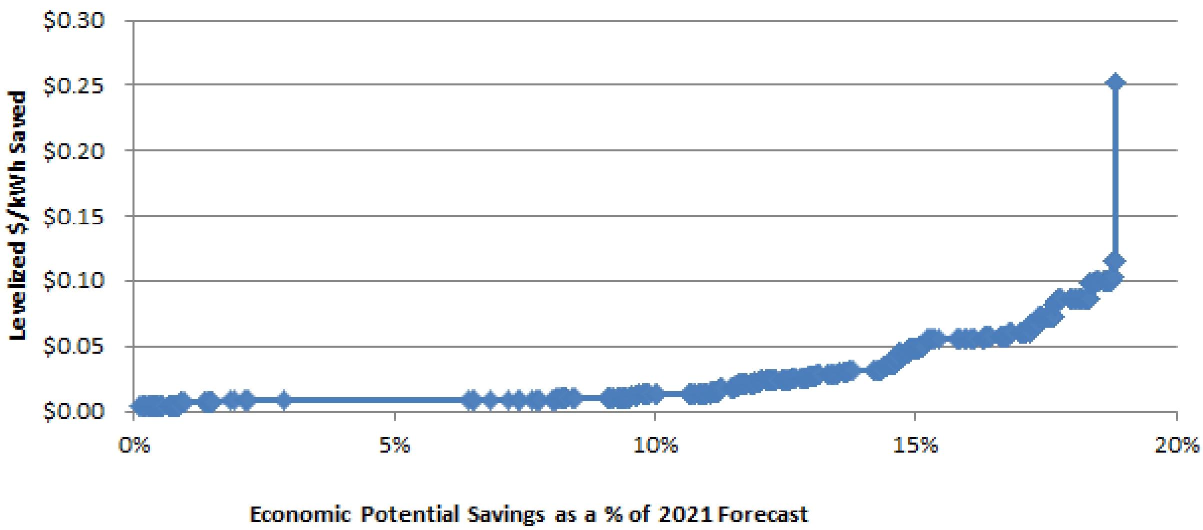
End Use	2021 Energy (MWh)
Machine Drive	364,021
Lighting	101,544
Ventilation	35,077
Space Cooling	42,130
Process Cooling & Refrig	20,558
HVAC Controls	11,805
Office Equipment	12,082
Process Heating	8,230
Water Heating	4,847
Envelope	12,859
Other	3,360
Total	616,514
% of Annual Sales Forecast	19%

Figure 21 presents economic electric-efficiency potential for the industrial sector as a supply curve, demonstrating relationships between economic potential savings (as a percentage of 2021 industrial forecast sales) and levelized costs per lifetime kWh saved.

For example, savings of roughly 15% of forecast sales could be achieved at a cost per lifetime kWh saved of $0.05 or less. To obtain increased electric energy savings from efficiency resources, one must move to the right on the curve, and choose progressively more costly resources.

In this analysis, levelized costs have been based only on electric savings, and do not consider associated capacity benefits, non-electric benefits, or include program administrative costs. For example, insulation measures have a high levelized cost, based on cooling-only savings, but pass the economic screen due to non-electric heating fuel savings.

Figure 21. Industrial Electric-Efficiency Supply Curve for Maine (Economic Potential)



Maximum Achievable Potential Savings

Various market and adoption barriers limit achievable potential, a subset of economic potential. Maximum achievable potential represents attainable savings if market penetration of selected measures ramps up to replace 80% of the eligible market, turning over each year by 2015.

As discussed, this analysis assumed target penetrations for replace-on-burnout measures could be achieved immediately, given Maine's existing network of program allies and their relationships with C&I businesses. For retrofit measures, a ramp-up period[12] was assumed (rather than immediate adoption) due to significant associated costs (for example, costs of adding insulation to an existing facility).

Table 18 and Figure 22 present maximum achievable potential in the industrial sector by end use, with maximum achievable potential for electric-efficiency savings in 2021 estimated at 318,007 MWh, or 10% of industrial MWh sales in 2021.

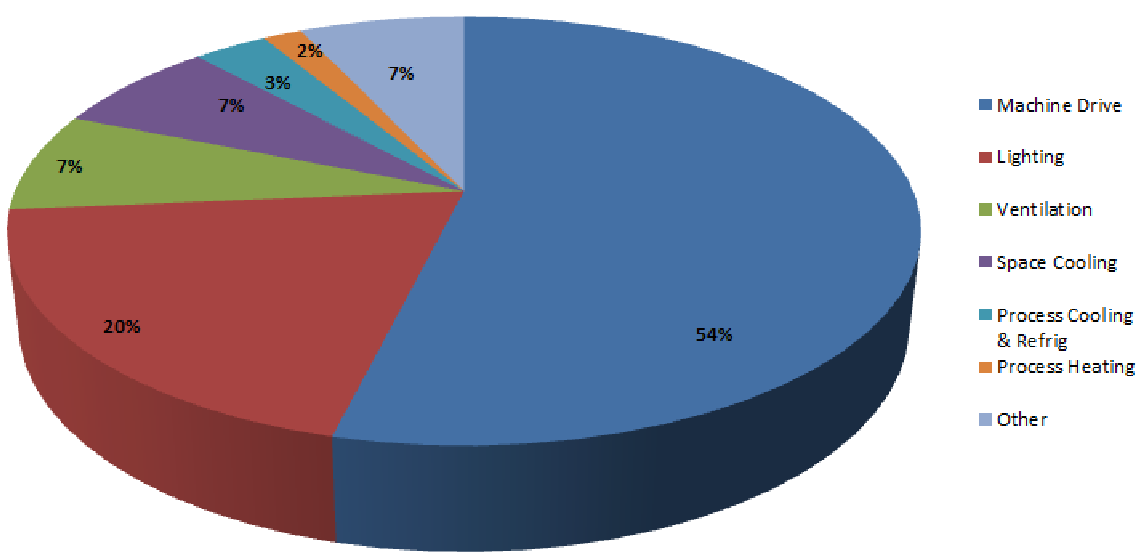
[12] Ramp-up rates for retrofit measures:

Year	1	2	3	4	5	6	7	8	9	10	Total
Ramp-Up Rate	5%	15%	20%	20%	10%	10%	5%	5%	5%	5%	100%

Table 18. Industrial Electric Max Achievable Potential Savings by End Use

End Use	2021 Energy (MWh)
Machine Drive	171,307
Lighting	62,776
Ventilation	23,909
Space Cooling	22,518
Process Cooling & Refrig	9,988
HVAC Controls	9,074
Office Equipment	5,867
Process Heating	5,297
Water Heating	2,908
Envelope	2,245
Other	2,117
Total	318,007
% of Annual Sales Forecast	10%

Figure 22. Industrial Sector End-Use Savings as a Percentage of 2021 Maximum Achievable Potential



Representing almost 54% of the maximum achievable potential, machine drives present the largest opportunity for electric energy-efficiency savings in the industrial sector. Machine drive energy-efficiency measures include:

- Motor system optimization (including VFDs);
- Sensors and controls; and
- Pump efficiency improvements.

Additional opportunities exist in lighting (20%), ventilation and cooling (HVAC), process heating, process cooling, and refrigeration.

Table 19 provides additional measure details on the most promising commercial sector opportunities.

Table 19. Top Industrial Measures by End Use

End Use/Measure	Percent of End Use Max Achievable Potential
Machine Drive	
Motor System Optimization (Including ASD)	58.6%
Electric Supply System Improvements	10.3%
Sensors and Controls	10.1%
Lighting	
High Intensity Fluorescent Fixture (replacing HID)	35.8%
Lighting Controls	34.7%
Remote Mounted Occupancy Sensor	13.6%
Ventilation	
Variable Speed Drive Controls	50.6%
Dual Enthalpy Economizer	30.0%
Demand Controlled Ventilation	15.5%
Space Cooling	
High-Efficiency AC	56.6%
Ductless (mini split)	34.4%
Process Heating/Cooling & Refrig	
Improved Refrigeration	36.1%
Electric Supply System Improvements	27.8%
Sensors and Controls	27.2%
Water Heating	
Solar Water Heating System	61.8%
Heat Pump Water Heater	23.3%
Other	
ENERGY STAR office equipment	35.2%
"Smart" Power Strip	25.9%
Energy-Efficient Windows	20.0%

DISTRIBUTED GENERATION POTENTIAL

In addition to traditional energy-efficiency resources, this report analyzes the potential for distributed generation resources, including:

- On-site solar photovoltaics (PV);
- Customer-sited wind projects; and
- Combined heat and power (CHP) projects.

On-site solar PV refers to rooftop PV systems, using solar energy to generate electricity. Similarly, customer-sited wind projects use wind energy to generate electricity.

CHP units, which generate electricity and utilize waste heat for space or water heating requirements, can be used in buildings with fairly coincident thermal and electric loads, or buildings producing combustible biomass or biogas. CHP units traditionally have been installed in hospitals, schools, and manufacturing facilities, but can be used across nearly all segments with an average annual energy load greater than about 30 kW.

Analysis included the following types of CHP units:

- Reciprocating engines
- Microturbines
- Fuel cells
- Gas turbines
- Steam turbines

Analysis also accounted for fuels used by CHP units (non-renewable CHP runs on fossil fuels, such as natural gas, while renewable CHP runs on biologically derived fuel).

The study determined technical assumptions for each distributed generation resource technology, including cost and savings information, evaluated the resources' cost-effectiveness (based on the TRC), and evaluated the potential for resources deemed cost-effective.

Technical Assumptions

Rooftop PV

Relying on the sun to generate electricity, rooftop PV systems' effectiveness depend on weather. This study focused on renewable-electricity generation potential from rooftop residential and commercial buildings.

Typically, PV generation offsets only a portion of baseline loads, and, in most cases, is considered a secondary source for a building's energy needs. PV electrical generation above the building's load feeds into the grid. This greatly depends on the PV system's size, and, for residential and commercial customers, generally occurs when buildings are unoccupied. This study did not include large PV generation facilities (operating to sell the majority [or all] of their power to the grid) or emerging PV technologies.

On-Site Solar PV Background Data

Primary and secondary resources for installed costs of on-site solar options have been derived from:

- PacifiCorp's PV pilot program in Utah (the Solar Incentive Program);
- The State of Utah's tax incentive program;
- The California Public Utilities Commission's California Solar Initiative program database;
- The Energy Trust of Oregon;
- U.S. DOE; and
- Other online sources.

Table 20 shows installed costs, and operational and maintenance (O&M) costs per kW as well as the measure life for all three solar technologies. O&M costs include: one inverter replacement over the system's life,[13] with an assumed PV system measure life of 30 years.[14]

Table 20. On-Site Solar Technology Costs and Measure Lives

Technology	Installed Costs ($/kW)*	O&M Costs ($/kW)	Measure Life (years)
Solar PV	$4,550	$24	30

*After the federal tax incentive.

Customer-Sited Wind

The initial step in evaluating wind resources in Maine required consulting a Maine wind resource map at an 80-meter height.[15] This map, published by DOE's Wind Program and the National Renewable Energy Laboratory (NREL), overviews the state's wind resource potential. Higher wind areas occur at higher elevations to the west and along the coast. Coastal sites were chosen for modeling, as most of Maine's development occurs in that area.

Using Google Earth, the study examined three coastal sites with high wind resources, and appearing to be C&I sites. By using the Distributed Wind Site Analysis Tool (DSAT),[16] turbine performance could be modeled at each site. Site terrain and obstacles also were fed into DSAT, providing performance estimates for particular turbines at specific locations.

[13] Current typical module warranties cover 10 to 15 years. Solarbuzz reported April 2012 inverter costs as $0.711 per watt: http://www.solarbuzz.com/Inverterprices.htm

[14] Current typical module warranties cover 25 years; so a 30-year system life was used. NREL's Solar Advisor Model also assumes a 30-year system life.

[15] http://www.windpoweringamerica.gov/wind_resource_maps.asp?stateab=me

[16] http://dsat.cadmusgroup.com/

The first site was located in Bath, at an industrial area on the waterfront, where a 600 kW turbine was modeled in DSAT. A 100 kW turbine was modeled at the second site in Woolwich, with large, warehouse-type buildings and open land nearby. A third site in Cutler, along Maine's northern coast, had the best wind resource of the three sites. The Cutler site, which appeared to be a farm or small business, was used to model a 10 kW wind turbine. Turbine sizes were dictated by space available at each site.

CHP

CHP encompasses all technologies generating electricity, while heating and/or cooling a customer's facility. Generally, power generated through these technologies contributes to a utility's base load resources, rather than peak load requirements.

CHP can be used in facilities with coincident electric and thermal loads, and with average annual energy loads greater than about 30 kW. CHP can be used to offset cooling loads with an absorption chiller—also known as combined cooling heat and power (CCHP)—a technique most applicable for building segments with large cooling requirements (such as retail, groceries, hospitals, and hotels/motels).

CHP includes a standard electrical generator, but business total energy needs also are reduced by capturing the generator's waste heat, and using it for other processes. For example, a typical spark-ignition engine has electrical efficiency of only about 35%, with "lost" energy primarily waste heat. A CHP unit captures much of this waste heat, using it for space heating, water heating, or to power an absorption chiller, achieving overall efficiency up to 80%. Thus, savings can be achieved by offsetting space heating, water heating, or air conditioning usage, in addition to generating electricity.

CHP can be broadly divided into non-renewable and renewable subcategories, based on the fuels used:

- *Non-renewable CHP* includes all generators producing energy by burning fossil fuels, such as natural gas or diesel. This study only considered natural gas, an environmentally cleaner-burning fuel than diesel. This category includes CHP used in cooling applications (CCHP), where generator units are coupled with absorption chillers.
- *Renewable CHP* refers to energy generated from any plant- or animal-based (biomass) material. Biomass can be directly combusted (i.e., industrial biomass), or can be fed into an anaerobic digester to produce biogas, which then can be combusted to produce electricity. Although biomass energy is based on a renewable resource, the combustion process is not considered "clean," as it produces emission products (e.g., carbon dioxide, NOx).

The market currently offers three primary generator technologies:

1. Reciprocating engines (spark-ignition or compression-ignition).
2. Turbines (gas or steam for larger capacity [>1 MW]; or microturbines for smaller capacity [<1 MW]).
3. Fuel cells.

The same generators can be used with renewable or non-renewable fuels. This study evaluated the cost-effectiveness and potential for CHP systems installed at individual C&I sites. Other configurations, such as district heating systems with CHP, were not considered.

The methodology used to calculate potential for CHP resources included three key steps:

- ***Cost-effectiveness screening***: determined configurations meeting the Trust's cost-effectiveness requirements, based on the TRC.
- ***Technical potential***: calculated for each configuration passing the cost-effectiveness screening, using the following key data inputs:
  - Natural gas: Central Maine Power's billing data, used to determine potential by C&I market segment.
  - Biomass: Central Maine Power's billing data, used to determine size and count of paper and wood product manufacturing facilities.
  - Biogas: National reports used to determine facilities in Maine producing biogas.
- ***Achievable technical potential***: determined for each resource class, based on other programmatic successes.

Cost-Effectiveness

The study first required conducting a preliminary cost-effectiveness analysis to determine technologies to be researched further. The preliminary cost-effectiveness tests used readily available data from Maine, other state and national reports, or previous Cadmus work. If the TRC benefit-cost ratio was near or greater than one, the technology passed, and further research was conducted to refine and update assumptions using data more recent or more specific to Maine.

On-site solar PV and customer-sited wind technologies did not pass the TRC screen, and current 30% federal tax benefits were included in the TRC analysis for PV. These technologies did not receive further analysis.

Analysis examined several configurations of CHP systems, including the fuel and generator technologies previously described.

The California Self-Generation Incentive Program (SGIP)[17] served as a major data source used in this analysis. Funded by California's major investor-owned utilities, the program provided incentives for individual customers to install various, distributed generation technologies, including CHP, with a maximum capacity of 5 MW from 2001 through 2008.[18] SGIP's annually published reports detailed CHP system installations and operations. Though CHP incentives no longer are available, annual program evaluations continue to report CHP system performance, as participants must provide system data and feedback for five years.

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[17] California Self-Generation Incentive Program: http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip/

[18] While SGIP did not offer most CHP incentives after 2008, some systems, such as fuel cells, remain eligible for incentives.

Data on CHP technologies and costs also were obtained from EPA reports: *Catalog of CHP Technologies* and *Biomass Combined Heat and Power Catalog of Technologies*.[19, 20]

The cost-effectiveness analysis also considered federal tax credits, currently offered for new CHP installations, but set to expire at the end of 2016.[21] Analysis conducted with and without the tax credit found it did not change the cost-effectiveness screening results (based on requirements of TRC>1) for any configurations. While having no effect on general CHP configurations' cost-effectiveness, tax credits can improve finances for specific CHP projects.

Using the TRC B/C metric, most CHP configurations proved cost-effective in Maine. While fuel cells and natural-gas fueled microturbines did not pass the screening, the following configurations did, and therefore were included in the potential analysis:

- Biogas-fueled:
  - Gas turbine and microturbine
  - Reciprocating engine
- Biomass-fueled steam turbine
- Natural gas-fueled:
  - Gas turbine
  - Reciprocating engine

Technical Potential

Biogas

Anaerobic digesters create methane gas (biogas fuel) by breaking down liquid or solid biological wastes. Heat captured by CHP units largely maintains high temperatures required by digesters. Depending on the anaerobic digester's size, it can be installed using a variety of generators, including:

- Fuel cells
- Gas turbines
- Microturbines
- Reciprocating engines

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19 Energy and Environmental Analysis (an ICF International Company). December 2008. *Catalog of CHP Technologies*. Prepared for EPA: www.epa.gov/chp/documents/catalog_chptech_full.pdf

20 Energy and Environmental Analysis (an ICF International Company) and Eastern Research Group. September 2007. *Biomass Combined Heat and Power Catalog of Technologies*. Prepared for EPA: http://www.epa.gov/chp/documents/biomass_chp_catalog.pdf

21 U.S. EPA Combined Heat and Power Partnership: http://www.epa.gov/chp/incentives/

Sites for anaerobic digesters include:

- Animal farms (dairy or swine)
- Landfills
- Wastewater treatment facilities

For farms, biogas amounts generated directly relate to the number and types of animals on site. Based on typical collection systems, EPA estimates anaerobic digesters prove cost-effective with farms with at least 500 head of cattle or 2,000 head of swine.[22] According to the U.S. Census of Agriculture, Maine has eight dairy farms of this size, but does not have sufficiently large swine farms.[23]

Similarly, the population size served by a wastewater treatment facility determines expected generation output. A cost-effective CHP installation generally requires a minimum volume of approximately 5 million gallons per day of waste. EPA reports Maine has no facilities meeting this size.[24] This minimum has been based on the total cost of a CHP system, including the anaerobic digester. CHP systems may be cost-effective at smaller facilities, if facilities already have a digester installed, or need to install a digester for environmental compliance.

The EPA Landfill Methane Outreach Program publishes a database of participating and candidate landfills, identifying 10 Maine landfills as candidates or potential sites for anaerobic digesters.[25]

Industrial Biomass

Industrial biomass utilizes industry waste products for fuel. For solid industrial biomass, heat produced from combustion often powers steam turbines, with industrial biomass potential based on customers with an average annual electric load greater than 1 MW in the key biomass-producing industries of wood and paper products. The CMP customer database contained 18 such facilities, all of which the study found CHP-eligible.

Natural Gas

For all other C&I facilities, the only constraints on technical potential are:

- A CHP unit's applicability within a particular building; and
- Fuel availability.

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22 U.S. EPA. November 2011. *Market Opportunities for Biogas Recovery Systems at U.S. Livestock Facilities*. Table 2.

23 U.S. Department of Agriculture. 2007. *Census of Agriculture, Maine*. Tables 15 and 21.

24 U.S. EPA. September 2007. *Biomass Combined Heat and Power Catalog of Technologies*. Page 19.

25 U.S. EPA. Landfill Methane Outreach Program: http://www.epa.gov/lmop/documents/xls/states/lmopdatame.xls

Generally, a building can be considered eligible for CHP if:

- Thermal to electric loads have a ratio between 0.5–2.5 (the range most CHP technologies operate within), with a high coincidence between these two loads; and
- Overall loads remain fairly consistent throughout the year.

Energy Insights™ provided the overall percentage of CHP-eligible buildings by market sector, based on these ratio and load requirements. Energy Insights determined consumption parameters from secondary sources, including:

- Market surveys;
- Data from the Gas Technology Institute and the American Gas Association; and
- The EIA Commercial Buildings Energy Consumption Survey and Manufacturing Energy Consumption Survey.

Using the CMP customer database and the Energy Insights data, the study established:

- The number of CHP-eligible establishments falling within several load ranges (based on average annual peak demand); and
- Total technical potential of natural gas-fueled CHP systems for CMP customers.

For the study, CHP system sizes were based on average electric demand at a site. The best approach for sizing an actual CHP installation depends on several site-specific factors, and should be evaluated on a case-by-case basis.

To account for other utility territories in Maine, 10% was added to the technical potential calculated using CMP data.

Total Technical Potential

Table 21 shows resulting total CHP technical potential. Maine has more than 2,000 facilities with technical potential for natural gas-fueled CHP systems, and 38 sites with potential biomass or biogas systems.

Table 21. CHP Technical Potential

Fuel	Number of Installations	Total Capacity (kW)
Natural gas	2,093	686,521
Biomass—paper/wood waste	20	61,600
Biogas—dairy farm	10	5,544
Biogas—landfill	8	1,559
Total	2,131	755,224

Achievable Potential

Non-Renewable CHP

Achievable technical potential for non-renewable CHP has been based on California's success in implementing CHP installations within SGIP, which provided incentives covering approximately 50% of system costs. Total system capacity installed through SGIP was multiplied by the ratio of Maine's C&I electricity consumption to California's, projecting achievable potential in Maine. Though the SGIP program lasted eight years, the adoption rate likely will be slightly lower in other states. In the present study, SGIP results were applied to develop a 10-year forecast for Maine.

Renewable CHP

To date, renewable CHP adoption rates have been relatively high in Maine (as indicated by 17 systems at wood or paper manufacturing facilities and two at landfill waste systems).[26] Cost-effectiveness analysis also showed very favorable results for biomass and biogas systems. Therefore, an estimated 10% of technical potential achievable was awarded for renewable CHP systems—a larger portion than for natural gas-fueled systems.

Total Achievable Potential

As shown in Table 22, analysis results indicate, by 2021, a cumulative achievable potential of 22 installations from all CHP technologies, with a total 12.5 MW capacity. The largest potential exists in:

- Natural gas-fueled systems (18 installations, 5.6 MW total capacity); and
- Industrial biomass applications at paper or wood product facilities (two installations, 6.2 MW total capacity).

Table 22. CHP Achievable Potential

Fuel	Number of Installations	Total Capacity (kW)
Natural gas	18	5,611
Biomass—paper/wood waste	2	6,160
Biogas—dairy farm	1	554
Biogas—landfill	1	156
Total	22	12,481

Though somewhat conservative results for achievable potential, these parallel the low interest in CHP indicated during C&I facility site visits the study conducted for the energy-efficiency potential analysis. Strong outreach efforts to key facilities might further increase achievable potential.

26 Combined Heat and Power Units located in Maine: http://www.eea-inc.com/chpdata/States/ME.html

APPENDIX A. SURVEY INSTRUMENT

Efficiency Maine Potential Study Commercial/Industrial On-site Data Collection

FINAL

Site ID: ____________ Survey Date: __________________

Building Name:________________________ Electric Utility:__________________

Primary Contact:_______________________ Contact Phone:_________________

Primary Address:____

Surveyor Name: ____________________ Survey Start Time:__________ Survey End Time:____________

Electric Meter Information (Meter Numbers):

____

Other Fuels Used Service Meter/Account Numbers:

Fuel Type	Fuel Used?	Other Info
Natural Gas	☐	
Oil	☐	
Propane	☐	
Biomass	☐	
Purchased Chilled Water / Purchased Steam	☐	
On-site Generation	☐	Capacity (kW): Fuel: When Used: Is waste heat used? (Y / N)
Other______________	☐	

I. General Building Information

1. Building Type Name: ___________ (if other, describe):___________________________________
2. Building Type Code: ___________

(Select one building type and matching code from the list below that best describes how the facility is used.)

Building Type	Building Type Code
Commercial	
Office	Com1
Retail	Com2
Grocery	Com3
Warehouse	Com4
Education	Com5
Health	Com6
Lodging	Com7
Restaurant	Com8
Agriculture	Com9
Other Commercial (Not Listed Above)	Com10
Industrial Facility (Manufacturing)	
Transportation Equipment	Ind1
Paper	Ind2
Ship & Boat Building	Ind3
Food	Ind4
Fabricated metal	Ind5
Computer & Electronic Products	Ind6
Wood Products	Ind7
Plastic and Rubber Products	Ind8
Machinery	Ind9
Printing	Ind11
Leather and Allied Products (incl. Footwear)	Ind12
Chemicals	Ind13
Furniture	Ind14
Medical Equipment & Supplies	Ind15
Mineral Products	Ind16
Beverage Manufacturing	Ind17
Miscellaneous Manufacturing (Not Listed Above)	Ind18

3. Is this space: ____owner-occupied? ____leased? (Check one)
4. Approximately how many full time employees report to this business location? ______ employees
5. What is the approximate floor area of this business? ______ square feet,

6. How many # of floors ________
7. Estimated exterior building wall dimensions
   Wall 1: H = _____ft. W = _____ft.
   Wall 2: H = _____ft. W = _____ft.
   Wall 3: H = _____ft. W = _____ft.
   Wall 4: H = _____ft. W = _____ft.
8. Number of buildings _______
9. In what year were buildings constructed? (Show year for each building)
   ____

II. Primary Building Schedule

10. How many hours per week does the commercial business or industrial facility operate? ____________
11. Is this a seasonal business? ______ (yes/no)
12. How many months per year does the business operate? ________ months
13. How many holidays does your business recognize over the calendar year: ___________ days
14. Are there any other scheduled shutdowns every year such as for summer vacation? ______ (yes/no)
15. If Yes, How many weeks? _______ weeks
16. How many months per year do you operate your primary heating systems? ______ months
17. How many months per year do you operate your primary cooling systems? ______ months
18. Do you have an Energy Management System (EMS) at this facility? ______ (yes/no)
19. If Yes,
    (a) Is the system working properly? ______ (yes/no)
    (b) What is the age of the system? ________ years

III. Efficiency Attitudes

Now I have some questions about your attitudes towards purchasing energy efficient equipment for this space. I am referring to new equipment specifically designed to be more energy efficient than other *new* models.

20. How likely would you be to purchase energy efficient equipment *instead of standard equipment when existing equipment fails and needs to be replaced?*
    - Very likely ☐
    - Somewhat likely ☐
    - Neutral ☐
    - Somewhat unlikely ☐
    - Very unlikely ☐

21. Would the likelihood of you purchasing efficient equipment *instead of standard equipment when existing equipment fails and needs to be replaced change if you could receive a* rebate covering 30% - 40% of the installed cost of the energy efficient? If Yes,

Very likely	☐
Somewhat likely	☐
Neutral	☐
Somewhat unlikely	☐
Very unlikely	☐

22. Would the likelihood of you purchasing efficient equipment *instead of standard equipment when existing equipment fails and needs to be replaced change if you could receive a* rebate covering 40% - 50% of the installed cost of the energy efficient? If Yes,

Very likely	☐
Somewhat likely	☐
Neutral	☐
Somewhat unlikely	☐
Very unlikely	☐

23. Would the likelihood of you purchasing efficient equipment *instead of standard equipment when existing equipment fails and needs to be replaced change if you could receive a* rebate covering 50% -75% of the installed cost of the energy efficient? If Yes,

Very likely	☐
Somewhat likely	☐
Neutral	☐
Somewhat unlikely	☐
Very unlikely	☐

24. When making a decision regarding energy efficient equipment, do you consider how quickly the savings will payback any additional investment that is required? ________ (yes/no)

If Yes,

(a) What payback would you require on additional investment to purchase in energy efficient equipment?

Less than 1 year
Less than 1.5 years
Less than 2 years
Less than 3 years
Other: less than _______ years

25. What other factors do you consider when making a decision regarding the purchase of energy efficient equipment?

Lower monthly electric bills	☐
Increased level of employee comfort	☐
Helping to protect the environment	☐
Improving the image or value of your business	☐
Receiving a rebate or tax incentive	☐
Recommendation of sales person, contractor, or consultant	☐
Other____	☐

IV. Interior & Exterior Lighting (Excluding Refrigeration Lighting)

Lighting Fixture Inventory: Utilize maintenance staff or contact reported info as available as well as lamp and ballast stocking information to inform as much detailed information as possible. Use multiplier if location is identical to others (offices, hallway runs, etc.).

Location. Use multiple lines for locations as needed to cover unique lighting encountered.	Fixture Type	Ballast Type Unk, ESMB, MB, EB	If fluorescent, has reflector?	Tube Length *(feet)*	Fixture Wattage (populate for non-IFT lamps only)	Fixture Count	Lamp Type	# of Lamps Per Fixture	Weekly operating hours (by location, not fixture)	Control	Location Multiplier

Fixture Type Codes: IFT = Interior Fluorescent Tube, I**NFT** = Interior Non Fluorescent Tube, **EX** = Exit Signs, OAF = Outdoor Area Fixture, Wall = Wallpack, PGF = Parking Garage Fixture

Lamp Type Codes: T5 = 5/8" Fluorescent Tube**, T8 =** 1" Fluorescent Tube**, HPT8** = High Performance T8**, RWHPT8 =** Reduced Wattage HPT8, **T12 =** 1.5" Fluorescent Tube, **T12HO** = High Output T12, **EST12** = Energy Saving T12, **LED** = LEDs, **CCB** = Cold Cathode Bulb, **I** = Incandescent, **CF** = Compact Fluorescent, **CIR** = Circline Fluorescent, **MV** = Mercury Vapor, **PSMH** = Pulse Start Metal Halide, **SMH** = Standard Metal Halide, **HPS** = High Pressure Sodium, **LPS** = Low Pressure Sodium, **Q =** Quartz/Halogen, **EI** = Electrodeless/Induction,

Lighting Control Codes:
M = Manual On/Off, **MD** = Manual Dimmer, **ROS** = Remote Occupancy Sensor, **SOS** = Switch Occupancy Sensor**, DLC** = Daylight - continuous dimming, **DLS** = Daylighting - stepped dimming, **EMS** = Energy Management System, TC = Time clock, **PC** = Photocell, **EMS** = Exterior Motion Sensor, **Oth** = Other

26. Other Lighting: Where manual switching is used, what percent of the time are lights turned off when an area is not in use? ________ %

V. Facility Cooling, Ventilation and /HVAC Controls

Facility Cooling Systems

Item #	Type	# of Systems	Size (Tons) 12k Btuh = 1 Ton	SEER, EER or kW/ton	Age	Manufacturer	Model #
1							
2							
3							
4							
5							
6							
7							
8							
9							

Common System Types and Abbreviations:

Cooling	Abbrev
Water Cooled Chiller	WC
Air Cooled Chiller	AC
Split System	SS
Mini-Split System	MSS
Packaged System	PS
Heat Pump	HP
Packaged Terminal Air Conditioner	PTAC
Window Unit A/C	WU
Other (specify)	

Other HVAC Questions:

27. Do you have programmable thermostats (or an Energy Management System) installed? ________(yes/no)
    a. If yes, what percentage of the facility has them? _________
    b. What are the setpoints? Weekdays ______days _______nights
       Weekends ______days _______nights

28. If you do not have programmable thermostats or an EMS system, do you manually adjust temperature settings when the facility is unoccupied? _______ (yes/no)

29. Do you have outside air economizers? ________(yes/no)

30. Do you have humidity controls? _________(yes/no)

31. Do you have VFD's on cooling tower fans? _________(yes/no)

32. How often do you tune the chiller and HVAC systems? _________(yes/no)

33. Have you had any duct sealing processes performed? __________(yes/no)

34. Are ducts insulated?________ (yes/no)

V. Facility Cooling, Ventilation and /HVAC Controls (Continued)

Air Handling Units

Item #	# of Systems	Supply Fan HP	Return Fan HP	Exhaust Fan HP	Sup. Motor Eff	Ret Motor Eff	Exh Motor Eff	Capacity (CFM)	Outdoor Air %	VFD ?	Demand Control Ventilation ?
1											
2											
3											
4											
5											

Cooling Towers

Item #	Manufacturer	Model #	# Fans	HP fan	Fan Motor Eff	Pump HP	Pump Eff	Gallons per minute	Age	VFD Fan?	VFD Pump ?
1											
2											
3											
4											

35. Are any large air circulation fans used in the facility that are not part of the air handling units such as large ceiling fans used in agriculture or warehouses. _______ (yes/no)
    a. If yes, how many fans____________
    b. Are any of these fans High Volume Low Speed (HVLS) Fans________ (yes/no)
    c. If yes, how many are HVLS?____________

VI. Building Envelope

Insulation

Wall Insulation type (From Insulation Type table below)	
Wall insulation (inches)	
Roof Insulation Type (From Insulation Type table below)	
Roof Insulation (inches)	
Ceiling Insulation Type (From Insulation Type table below)	
Ceiling Insulation (inches)	
Floor Insulation type (From Insulation table below)	
Floor Insulation (inches)	

	Insulation Types	(R/in)
BAT	Batt or Blanket	3.3
LSF	Loose fill	2.7
XPE	Expanded perlite	2.8
XPS	Expanded polystyrene	3.8-5.0
RDG	Rigid board	2.8-4.0
N	None	0
OTH1	Other1 ___________	_____
OTH2	Other2 ___________	_____

Windows/Fenestration:

		G1	G2	G3
Layers of glazing		1 2 3	1 2 3	1 2 3
Type of glazing	**C** = Clear **T** = Tinted **R** = Reflective **O** = Opaque, S = Spectrally Selective	C T R O S	C T R O S	C T R O S
Glazing features	**N** = None **L** = Low E **G** = Gas Filled	N L G	N L G	N L G
Interior shading	**F** = Fixed **M** = Moveable **N** = None	F M N	F M N	F M N
Quantity of windows				
Average Window Dimensions		H = W =	H = W =	H = W =

VII. Electric Water Heating

Item No.	Water Heater Type	Storage (Gal)	Extra Tank Wrap? (Y/N)	Percent Used for Process Heat (enter 0 if DHW only)	Count	Age (Yrs)	Water temp reading	Eff.	Input Capacity (kW)	General Use in Facility (restroom, pool, process, etc.)	Manuf.	Model #
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Water Heater Types	Abbreviation
Stand Alone Storage	SAS
On-Demand Tankless	ODT
Point of Use	POU
Booster Water Heater	BWH
Heat Pump Water Heater	HPWH
Solar Water Heater Assisted	SWHA
Heat Recovery	HR

36. Are hot water pipes insulated (yes/no)
37. Are the circulation pumps on a time-clock? _________(yes/no)
38. Is solar assisted heating used to pre-heat hot water? _______(yes/no)
39. Is drain water heat recovery used? _______(yes/no)

40. Is a demand controlled circulating system used? _______(yes/no)
41. If water heat is non-electric, what is the fuel type?
    a. Natural Gas ☐
    b. Propane ☐
    c. Oil ☐
    d. Other______________________

VIII. Non HVAC Motors

Item #	Service Type	Control Type (VFD?)	Size (hp)	# of Units	Nom. Eff. %**	Avg. Age (yrs)	Avg. run hrs. per week*
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

* "Avg. run hrs. per week" estimate is required for each motor item.

** Enter Nominal Efficiency as a % or if not available, use: **S**=Standard **H**=High-efficiency **P**=Premium-efficiency

Motor Codes

Service Type	Control Type
P : Pump	**T** : Throttled
F : Fan/Blower	**M** : Mechanical VFD
M: Material Handling/conveyor	**E** : Electronic VFD
T : Machine Tool	**C** : Constant Speed
G : Grinding/milling	
E : Escalator	
PE : Passenger Elevator	
FE : Freight Elevator	
S : Separation	
O : Other ____________	

IX. Refrigeration - Self Contained

Non-Commercial Refrigerator/Freezers:

N/A ☐

Item #	Equip Code	Equipment Description	Total # of Units	Average Age (years)	Energy Star? (Y/N)	Manufacturer	Model #
1	1D	Single-door					
2	2D	Two-door (**T**op, **B**ottom or **S**ide freezer)					
3	UC	Under counter					
4	UF	Upright freezer					
5	CH	Chest freezer					
6	OT	*(describe)*____________					

Self-Contained Commercial Refrigeration Equipment:

N/A ☐

Item #	Equip Code	Size (L. Ft or Cu. Ft)	# of Doors	*Amps	Voltage	Age Yrs.	Total # of units	Lighting Type Code	Lighting Control (Y/N)	Door Heater Controls (Y/N)	Zero Energy Doors (Y/N)	High Eff. Evap. Fan Motor (Y/N)	Evap. Fan Motor Control (Y/N)	Defrost Control (Y/N)
1														
2														
3														
4														
5														
6														
7														
8														
9														

**Note: Amps listed should not include defrost heater amperage.*

Self-Contained Commercial Refrigeration Equipment Codes

Equip Code	Equipment Description	Lighting Type Code	Description
GDR	Glass Door Reach-In Refrigerator	FL	Fluorescent
GDF	Glass Door Reach-In Freezer	LED	LED
SDR	Solid Door Reach-In Refrigerator	I	Incandescent
SDF	Solid Door Reach-In Freezer	N	None
GDB	Glass door beverage cases (e.g. vendor supplied) from 2 to 4 doors		
OU	Open upright display cases (pizza, juice, etc.) usually 4,5,6 ft lengths		
IC	Island cases (cheese, sometimes produce or juice) from 8 to 16 ft long		
SC	Service cases (bakery, sometimes deli) from 4 to 8 ft long		
CD	Closed door storage cabinets (e.g. backbar storage cabinet for wine & beer)		
CF	Coffin type glass top freezer cases (usually ice cream) typically 6 or 8 ft		
OT	Other: self-contained refrigeration not listed above		
VM	Soft drink vending machine		
IV	Ice vending machines (hotel-sized icemaker)		

X. Remote Refrigeration:

Remote Refrigeration Equipment:

Item #	Equip Code	Size (L. Ft or Cu. Ft)	# of Doors	Age Yrs.	Total # of units	Case Lighting Type Code	Lighting Control (Y/N)	Door Heater Controls (Y/N)	Zero Energy Doors (Y/N)	High Eff. Evap. Fan Motor ECM (Y/N)	Evap. Fan Motor Control (Y/N)	Defrost Controls (Y/N)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Equip Code	Equipment Description		Lighting Type Code	Description
RDC	Remote Refrigeration Merchandiser		FL	Fluorescent
RRIC	Remote Reach-In Cooler		LED	LED
RRIF	Remote Reach-In Freezer		I	Incandescent
WIC	Walk-In Cooler		N	None
WIF	Walk-In Freezer			
OTRR	Other remote refrigeration not listed above			

Compressors:

Item #	Type Code	HP	Age Yrs.	Floating Head Pressure Controls (Y/N)	Heat Recovery Type Code	Serves Cases or Walk-ins?	Manufacturer	Model #
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Compressor Type Codes

Code	Type
Recip	Reciprocating
Screw	Screw
Rot	Rotary
Cent	Centrifugal
Scroll	Scroll
Disc	Discus

Heat Recovery Type Code

Code	Type
N	None
W	Water Heating
S	Space heating/Reheat
O	Other

Condensers:

Item #	Type Code	Age Yrs.	Fan HP (all types)	High Eff. Condenser Fan Motor ECM (Y/N)	Fan VSD (Y/N)	High Eff. Condenser Pump Motor ECM (Y/N)	Pump VSD (Y/N)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Condenser Type Codes

Code	Type
A	Air Cooled
W	Water Cooled
P	Air Cooled w/precooler
C	Close Approach

XI - Compressed Air

Item #	Description	Comp Type	Appl Type	Control Type	Drive Type	Size (hp)	# of Units	Nom. Eff. %**	Supply Pressure (psi)	Avg. Age (yrs)	Avg. run hrs per week*	Manufacturer	Model#
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

* "Avg. run hrs per week" estimate is required for each air compressor item

** Enter Nominal Efficiency as a % or if not available, use: **S**=Standard **H**=High-efficiency **P**=Premium-efficiency

Air Compressor Codes

Compressor Type	Application Types	Control Type	Drive Type
RTD: Reciprocating (Two-stage, Double-acting) RST: Reciprocating (Single-stage, Double-acting) RTS: Reciprocating (Two-stage, Single-acting) RSS: Reciprocating (Single-stage, Single-acting) ST: Rotary Screw (Two-stage) C: Centrifugal O: Other ________________	B-Blowoff Nozzles D-Drying H-HVAC Pneumatic O-Other _________	**S**-Start/Stop L-Load/Unload V-VSD Throttling T-Throttling O-Other ________	**AC** **DC** **N : Non-electric**

42. Does the facility have a Leak Reduction Maintenance Program? _____________(yes/no)
    a. If so, how often do you check for leaks? ___________________________

43. Is compressed air used for blow-off___________(yes/no)
    e. If yes, what percentage of blow-off nozzles have engineered nozzles? _______________

XII – Process Electric Heating

Item #	Process Code	Product Produced	# of Machines	Rated Heat Input (specify units)	Avg. Age of Equipment (yrs)	Waste Heat Recovery (Y/N)	Avg. Operating hrs. per week
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Process Codes

Process	Process Code
Heat Processing	HP
Dehydration	DHD
Material Preparation:	MP
Filtration	FL
Finishing	FI
Pulping	PLP
Paper Preparation	PP
Separation and Distillation	SD
Solid-Liquid Extraction	SLE
Plastic Molding	PM
Washing and Drying	WD
Drying/Curing/Baking	DCB
Refrigeration/Freezing	RF
Mixing and Emulsification	M&E
Fiber Preparation	FP
Crystallization	CR
Screening and Separation	SS
Exploration and Drilling	ED
Emission Reduction Equipment	ERD

44. If Emissions Reduction Equipment (ERD) is used what type of equipment is this? _______________

    a. If thermal oxiders, are they regenerative (recover heat from the process)? __________

XIII - Cooking/Food Service Equipment (Electric Only)

Item #	Equip Code	Equipment Description	Total # of *Electric* Units	Unit Watts	Avg. operating hrs. per week	Avg. Age Yrs.	Cooking Energy Efficiency	Idle Energy Rate (watts)	Manufacturer	Model #	Interior Volume Ft^3
	FS	Fryer - Standard									N/A
	FLV	Fryer – Large Vat									N/A
	G	Griddle									N/A
	HFHC	Hot Food Holding Cabinet					N/A				
	OV	Oven (in Range or standalone)									N/A
	COHS	Oven, Convection – Half Size (1)									N/A
	COFS	Oven, Convection – Full Size (2)									N/A
	ICO	Infrared Conveyor Oven									N/A
	PC	Oven, Pizza, Counter-top									N/A
	PL	Oven, Pizza, Large									N/A
	SC3	Steamer Cooker – 3 pan									N/A
	SC4	Steamer Cooker – 4 pan									N/A
	SC5	Steamer Cooker – 5 pan									N/A
	SC6	Steamer Cooker – 6+ pan									N/A
	EH	Exhaust Hood					N/A	N/A			N/A

(1) Half-Size Convection Oven: A convection oven that is able to accept a minimum of five sheet pans measuring 18 x 13 x 1-inch.
(2) Full-Size Convection Oven: A convection oven that is able to accept a minimum of five standard full-size sheet pans measuring 18 x 26 x 1-inch.

45. Does the facility use pre-rinse spray nozzles? _______________
    b. If so, what percentage are low flow? ________________

46. How many of the exhaust hoods are demand controlled? ___________

47. How many of the exhaust hoods have a make-up air supply? __________

XIV - Pool/SPA

☐ N/A

	# 1	# 2	# 3
Type: **S** = Swimming Pool **H** = Hot Tub **O** = Other________	S H O	S H O	S H O
What is the size of the pool (sq. ft.)?			
Dedicated water heater? If yes, note Item #			
Pool Cover in use?	Y N	Y N	Y N
Months heated start... (1…12)			
stop... (1…12)			
Solar collector area in use (ft^2)			
Temperature Control Measures?	Y N	Y N	Y N
On-Demand Ventilation Control?	Y N	Y N	Y N

XV – Other (Time Permitting)

Item #	**Equip ment Code**	**Equipment Description**	**Total # of units (check one)**					**ENERGY STAR?**	**Avg. age of stock (yrs)**	**How often replaced? (yrs)**
			0	**1 - 5**	**6 - 20**	**21 - 50**	**> 50**	**Yes/No**		
1	PC	Personal Computer								
2	PTR	Printer								
3	UPS	Uninterruptible Power Supply								
4	COP	Copier								
6	MON	Monitor								
10	FAX	FAX machine								
11	MFM	Multi-Function Machine								
12	POS	Point-of-Sale Terminals								
13	REG	Cash Registers								
14	SHRD	Shredder								
15	RCW	Residential Clothes Washers								
16	CCW	Commercial Clothes Washers								
17	TV	Televisions								
18	DH	Dehumidifier								
19	PEH	Portable Electric Heater								
20	EV	Electric Vehicles (That must be plugged in)								
21	FBH	Fleet Block Heaters								

XVI – Distributed Generation

1. How would you rate you facility's need for backup, or redundant, energy on a scale of 1-5, where 1=Useless and 5=Critical?
    1. Useless
    2. Not very important
    3. Somewhat important
    4. Very important
    5. Critical
    99 Don't know/Refused

2. Do you currently have any backup or emergency standby generation, base-load power generation, combined heat and power (CHP) generation, cogeneration, distributed generation, or any other onsite power generation capabilities?
    a. Yes
    b. No → Go to 3
    c. Don't know/Refused → Go to 3

Resource Code	Equipment Description	Brand	kW	Fuel Type	Primary Function	% of Facility Power Needs Met (Enter Code)	Is the Heat Recovered and Used For Any Purpose? (See Note 1)	Deciding Factor to Install Equipment	Current Plans to Upgrade? (Yes/No)

Resource Codes: Solar Photovoltaic = SPV, Wind, Combined Heat & Power = CHP

Percent of Facility Power Needs Met:
1= Less Than 10%
2= 10% - 30%
3= 30% - 50%
4= >50%
5 = Backup/standby only

Note 1: If system is not wind or SPV

3. Are you familiar with the following distributed generation systems:

Technology	Familiarity (Yes/No)	Description (if needed)	Would your company have an interest in installing this type of system? (Yes/No)	Intended Use (See Codes Below)
Combined Heat and Power (CHP)		CHP, or cogeneration systems, generate both electricity and heat. A CHP system can provide up to 100% of your electric power needs, and heat to meet your space heating, hot water, and/or air-conditioning needs. These systems are typically also connected to the grid to ensure nearly 100% reliability—that is, if the system should ever fail, you still have your local power connection to keep everything running without interruption		
Solar Thermal or Solar Hot Water		Solar thermal systems include collector tanks in which water is heated by the sun's energy.		
Photovoltaics		Photovoltaics, or PV, include solar arrays that convert the sun's energy into electricity.		
Wind turbine		Wind turbines covert the wind's energy into electricity.		

Intended Use Codes

1) Backup power for critical equipment
2) To provide for excess (peak) demand
3) To provide base load
4) To provide for all electricity needs
5) To provide for all or some heating needs
6) To provide for all or some hot water needs
7) To provide for all or some cooling needs
8) Other _______________

4. Why might your company not be interested in such equipment? [Check all that apply]

   a. Don't need
   b. Too expensive
   c. Not focus of business
   d. Other [Verbatim]____
   ____
   ____
   e. Don't know/Refused

5. Do you think that the ability to manage your own electrical power production, while still being able to rely on the grid as a fallback, is a benefit or a liability?

   a. Benefit
   b. Liability
   c. Other ___________________________
   d. Don't know/Refused

APPENDIX B. FREQUENCY TABLES

Question 2, Building Type

	Frequency	Percent
Beverage	2	2%
Chemicals	1	1%
Education	7	5%
Fabricated Metal	7	5%
Furniture	2	2%
Grocery	20	15%
Health	6	5%
Lodging	2	2%
Non-Metallic Mineral	1	1%
Office	18	14%
Other Commercial	16	12%
Other Manufacturing	5	4%
Plastic and Rubber Products	3	2%
Printing	3	2%
Restaurant	15	11%
Retail	18	14%
Transportation Equipment	3	2%
Warehouse	1	1%
Wood Products	3	2%
Grand Total	**133**	**100%**

Question 2, Customer Class

	Frequency	Percent
Commercial	103	77%
Industrial	30	23%
Grand Total	**133**	**100%**

Question 3, Is this space owner occupied?

	Frequency	Percent
Leased	30	23%
Owner-Occupied	99	74%
NR/NA	4	3%
Grand Total	**133**	**100%**

Question 4, Approximately how many full time employees report to this business location?

	Frequency	Percent
<10	83	62%
10 - 49	37	28%
50 - 99	4	3%
100+	7	5%
NR/NA	2	2%
Grand Total	**133**	**100%**

Question 5, 5. What is the approximate floor area of this business?

Square Feet	Frequency	Percent
<1000	9	7%
1000 - 4999	58	44%
5000 - 9999	22	17%
10000 - 99999	36	27%
Grand Total	**133**	**100%**

Question 6, Number of Floors

	Frequency	Percent
1	94	71%
1.5	3	2%
2	21	16%
3	11	8%
35	1	1%
195	1	1%
NR/NA	2	2%
Grand Total	**133**	**100%**

Question 7.1, 7. Estimated exterior building wall dimensions

Wall 1 height (ft.)	Frequency	Percent
<10	67	50%
10 - 19	45	34%
20+	21	16%
Grand Total	**133**	**100%**

Wall 2 height (ft.)	Frequency	Percent
<10	35	26.32%
10 - 19	27	20.30%
20+	5	3.76%
NR/NA	66	49.62%
Grand Total	**133**	**100.00%**

Wall 3 height (ft.)	Frequency	Percent
<10	32	24.06%
10 - 19	27	20.30%
20+	5	3.76%
NR/NA	69	51.88%
Grand Total	**133**	**100.00%**

Wall 4 height (ft.)	Frequency	Percent
<10	30	22.56%
10 - 19	25	18.80%
20+	5	3.76%
NR/NA	73	54.89%
Grand Total	**133**	**100.00%**

Wall 1 width (ft.)	Frequency	Percent
<50	23	17.29%
50 - 99	24	18.05%
100 - 499	56	42.11%
500 +	17	12.78%
Don't know	1	0.75%
NR/NA	12	9.02%
Grand Total	**133**	**100.00%**

Wall 2 width (ft.)	Frequency	Percent
<50	25	18.80%
50 - 99	24	18.05%
100 - 499	14	10.53%
500 +	1	0.75%
Don't know	1	0.75%
NR/NA	68	51.13%
Grand Total	**133**	**100.00%**

Wall 3 width (ft.)	Frequency	Percent
<50	23	17.29%
50 - 99	21	15.79%
100 - 499	14	10.53%
500 +	1	0.75%
Don't know	1	0.75%
NR/NA	73	54.89%
Grand Total	**133**	**100.00%**

Wall 4 width (ft.)	Frequency	Percent
<50	25	18.80%
50 - 99	18	13.53%
100 - 499	12	9.02%
500 +	1	0.75%
Don't know	1	0.75%
NR/NA	76	57.14%
Grand Total	**133**	**100.00%**

Question 8, Number of buildings

	Frequency	Percent
1	109	82%
2	12	9%
3	5	4%
10	1	1%
18	2	2%
37	1	1%
39	1	1%
NR/NA	2	2%
Grand Total	**133**	**100%**

Question 9, In what year were buildings constructed?

	Frequency	Percent
Pre-1900	18	14%
1900-1949	16	12%
1950-1979	29	22%
1980-1999	27	20%
2000-2012	16	12%
Multiple responses	16	12%
Don't know	8	6%
NR/NA	3	2%
Grand Total	**133**	**100%**

Question 10, How many hours per week does the commercial business or industrial facility operate?

	Frequency	Percent
Under 40	5	4%
40-59	60	45%
60-99	40	30%
100+	23	17%
NR/NA	5	4%
Grand Total	**133**	**100%**

Question 11, Is this a seasonal business?

	Frequency	Percent
No	122	92%
Yes	8	6%
NR/NA	3	2%
Grand Total	**133**	**100%**

Question 12, How many months per year does the business operate?

	Frequency	Percent
5	2	2%
9	2	2%
10 - 11	6	5%
12	120	90%
NR/NA	3	2%
Grand Total	**133**	**100%**

Question 13, How many holidays does your business recognize over the calendar year

	Frequency	Percent
<10	95	71%
10 - 19	31	23%
20+	3	2%
Multiple responses	1	1%
NR/NA	3	2%
Grand Total	**133**	**100%**

Question 14, Are there any other scheduled shutdowns every year such as for summer vacation?

	Frequency	Percent
No	112	84%
Yes	19	14%
NR/NA	2	2%
Grand Total	**133**	**100%**

Question 15, If Yes, How many weeks?

	Frequency	Percent
0	31	23%
1	7	5%
2	3	2%
3	1	1%
6	1	1%
9	1	1%
10	4	3%
12	1	1%
NR/NA	84	63%
Grand Total	**133**	**100%**

Question 16, How many months per year do you operate your primary heating systems?

	Frequency	Percent
1	1	0.75%
2	2	1.50%
3	1	0.75%
4	2	1.50%
5	10	7.52%
6	19	14.29%
7	46	34.59%
8	43	32.33%
9	1	0.75%
10	1	0.75%
11	0	0.00%
12	5	3.76%
NR/NA	2	1.50%
Grand Total	**133**	**100.00%**

Question 17, How many months per year do you operate your primary cooling systems?

	Frequency	Percent
0	43	32.33%
1	2	1.50%
2	13	9.77%
3	16	12.03%
4	26	19.55%
5	14	10.53%
6	8	6.02%
7	3	2.26%
9	1	0.75%
10	0	0.00%
11	0	0.00%
12	3	2.26%
NR/NA	4	3.01%
Grand Total	**133**	**100.00%**

Question 18, Do you have an Energy Management System (EMS) at this facility?

	Frequency	Percent
No	118	89%
Yes	10	8%
NR/NA	5	4%
Grand Total	**133**	**100%**

Question 19, Is the system working properly?

	Frequency	Percent
No	1	0.75%
Yes	9	6.77%
NR/NA	123	92.48%
Grand Total	**133**	**100.00%**

Question 19, What is the age of the system?

Years	Frequency	Percent
0	5	3.76%
1	1	0.75%
2	1	0.75%
5	1	0.75%
6	2	1.50%
10	1	0.75%
11	2	1.50%
20	1	0.75%
40	1	0.75%
NR/NA	118	88.72%
Grand Total	**133**	**100.00%**

Question 20, How likely would you be to purchase energy efficient equipment instead of standard equipment when existing equipment fails and needs to be replaced?

	Frequency	Percent
Very unlikely	3	2.26%
Somewhat unlikely	11	8.27%
Neutral	31	23.31%
Somewhat likely	58	43.61%
Very likely	25	18.80%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Question 21, Would the likelihood of you purchasing efficient equipment instead of standard equipment when existing equipment fails and needs to be replaced change if you could receive a rebate covering 30% - 40% of the installed cost of the energy efficient?

	Frequency	Percent
Very unlikely	1	0.75%
Somewhat unlikely	3	2.26%
Neutral	10	7.52%
Somewhat likely	62	46.62%
Very likely	52	39.10%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Question 22, Would the likelihood of you purchasing efficient equipment instead of standard equipment when existing equipment fails and needs to be replaced change if you could receive a rebate covering 40% - 50% of the installed cost of the energy efficient?

	Frequency	Percent
Somewhat unlikely	2	1.50%
Neutral	3	2.26%
Somewhat likely	35	26.32%
Very likely	88	66.17%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Question 23, Would the likelihood of you purchasing efficient equipment instead of standard equipment when existing equipment fails and needs to be replaced change if you could receive a rebate covering 50% -75% of the installed cost of the energy efficient?

	Frequency	Percent
Somewhat unlikely	4	3.01%
Neutral	3	2.26%
Somewhat likely	12	9.02%
Very likely	109	81.95%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Question 24, When making a decision regarding energy efficient equipment, do you consider how quickly the savings will payback any additional investment that is required?

	Frequency	Percent
No	53	39.85%
Yes	75	56.39%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Question 24, If Yes, what payback would you require on additional investment to purchase in energy efficient equipment?

	Frequency	Percent
It depends upon the project.	1	0.75%
Less than 1 year	4	3.01%
Less than 1.5 years	4	3.01%
Less than 2 years	21	15.79%
Less than 3 years	28	21.05%
Other	21	15.79%
NR/NA	54	40.60%
Grand Total	**133**	**100.00%**

Question 25, What other factors do you consider when making a decision regarding the purchase of energy efficient equipment?

	Frequency	Percent
Environment	44	33.08%
Improved Image	56	42.11%
Increased Comfort	46	34.59%
Lower bills	126	94.74%
Other	1	0.75%
Recommendation	19	14.29%
Tax Incentive	76	57.14%
Grand Total	**N/A**	**N/A**

Question 26, Other Lighting: Where manual switching is used, what percent of the time are lights turned off when an area is not in use?

% of Time	Frequency	Percent
0	11	8.27%
25	1	0.75%
30	1	0.75%
40	1	0.75%
50	2	1.50%
75	1	0.75%
80	1	0.75%
100	21	15.79%
NR/NA	94	70.68%
Grand Total	**133**	**100.00%**

Question 27, Do you have programmable thermostats (or an Energy Management System) installed?

	Frequency	Percent
No	77	57.89%
Yes	21	15.79%
NR/NA	35	26.32%
Grand Total	**133**	**100.00%**

Question 27, If yes, what percentage of the facility has them?

% of Facility	Frequency	Percent
0	7	5.26%
5	1	0.75%
15	1	0.75%
20	1	0.75%
33	1	0.75%
50	1	0.75%
60	1	0.75%
75	1	0.75%
100	11	8.27%
NR/NA	108	81.20%
Grand Total	**133**	**100.00%**

Question 27, What are the setpoints?

Weekday Day (degrees)	Frequency	Percent
55	1	0.75%
65	1	0.75%
66	2	1.50%
68	8	6.02%
69	2	1.50%
70	7	5.26%
72	3	2.26%
73	1	0.75%
Don't know	1	0.75%
NR/NA	107	80.45%
Grand Total	**133**	**100.00%**

Weekday Night (degrees)	Frequency	Percent
0	1	0.75%
55	1	0.75%
60	8	6.02%
62	1	0.75%
63	1	0.75%
64	1	0.75%
65	6	4.51%
66	1	0.75%
68	2	1.50%
70	3	2.26%
NR/NA	108	81.20%
Grand Total	**133**	**100.00%**

Weekend Day (degrees)	Frequency	Percent
55	1	0.75%
60	5	3.76%
62	1	0.75%
65	4	3.01%
66	2	1.50%
68	6	4.51%
70	4	3.01%
72	1	0.75%
73	1	0.75%
Don't know	1	0.75%
NR/NA	107	80.45%
Grand Total	**133**	**100.00%**

Weekend Night (degrees)	Frequency	Percent
0	1	0.75%
55	1	0.75%
60	10	7.52%
62	1	0.75%
64	1	0.75%
65	4	3.01%
66	2	1.50%
68	1	0.75%
686	1	0.75%
70	3	2.26%
NR/NA	108	81.20%
Grand Total	**133**	**100.00%**

Question 28, If you do not have programmable thermostats or an EMS system, do you manually adjust temperature settings when the facility is unoccupied?

	Frequency	Percent
No	49	36.84%
Yes	17	12.78%
NR/NA	67	50.38%
Grand Total	**133**	**100.00%**

Question 29, Do you have outside air economizers?

	Frequency	Percent
No	49	36.84%
Yes	5	3.76%
NR/NA	79	59.40%
Grand Total	**133**	**100.00%**

Question 30, Do you have humidity controls?

	Frequency	Percent
No	47	35.34%
Yes	6	4.51%
NR/NA	80	60.15%
Grand Total	**133**	**100.00%**

Question 31, Do you have VFD's on cooling tower fans?

	Frequency	Percent
No	41	30.83%
Yes	5	3.76%
NR/NA	87	65.41%
Grand Total	**133**	**100.00%**

Question 32, How often do you tune the chiller and HVAC systems?

	Frequency	Percent
As needed	10	7.52%
Once Per Year	17	12.78%
One Every 2 Years	4	3.01%
Other	4	3.01%
Twice Per Year	4	3.01%
when stops working	2	1.50%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Question 33, Have you had any duct sealing processes performed?

	Frequency	Percent
No	24	18.05%
Yes	9	6.77%
NR/NA	100	75.19%
Grand Total	**133**	**100.00%**

Question 34, Are ducts insulated?

	Frequency	Percent
No	12	9.02%
Yes	21	15.79%
NR/NA	100	75.19%
Grand Total	**133**	**100.00%**

Question VI, Insulation

	Frequency	Percent
Batt or Blanket	80	60.15%
Expanded perlite	1	0.75%
Expanded polystyrene	2	1.50%
Loose fill	14	10.53%
None	30	22.56%
Rigid board	1	0.75%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Wall Inches	Frequency	Percent
0	17	12.78%
1 – 4	63	47.37%
5 – 8	28	21.05%
9+	6	4.51%
Don't know	1	0.75%
NR/NA	18	13.53%
Grand Total	**133**	**100.00%**

Roof Insulation	Frequency	Percent
Batt or Blanket	23	17.29%
Expanded polystyrene	2	1.50%
Loose fill	2	1.50%
None	3	2.26%
Rigid board	11	8.27%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Roof Inches	Frequency	Percent
0	3	2.26%
1 - 4	12	9.02%
5 - 8	15	11.28%
9+	10	7.52%
Don't know	1	0.75%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Ceiling Insulation	Frequency	Percent
Batt or Blanket	53	40%
Expanded perlite	1	1%
Expanded polystyrene	1	1%
Loose fill	15	11%
None	19	14%
Rigid board	4	3%
NR/NA	40	30%
Grand Total	**133**	**100%**

Ceiling Inches	Frequency	Percent
0	11	8.27%
1 - 4	16	12.03%
5 - 8	23	17.29%
9+	33	24.81%
Don't know	1	0.75%
n/a	1	0.75%
NR/NA	48	36.09%
Grand Total	**133**	**100.00%**

Floor Insulation	Frequency	Percent
Expanded polystyrene	2	1.50%
None	55	41.35%
Rigid board	9	6.77%
NR/NA	67	50.38%
Grand Total	**133**	**100.00%**

Question VI, Windows/Fenestration

Glaze Layers 1	Frequency	Percent
1	26	19.55%
2	95	71.43%
3	1	0.75%
NR/NA	11	8.27%
Grand Total	**133**	**100.00%**

Glaze Layers 2	Frequency	Percent
1	9	7%
2	32	24%
NR/NA	92	69%
Grand Total	**133**	**100%**

Glaze Layers 3	Frequency	Percent
1	5	3.76%
2	6	4.51%
NR/NA	122	91.73%
Grand Total	**133**	**100.00%**

Glaze Type 1	Frequency	Percent
Clear	100	75.19%
Opaque	1	0.75%
Reflective	4	3.01%
Tinted	17	12.78%
NR/NA	11	8.27%
Grand Total	**133**	**100.00%**

Glaze Type 2	Frequency	Percent
Clear	33	24.81%
Tinted	8	6.02%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Glaze Type 3	Frequency	Percent
Clear	8	6.02%
Tinted	3	2.26%
NR/NA	122	91.73%
Grand Total	**133**	**100.00%**

Glaze Features 1	Frequency	Percent
Low E	36	27.07%
None	85	63.91%
NR/NA	12	9.02%
Grand Total	**133**	**100.00%**

Glaze Features 2	Frequency	Percent
Low E	12	9.02%
None	29	21.80%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Glaze Features 3	Frequency	Percent
Low E	2	1.50%
None	9	6.77%
NR/NA	122	91.73%
Grand Total	**133**	**100.00%**

Interior Shading 1	Frequency	Percent
Fixed	2	1.50%
Moveable	15	11.28%
None	105	78.95%
NR/NA	11	8.27%
Grand Total	**133**	**100.00%**

Interior Shading 2	Frequency	Percent
Fixed	1	0.75%
Moveable	3	2.26%
None	37	27.82%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Interior Shading 3	Frequency	Percent
Fixed	1	0.75%
Moveable	1	0.75%
None	9	6.77%
NR/NA	122	91.73%
Grand Total	**133**	**100.00%**

Window Quantity 1	Frequency	Percent
<10	85	63.91%
10-49	33	24.81%
50+	10	7.52%
NR/NA	5	3.76%
Grand Total	**133**	**100.00%**

Window Quantity 2	Frequency	Percent
<10	67	50.38%
10-49	14	10.53%
50+	2	1.50%
NR/NA	50	37.59%
Grand Total	**133**	**100.00%**

Window Quantity 3	Frequency	Percent
<10	73	54.89%
10-49	2	1.50%
NR/NA	58	43.61%
Grand Total	**133**	**100.00%**

Window Dimensions Height1 (in)	Frequency	Percent
<10	25	18.80%
10-49	56	42.11%
50+	39	29.32%
Don't know	1	0.75%
NR/NA	12	9.02%
Grand Total	**133**	**100.00%**

Window Dimensions Height2 (in)	Frequency	Percent
<10	10	7.52%
10-49	18	13.53%
50+	13	9.77%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Window Dimensions Height3 (in)	Frequency	Percent
<10	5	3.76%
10-49	2	1.50%
50+	4	3.01%
NR/NA	122	91.73%
Grand Total	**133**	**100.00%**

Window Dimensions Width1 (in)	Frequency	Percent
<10	24	18.05%
10-49	65	48.87%
50+	31	23.31%
Don't know	1	0.75%
NR/NA	12	9.02%
Grand Total	**133**	**100.00%**

Window Dimensions Width2 (in)	Frequency	Percent
<10	10	7.52%
10-49	16	12.03%
50+	14	10.53%
NR/NA	93	69.92%
Grand Total	**133**	**100.00%**

Window Dimensions Width3 (in)	Frequency	Percent
<10	5	3.76%
10-49	5	3.76%
50+	1	0.75%
NR/NA	122	91.73%
Grand Total	**133**	**100.00%**

Question 36, Are hot water pipes insulated?

	Frequency	Percent
No	36	27.07%
Yes	8	6.02%
NR/NA	89	66.92%
Grand Total	**133**	**100.00%**

Question 37, Are the circulation pumps on a time-clock?

	Frequency	Percent
No	41	30.83%
NR/NA	92	69.17%
Grand Total	**133**	**100.00%**

Question 38, Is solar assisted heating used to pre-heat hot water?

	Frequency	Percent
No	43	32.33%
NR/NA	90	67.67%
Grand Total	**133**	**100.00%**

Question 39, Is drain water heat recovery used?

	Frequency	Percent
No	43	32.33%
NR/NA	90	67.67%
Grand Total	**133**	**100.00%**

Question 40, Is a demand controlled circulating system used?

	Frequency	Percent
No	37	27.82%
NR/NA	96	72.18%
Grand Total	**133**	**100.00%**

Question 41, If water heat is non-electric, what is the fuel type?

	Frequency	Percent
Natural Gas	12	9.02%
Oil	39	29.32%
Other	4	3.01%
Propane	31	23.31%
NR/NA	47	35.34%
Grand Total	**133**	**100.00%**

Question 41, Other fuel types

Other	Frequency	Percent
biomass	1	0.75%
hot gas by-pass off compressors	1	0.75%
landlord	1	0.75%
off boiler	1	0.75%
oil boiler in winter	1	0.75%
on demand - new	1	0.75%
sm 20 gal electric4	1	0.75%
steam boiler	1	0.75%
wood chips	1	0.75%
NR/NA	124	93.23%
Grand Total	**133**	**100.00%**

Section XVI – Distributed Generation

How would you rate you facility's need for backup, or redundant, energy on a scale of 1-5, where 1=Useless and 5=Critical?

	Frequency	Percent
1) Useless	1	0.75%
2) Not very important	41	30.83%
3) Somewhat important	3	2.26%
4) Very important	8	6.02%
5) Critical	4	3.01%
99) Don't know/Refused	1	0.75%
NR/NA	75	56.39%
Grand Total	**133**	**100.00%**

Do you currently have any backup or emergency standby generation, base-load power generation, combined heat and power (CHP) generation, cogeneration, distributed generation, or any other onsite power generation capabilities?

	Frequency	Percent
Don't know/Refused	1	0.75%
No	41	30.83%
Yes	16	12.03%
NR/NA	75	56.39%
Grand Total	**133**	**100.00%**

Why might your company not be interested in such equipment?

	Frequency	Percent
Don't Need	40	30.08%
Too Expensive	0	0.00%
Not Focus	1	0.75%
Other	3	2.26%
Grand Total	**N/A**	**N/A**

Do you think that the ability to manage your own electrical power production, while still being able to rely on the grid as a fallback, is a benefit or a liability?

	Frequency	Percent
Don't know/Refused	2	1.50%
Benefit	5	3.76%
Liability	47	35.34%
NR/NA	79	59.40%
Grand Total	**133**	**100.00%**

Question 42, Does the facility have a Leak Reduction Maintenance Program?

	Frequency	Percent
No	21	15.79%
Yes	9	6.77%
NR/NA	103	77.44%
Grand Total	**133**	**100.00%**

Question 42, If so, how often do you check for leaks?

	Frequency	Percent
Never	2	1.50%
occasionally	3	2.26%
daily	6	4.51%
weekly	4	3.01%
Don't know	1	0.75%
NR/NA	117	87.97%
Grand Total	**133**	**100.00%**

Question 43, Is compressed air used for blow-off

	Frequency	Percent
No	22	16.54%
Yes	6	4.51%
NR/NA	105	78.95%
Grand Total	**133**	**100.00%**

Question 43, If yes, what percentage of blow-off nozzles have engineered nozzles?

% of Nozzels	Frequency	Percent
0	9	6.77%
20	1	0.75%
30	1	0.75%
100	1	0.75%
NR/NA	121	90.98%
Grand Total	**133**	**100.00%**

Question 45, Does the facility use pre-rinse spray nozzles?

	Frequency	Percent
No	21	15.79%
Yes	4	3.01%
NR/NA	108	81.20%
Grand Total	**133**	**100.00%**

Question 45, If so, what percentage are low flow?

	Frequency	Percent
0	4	3.01%
Don't know	1	0.75%
NR/NA	128	96.24%
Grand Total	**133**	**100.00%**

Question 46, How many of the exhaust hoods are demand controlled?

	Frequency	Percent
0	23	17.29%
1	1	0.75%
NR/NA	109	81.95%
Grand Total	**133**	**100.00%**

Question 47, How many of the exhaust hoods have a make-up air supply?

	Frequency	Percent
0	14	10.53%
1	8	6.02%
2	1	0.75%
NR/NA	110	82.71%
Grand Total	**133**	**100.00%**

APPENDIX C. MEASURE DATA

Measure ID	Measure Name	Home Type (SF/MF)	ROB vs. Retrofit vs. NC	Income Target	Base Annual kWh	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Base Saturation	EE Saturation	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
101	Refrigerator Retirement (and Recycling) - No Replacement	SF	Retrofit	All	1320.0	100.0%	1320.0	8	$170.00	8.40%	5.00%	$0.020	5.24	55,829,400	55,829,400	44,658,240
102	Freezer Retirement (and Recycling) - No Replacement	SF	Retrofit	All	1320.0	100.0%	1320.0	8	$170.00	1.90%	5.00%	$0.020	5.24	12,628,440	12,628,440	10,105,920
103	Energy Star Electric Clothes Washer (with electric heating & electric dryer)	SF	ROB	All	728.0	23.3%	169.9	14	$95.00	26.20%	56.50%	$0.055	4.95	3,490,077	3,490,077	1,936,383
104	CEE Tier 2 Clothes Washer (with electric heating & electric dryer)	SF	ROB	All	728.0	32.0%	233.1	14	$250.00	26.20%	56.50%	$0.105	2.60	4,645,824	4,645,824	2,576,714
105	CEE Tier 3 Clothes Washer (with electric heating & electric dryer)	SF	ROB	All	728.0	37.7%	274.6	14	$440.00	26.20%	56.50%	$0.157	1.71	5,474,644	5,474,644	3,036,404
106	Energy Star Electric Clothes Washer (with non-electric heating and electric dryer)	SF	ROB	All	545.3	23.5%	128.2	14	$95.00	62.40%	56.50%	$0.073	4.03	6,269,190	6,269,190	3,477,059
107	CEE Tier 2 Clothes Washer (with non-electric heating and electric dryer)	SF	ROB	All	545.3	32.3%	175.9	14	$250.00	62.40%	56.50%	$0.139	2.13	8,351,886	8,351,886	4,632,450
108	CEE Tier 3 Clothes Washer (with non-electric heating and electric dryer)	SF	ROB	All	545.3	38.0%	207.0	14	$440.00	62.40%	56.50%	$0.208	1.39	9,829,018	9,829,018	5,451,755
109	Energy Star Refrigerator	SF	ROB	All	578.8	20.0%	115.8	17	$70.00	99.00%	40.00%	$0.052	2.26	12,395,348	12,395,348	5,541,262
110	CEE Tier 2 Refrigerator	SF	ROB	All	578.8	25.0%	144.7	17	$150.00	99.00%	40.00%	$0.089	1.32	15,033,317	15,033,317	6,720,592
111	CEE Tier 3 Refrigerator	SF	ROB	All	578.8	30.0%	173.7	17	$225.00	99.00%	40.00%	$0.111	1.06	18,046,214	18,046,214	8,067,497
112	Energy Star Freezer	SF	ROB	All	673.0	10.0%	67.0	11	$33.00	39.50%	12.00%	$0.058	1.89	12,343,544	12,343,544	8,214,200
113	Energy Star Dehumidifier	SF	ROB	All	1167.8	18.8%	219.6	12	$25.00	33.50%	78.00%	$0.012	8.88	8,578,796	8,578,796	5,704,630
114	Energy Star Dishwasher (electric water heating)	SF	ROB	All	355.0	16.9%	60.0	10	$12.00	15.10%	47.00%	$0.025	7.88	2,545,020	2,545,020	1,951,860
115	Energy Star Dishwasher (non-electric water heating)	SF	ROB	All	161.1	16.4%	26.4	10	$12.00	49.10%	47.00%	$0.057	3.99	3,641,220	3,641,220	2,792,830
116	Energy Star Electric Clothes Washer (with electric heating & electric dryer)	SF	NC	All	728.0	23.3%	169.9	14	$95.00	11.53%	0.00%	$0.055	4.95	328,310	328,310	250,821
117	CEE Tier 2 Clothes Washer (with electric heating & electric dryer)	SF	NC	All	728.0	32.0%	233.1	14	$250.00	11.53%	0.00%	$0.105	2.60	436,988	436,988	333,276
118	CEE Tier 3 Clothes Washer (with electric heating & electric dryer)	SF	NC	All	728.0	37.7%	274.6	14	$440.00	11.53%	0.00%	$0.157	1.71	514,947	514,947	392,733
119	Energy Star Electric Clothes Washer (with non-electric heating and electric dryer)	SF	NC	All	545.3	23.5%	128.2	14	$95.00	84.53%	0.00%	$0.073	4.03	1,816,263	1,816,263	1,386,645
120	CEE Tier 2 Clothes Washer (with non-electric heating and electric dryer)	SF	NC	All	545.3	32.3%	175.9	14	$250.00	84.53%	0.00%	$0.139	2.13	2,419,753	2,419,753	1,847,140
121	CEE Tier 3 Clothes Washer (with non-electric heating and electric dryer)	SF	NC	All	545.3	38.0%	207.0	14	$440.00	84.53%	0.00%	$0.208	1.39	2,847,716	2,847,716	2,173,829
122	Energy Star Refrigerator	SF	NC	All	578.8	20.0%	115.8	17	$70.00	111.84%	0.00%	$0.052	2.26	2,171,366	2,171,366	1,657,330
123	CEE Tier 2 Refrigerator	SF	NC	All	578.8	25.0%	144.7	17	$150.00	111.84%	0.00%	$0.089	1.32	2,633,540	2,633,540	2,010,172
124	CEE Tier 3 Refrigerator	SF	NC	All	578.8	30.0%	173.7	17	$225.00	111.84%	0.00%	$0.111	1.06	3,161,340	3,161,340	2,413,040
125	Energy Star Freezer	SF	NC	All	673.0	10.0%	67.0	11	$33.00	26.32%	0.00%	$0.058	1.89	869,526	869,526	663,702
126	Energy Star Dehumidifier	SF	NC	All	1167.8	18.8%	219.6	12	$25.00	26.32%	0.00%	$0.012	8.88	2,850,228	2,850,228	2,175,556
127	Energy Star Dishwasher (electric water heating)	SF	NC	All	355.0	16.9%	60.0	10	$12.00	10.74%	0.00%	$0.025	7.88	317,640	317,640	242,460
128	Energy Star Dishwasher (non-electric water heating)	SF	NC	All	161.1	16.4%	26.4	10	$12.00	78.74%	0.00%	$0.057	3.99	1,024,980	1,024,980	782,364
129	Refrigerator Retirement (and Recycling) - No Replacement	MF	Retrofit	All	1320.0	100.0%	1320.0	8	$170.00	15.60%	5.00%	$0.020	5.24	16,878,840	16,878,840	13,506,240
130	Freezer Retirement (and Recycling) - No Replacement	MF	Retrofit	All	1320.0	100.0%	1320.0	8	$170.00	0.40%	5.00%	$0.020	5.24	432,960	432,960	348,480
131	Energy Star Electric Clothes Washer (with electric heating & electric dryer)	MF	ROB	All	728.0	23.3%	169.9	14	$95.00	18.90%	56.50%	$0.055	4.95	409,878	409,878	227,540
132	CEE Tier 2 Clothes Washer (with electric heating & electric dryer)	MF	ROB	All	728.0	32.0%	233.1	14	$250.00	18.90%	56.50%	$0.105	2.60	545,594	545,594	303,211
133	CEE Tier 3 Clothes Washer (with electric heating & electric dryer)	MF	ROB	All	728.0	37.7%	274.6	14	$440.00	18.90%	56.50%	$0.157	1.71	642,929	642,929	357,305
134	Energy Star Electric Clothes Washer (with non-electric heating and electric dryer)	MF	ROB	All	545.3	23.5%	128.2	14	$95.00	51.20%	56.50%	$0.073	4.03	837,447	837,447	464,095
135	CEE Tier 2 Clothes Washer (with non-electric heating and electric dryer)	MF	ROB	All	545.3	32.3%	175.9	14	$250.00	51.20%	56.50%	$0.139	2.13	1,115,496	1,115,496	618,176
136	CEE Tier 3 Clothes Washer (with non-electric heating and electric dryer)	MF	ROB	All	545.3	38.0%	207.0	14	$440.00	51.20%	56.50%	$0.208	1.39	1,312,786	1,312,786	727,508
137	Energy Star Refrigerator	MF	ROB	All	578.8	20.0%	115.8	17	$70.00	100.00%	40.00%	$0.052	2.26	2,038,196	2,038,196	910,883
138	CEE Tier 2 Refrigerator	MF	ROB	All	578.8	25.0%	144.7	17	$150.00	100.00%	40.00%	$0.089	1.32	2,472,055	2,472,055	1,105,219
139	CEE Tier 3 Refrigerator	MF	ROB	All	578.8	30.0%	173.7	17	$225.00	100.00%	40.00%	$0.111	1.06	2,967,491	2,967,491	1,326,721
140	Energy Star Freezer	MF	ROB	All	673.0	10.0%	67.0	11	$33.00	17.10%	12.00%	$0.058	1.89	869,928	869,928	578,746
141	Energy Star Dehumidifier	MF	ROB	All	1167.8	18.8%	219.6	12	$25.00	14.80%	78.00%	$0.012	8.88	616,913	616,913	409,811
142	Energy Star Dishwasher (electric water heating)	MF	ROB	All	355.0	16.9%	60.0	10	$12.00	16.80%	47.00%	$0.025	7.88	460,920	460,920	353,760
143	Energy Star Dishwasher (non-electric water heating)	MF	ROB	All	161.1	16.4%	26.4	10	$12.00	36.50%	47.00%	$0.057	3.99	440,642	440,642	337,920
144	Energy Star Electric Clothes Washer (with electric heating & electric dryer)	MF	NC	All	728.0	23.3%	169.9	14	$95.00	18.90%	0.00%	$0.055	4.95	59,816	59,816	45,712

Efficiency Maine - Residential Measure Database

Measure ID	Measure Name	Home Type (SF/MF)	ROB vs. Retrofit vs. NC	Income Target	Base Annual kWh	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Base Saturation	EE Saturation	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
145	CEE Tier 2 Clothes Washer (with electric heating & electric dryer)	MF	NC	All	728.0	32.0%	233.1	14	$250.00	18.90%	0.00%	$0.105	2.60	79,474	79,474	60,829
146	CEE Tier 3 Clothes Washer (with electric heating & electric dryer)	MF	NC	All	728.0	37.7%	274.6	14	$440.00	18.90%	0.00%	$0.157	1.71	93,652	93,652	71,681
147	Energy Star Electric Clothes Washer (with non-electric heating and electric dryer)	MF	NC	All	545.3	23.5%	128.2	14	$95.00	51.20%	0.00%	$0.073	4.03	122,272	122,272	93,306
148	CEE Tier 2 Clothes Washer (with non-electric heating and electric dryer)	MF	NC	All	545.3	32.3%	175.9	14	$250.00	51.20%	0.00%	$0.139	2.13	162,724	162,724	124,198
149	CEE Tier 3 Clothes Washer (with non-electric heating and electric dryer)	MF	NC	All	545.3	38.0%	207.0	14	$440.00	51.20%	0.00%	$0.208	1.39	191,504	191,504	146,164
150	Energy Star Refrigerator	MF	NC	All	578.8	20.0%	115.8	17	$70.00	100.00%	0.00%	$0.052	2.26	215,735	215,735	164,552
151	CEE Tier 2 Refrigerator	MF	NC	All	578.8	25.0%	144.7	17	$150.00	100.00%	0.00%	$0.089	1.32	261,907	261,907	199,686
152	CEE Tier 3 Refrigerator	MF	NC	All	578.8	30.0%	173.7	17	$225.00	100.00%	0.00%	$0.111	1.06	314,397	314,397	239,706
153	Energy Star Freezer	MF	NC	All	673.0	10.0%	67.0	11	$33.00	17.10%	0.00%	$0.058	1.89	62,913	62,913	47,838
154	Energy Star Dehumidifier	MF	NC	All	1167.8	18.8%	219.6	12	$25.00	14.80%	0.00%	$0.012	8.88	178,331	178,331	135,945
155	Energy Star Dishwasher (electric water heating)	MF	NC	All	355.0	16.9%	60.0	10	$12.00	16.80%	0.00%	$0.025	7.88	55,260	55,260	42,240
156	Energy Star Dishwasher (non-electric water heating)	MF	NC	All	161.1	16.4%	26.4	10	$12.00	36.50%	0.00%	$0.057	3.99	52,800	52,800	40,313
200	Electronics															
201	Controlled Power Strips - Entertainment Center	SF	Retrofit	All	-	-	79.0	4	$15.00	100.00%	10.00%	$0.053	1.64	37,683,711	37,683,711	30,147,032
202	Controlled Power Strips - Home Office	SF	Retrofit	All	-	-	38.4	4	$15.00	100.00%	10.00%	$0.109	0.78	18,317,146	0	0
203	HE Internal Power Supplies (80+ Desktop)	SF	ROB	All	406.7	19.8%	80.6	4	$5.00	69.50%	28.00%	$0.017	5.09	10,693,566	10,693,566	8,554,724
204	HE Internal Power Supplies (ES Desktop)	SF	ROB	All	406.7	32.4%	131.8	4	$8.00	69.50%	28.00%	$0.017	5.20	17,481,656	17,481,656	13,985,114
205	HE Laptops	SF	ROB	All	75.2	31.4%	23.6	4	$1.00	48.30%	69.00%	$0.012	7.47	1,875,952	1,875,952	1,500,762
206	HE Televisions (<50")	SF	ROB	All	344.8	39.5%	136.1	6	$1.00	108.31%	68.00%	$0.001	62.53	25,010,109	25,010,109	20,008,414
207	HE Televisions (>50")	SF	ROB	All	615.1	42.3%	260.1	6	$1.00	91.29%	68.00%	$0.001	120.80	40,275,739	40,275,739	32,219,863
208	LCD Computer Monitors	SF	ROB	All	82.7	36.3%	30.0	4	$1.80	69.50%	75.00%	$0.017	5.97	2,762,760	2,762,760	2,210,160
209	Controlled Power Strips - Entertainment Center	SF	NC	All	-	-	79.0	4	$15.00	100.00%	0.00%	$0.053	1.64	3,895,411	3,895,411	1,449,334
210	Controlled Power Strips - Home Office	SF	NC	All	-	-	38.4	4	$15.00	100.00%	0.00%	$0.109	0.78	1,893,466	0	0
211	HE Internal Power Supplies (80+ Desktop)	SF	NC	All	406.7	19.8%	80.6	4	$5.00	97.37%	0.00%	$0.017	5.09	1,935,876	1,935,876	720,178
212	HE Internal Power Supplies (ES Desktop)	SF	NC	All	406.7	32.4%	131.8	4	$8.00	97.37%	0.00%	$0.017	5.20	3,164,737	3,164,737	1,177,334
213	HE Laptops	SF	NC	All	75.2	31.4%	23.6	4	$1.00	55.26%	0.00%	$0.012	7.47	644,214	644,214	239,662
214	HE Televisions (<50")	SF	NC	All	344.8	39.5%	136.1	6	$1.00	206.58%	0.00%	$0.001	62.53	13,868,274	13,868,274	7,684,568
215	HE Televisions (>50")	SF	NC	All	615.1	42.3%	260.1	6	$1.00	56.58%	0.00%	$0.001	120.80	7,257,520	7,257,520	4,021,435
216	LCD Computer Monitors	SF	NC	All	82.7	36.3%	30.0	4	$1.80	97.37%	0.00%	$0.017	5.97	1,440,360	1,440,360	535,920
217	Controlled Power Strips - Entertainment Center	MF	Retrofit	All	-	-	79.0	4	$15.00	100.00%	10.00%	$0.053	1.64	6,134,587	6,134,587	4,907,796
218	Controlled Power Strips - Home Office	MF	Retrofit	All	-	-	38.4	4	$15.00	100.00%	10.00%	$0.109	0.78	2,981,875	0	0
219	HE Internal Power Supplies (80+ Desktop)	MF	ROB	All	406.7	19.8%	80.6	4	$5.00	50.88%	28.00%	$0.017	5.09	1,274,322	1,274,322	1,019,587
220	HE Internal Power Supplies (ES Desktop)	MF	ROB	All	406.7	32.4%	131.8	4	$8.00	50.88%	28.00%	$0.017	5.20	2,083,240	2,083,240	1,666,803
221	HE Laptops	MF	ROB	All	75.2	31.4%	23.6	4	$1.00	59.72%	69.00%	$0.012	7.47	377,625	377,625	302,119
222	HE Televisions (<50")	MF	ROB	All	344.8	39.5%	136.1	6	$1.00	85.13%	68.00%	$0.001	62.53	3,199,816	3,199,816	2,560,071
223	HE Televisions (>50")	MF	ROB	All	615.1	42.3%	260.1	6	$1.00	81.07%	68.00%	$0.001	120.80	5,822,873	5,822,873	4,659,027
224	LCD Computer Monitors	MF	ROB	All	82.7	36.3%	30.0	4	$1.80	50.88%	75.00%	$0.017	5.97	329,220	329,220	263,400
225	Controlled Power Strips - Entertainment Center	MF	NC	All	-	-	79.0	4	$15.00	100.00%	0.00%	$0.053	1.64	432,841	432,841	161,081
226	Controlled Power Strips - Home Office	MF	NC	All	-	-	38.4	4	$15.00	100.00%	0.00%	$0.109	0.78	210,394	0	0
227	HE Internal Power Supplies (80+ Desktop)	MF	NC	All	406.7	19.8%	80.6	4	$5.00	50.88%	0.00%	$0.017	5.09	112,409	112,409	41,770
228	HE Internal Power Supplies (ES Desktop)	MF	NC	All	406.7	32.4%	131.8	4	$8.00	50.88%	0.00%	$0.017	5.20	183,765	183,765	68,286
229	HE Laptops	MF	NC	All	75.2	31.4%	23.6	4	$1.00	59.72%	0.00%	$0.012	7.47	77,350	77,350	28,770
230	HE Televisions (<50")	MF	NC	All	344.8	39.5%	136.1	6	$1.00	85.13%	0.00%	$0.001	62.53	634,980	634,980	351,799
231	HE Televisions (>50")	MF	NC	All	615.1	42.3%	260.1	6	$1.00	81.07%	0.00%	$0.001	120.80	1,155,262	1,155,262	640,193
232	LCD Computer Monitors	MF	NC	All	82.7	36.3%	30.0	4	$1.80	50.88%	0.00%	$0.017	5.97	83,610	83,610	31,110
300	Lighting															
301	ENERGY STAR Specialty CFL	SF	ROB	All	39.9	72.7%	29.0	10	$4.00	594.00%	5.00%	$0.017	7.12	86,682,162	86,682,162	62,844,581
302	ENERGY STAR Standard CFL (14 W CFL replacing 60 W incandescent)	SF	ROB	All	24.5	67.4%	16.5	10	$1.55	4104.00%	33.00%	$0.012	10.47	132,452,601	132,452,601	84,088,186
303	ENERGY STAR Standard CFL (19 W CFL replacing 75 W incandescent)	SF	ROB	All	30.2	64.2%	19.4	10	$1.55	4104.00%	33.00%	$0.010	12.27	14,445,514	14,445,514	8,992,321
304	ENERGY STAR Standard CFL (23 W CFL replacing 100 W incandescent)	SF	ROB	All	41.0	68.1%	27.9	10	$1.55	4104.00%	33.00%	$0.007	17.68	15,613,901	15,613,901	10,858,160
305	ENERGY STAR Dedicated CFL Fixture	SF	ROB	All	35.1	77.7%	27.3	20	$20.00	4104.00%	33.00%	$0.056	2.28	31,790,960	31,790,960	18,160,615
306	LED Lighting (screw-in) ; 2012-2019	SF	ROB	All	27.7	73.5%	20.4	20	$29.40	4104.00%	33.00%	$0.111	1.35	23,766,047	23,766,047	41,382,655
307	LED Lighting (screw-in) ; 2020 and later	SF	ROB	All	9.5	44.9%	4.3	20	$3.00	4408.00%	33.00%	$0.054	3.80	13,369,330	13,369,330	10,695,459
308	ENERGY STAR Dedicated Exterior Fixture	SF	ROB	All	100.6	75.8%	76.2	20	$20.00	200.00%	33.00%	$0.020	5.25	43,304,248	43,304,248	32,099,216
309	ENERGY STAR Specialty CFL	SF	NC	All	39.9	72.7%	29.0	10	$4.00	594.00%	0.00%	$0.017	7.12	8,489,078	8,489,078	6,479,667
310	ENERGY STAR Standard CFL (14 W CFL replacing 60 W incandescent)	SF	NC	All	24.5	67.4%	16.5	10	$1.55	4104.00%	0.00%	$0.012	10.47	18,392,444	18,392,444	10,110,368

Efficiency Maine - Residential Measure Database

Measure ID	Measure Name	Home Type (SF/MF)	ROB vs. Retrofit vs. NC	Income Target	Base Annual kWh	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Base Saturation	EE Saturation	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
311	ENERGY STAR Standard CFL (19 W CFL replacing 75 W incandescent)	SF	NC	All	30.2	64.2%	19.4	10	$1.55	4104.00%	0.00%	$0.010	12.27	2,005,906	2,005,906	1,630,620
312	ENERGY STAR Standard CFL (23 W CFL replacing 100 W incandescent)	SF	NC	All	41.0	68.1%	27.9	10	$1.55	4104.00%	0.00%	$0.007	17.68	2,168,156	2,168,156	2,299,121
313	ENERGY STAR Dedicated CFL Fixture	SF	NC	All	35.1	77.7%	27.3	20	$20.00	4104.00%	0.00%	$0.056	2.28	4,414,491	4,414,491	2,316,330
314	LED Lighting (screw-in) ; 2012-2019	SF	NC	All	27.7	73.5%	20.4	20	$29.40	4104.00%	0.00%	$0.111	1.35	3,300,152	3,300,152	6,210,042
315	LED Lighting (screw-in) ; 2020 and later	SF	NC	All	9.5	44.9%	4.3	20	$3.00	4408.00%	0.00%	$0.054	3.80	1,856,467	1,856,467	1,725,444
316	ENERGY STAR Dedicated Exterior Fixture	SF	NC	All	100.6	75.8%	76.2	20	$20.00	200.00%	0.00%	$0.020	5.25	6,013,134	6,013,134	4,340,021
317	ENERGY STAR Specialty CFL	MF	ROB	All	39.9	72.7%	29.0	10	$4.00	297.00%	5.00%	$0.017	7.12	7,055,519	7,055,519	5,115,172
318	ENERGY STAR Standard CFL (14 W CFL replacing 60 W incandescent)	MF	ROB	All	24.5	67.4%	16.5	10	$1.55	2052.00%	33.00%	$0.012	10.47	10,781,027	10,781,027	6,159,943
319	ENERGY STAR Standard CFL (19 W CFL replacing 75 W incandescent)	MF	ROB	All	30.2	64.2%	19.4	10	$1.55	2052.00%	33.00%	$0.010	12.27	1,175,805	1,175,805	1,083,053
320	ENERGY STAR Standard CFL (23 W CFL replacing 100 W incandescent)	MF	ROB	All	41.0	68.1%	27.9	10	$1.55	2052.00%	33.00%	$0.007	17.68	1,270,900	1,270,900	1,534,393
321	ENERGY STAR Dedicated CFL Fixture	MF	ROB	All	35.1	77.7%	27.3	20	$20.00	2052.00%	33.00%	$0.056	2.28	2,587,642	2,587,642	1,478,205
322	LED Lighting (screw-in) ; 2012-2019	MF	ROB	All	27.7	73.5%	20.4	20	$29.40	2052.00%	33.00%	$0.111	1.35	1,934,450	1,934,450	3,368,358
323	LED Lighting (screw-in) ; 2020 and later	MF	ROB	All	9.5	44.9%	4.3	20	$3.00	2204.00%	33.00%	$0.054	3.80	1,088,200	1,088,200	870,559
324	ENERGY STAR Dedicated Exterior Fixture	MF	ROB	All	100.6	75.8%	76.2	20	$20.00	100.00%	33.00%	$0.020	5.25	3,524,728	3,524,728	2,612,869
325	ENERGY STAR Specialty CFL	MF	NC	All	39.9	72.7%	29.0	10	$4.00	297.00%	0.00%	$0.017	7.12	471,632	471,632	359,991
326	ENERGY STAR Standard CFL (14 W CFL replacing 60 W incandescent)	MF	NC	All	24.5	67.4%	16.5	10	$1.55	2052.00%	0.00%	$0.012	10.47	1,021,800	1,021,800	561,660
327	ENERGY STAR Standard CFL (19 W CFL replacing 75 W incandescent)	MF	NC	All	30.2	64.2%	19.4	10	$1.55	2052.00%	0.00%	$0.010	12.27	111,414	111,414	90,622
328	ENERGY STAR Standard CFL (23 W CFL replacing 100 W incandescent)	MF	NC	All	41.0	68.1%	27.9	10	$1.55	2052.00%	0.00%	$0.007	17.68	120,419	120,419	127,785
329	ENERGY STAR Dedicated CFL Fixture	MF	NC	All	35.1	77.7%	27.3	20	$20.00	2052.00%	0.00%	$0.056	2.28	245,299	245,299	128,703
330	LED Lighting (screw-in) ; 2012-2019	MF	NC	All	27.7	73.5%	20.4	20	$29.40	2052.00%	0.00%	$0.111	1.35	183,379	183,379	345,028
331	LED Lighting (screw-in) ; 2020 and later	MF	NC	All	9.5	44.9%	4.3	20	$3.00	2204.00%	0.00%	$0.054	3.80	103,137	103,137	95,860
332	ENERGY STAR Dedicated Exterior Fixture	MF	NC	All	100.6	75.8%	76.2	20	$20.00	100.00%	0.00%	$0.020	5.25	334,135	334,135	241,150
400	Water Heating															
401	Efficient Storage Tank Water Heater	SF	ROB	All	4040.5	4.8%	195.6	13	$151.00	33.50%	10.00%	$0.080	1.32	7,816,018	10,629,589	5,968,151
402	Heat Pump DHW	SF	ROB	All	4040.5	54.8%	2214.2	13	$1,051.00	33.50%	10.00%	$0.049	2.14	88,456,934	116,760,938	65,564,412
403	Hotwater Pipe wrap	SF	Retrofit	All	81.7	77.8%	63.6	13	$15.00	33.50%	20.00%	$0.024	3.78	9,027,587	9,027,587	6,680,235
404	Low Flow Showerheads	SF	Retrofit	All	1101.6	20.0%	220.3	9	$15.00	50.40%	61.60%	$0.009	11.87	22,598,774	22,598,774	17,925,285
405	Low Flow Faucets	SF	Retrofit	All	139.6	31.8%	44.4	9	$15.00	110.25%	44.40%	$0.046	2.69	14,433,953	14,433,953	11,356,757
406	Tank Wrap	SF	Retrofit	All	327.3	35.0%	114.7	7	$35.00	33.50%	29.10%	$0.052	1.56	3,608,744	4,763,574	3,811,135
407	Solar Water Heating w/ Electric Storage Back-Up	SF	Retrofit	All	4040.5	60.0%	2424.3	20	$10,500.00	33.50%	10.00%	$0.333	0.59	96,850,657	0	0
408	Efficient Storage Tank Water Heater	SF	NC	All	4040.5	4.8%	195.6	13	$151.00	12.00%	0.00%	$0.080	1.32	289,359	393,638	300,706
409	Heat Pump DHW	SF	NC	All	4040.5	54.8%	2214.2	13	$1,051.00	12.00%	0.00%	$0.049	2.14	3,274,789	4,326,529	3,299,145
410	Hotwater Pipe wrap	SF	NC	All	81.7	77.8%	63.6	13	$15.00	12.00%	0.00%	$0.024	3.78	376,057	376,057	287,143
411	Low Flow Showerheads	SF	NC	All	1101.6	20.0%	220.3	9	$15.00	19.20%	0.00%	$0.009	11.87	2,085,919	2,085,919	1,573,912
412	Low Flow Faucets	SF	NC	All	139.6	31.8%	44.4	9	$15.00	42.00%	0.00%	$0.046	2.69	920,129	920,129	694,306
413	Tank Wrap	SF	NC	All	327.3	35.0%	114.7	7	$35.00	12.00%	0.00%	$0.052	1.56	169,595	224,063	143,221
414	Solar Water Heating w/ Electric Storage Back-Up	SF	NC	All	4040.5	60.0%	2424.3	20	$10,500.00	12.00%	0.00%	$0.333	0.59	3,585,535	0	0
415	Efficient Storage Tank Water Heater	MF	ROB	All	3403.8	4.8%	164.8	13	$151.00	30.50%	10.00%	$0.095	1.11	1,327,250	1,951,732	1,096,345
416	Hotwater Pipe wrap	MF	Retrofit	All	81.7	77.8%	63.6	13	$15.00	30.50%	15.00%	$0.024	3.78	1,421,605	1,421,605	1,044,659
417	Low Flow Showerheads	MF	Retrofit	All	1068.2	20.0%	213.6	9	$15.00	36.60%	72.50%	$0.010	11.51	1,855,218	1,855,218	1,479,218
418	Low Flow Faucets	MF	Retrofit	All	177.7	31.8%	56.5	9	$15.00	61.00%	60.00%	$0.037	3.42	1,190,411	1,190,411	943,316
419	Tank Wrap	MF	Retrofit	All	303.6	34.5%	104.7	7	$35.00	30.50%	25.80%	$0.057	1.43	674,775	1,022,319	818,023
420	Solar Water Heating w/ Electric Storage Back-Up	MF	Retrofit	All	3403.8	60.0%	2042.3	20	$4,600.00	30.50%	10.00%	$0.173	0.92	15,962,341	0	0
421	Efficient Storage Tank Water Heater	MF	NC	All	3403.8	4.8%	164.8	13	$151.00	30.50%	0.00%	$0.095	1.11	93,615	137,455	104,987
422	Hotwater Pipe wrap	MF	NC	All	81.7	77.8%	63.6	13	$15.00	30.50%	0.00%	$0.024	3.78	106,264	106,264	81,097
423	Low Flow Showerheads	MF	NC	All	1068.2	20.0%	213.6	9	$15.00	36.60%	0.00%	$0.010	11.51	428,341	428,341	323,018
424	Low Flow Faucets	MF	NC	All	177.7	31.8%	56.5	9	$15.00	61.00%	0.00%	$0.037	3.42	189,025	189,025	142,659
425	Tank Wrap	MF	NC	All	303.6	34.5%	104.7	7	$35.00	30.50%	0.00%	$0.057	1.43	57,802	87,331	55,917
426	Solar Water Heating w/ Electric Storage Back-Up	MF	NC	All	3403.8	60.0%	2042.3	20	$4,600.00	30.50%	0.00%	$0.173	0.92	1,127,330	0	0
500	Other															
501	Pool Pump & Motor	SF	ROB	All	1857.5	66.5%	1235.0	10	$450.00	9.70%	20.00%	$0.046	3.18	50,794,315	50,794,315	37,584,755
502	Pool Pump & Motor	SF	NC	All	1857.5	66.5%	1235.0	10	$450.00	9.70%	0.00%	$0.046	3.18	5,908,240	5,908,240	4,508,985
600	HVAC (Envelope)															
603	Improved Duct Sealing	SF	Retrofit	All	1770.0	1.8%	31.0	20	$300.00	2.20%	50.00%	$0.745	1.22	180,730	0	0
604	Energy Star Windows	SF	ROB	All	1568.0	14.5%	228.0	25	$416.40	42.40%	27.00%	$0.123	11.47	37,403,172	37,403,172	11,176,788
605	Improved Attic/Roof Insulation (R-0 to R-49)	SF	Retrofit	NLI	1684.0	7.2%	122.0	25	$1,854.61	42.40%	99.00%	$1.026	10.86	233,020	233,020	186,660
606	Improved Attic/Roof Insulation (R-19 to R-49)	SF	Retrofit	NLI	1568.0	0.4%	6.0	25	$1,456.50	42.40%	48.00%	$16.388	1.62	595,968	595,968	457,692
607	Improved Attic/Roof Insulation (R-0 to R-49)	SF	Retrofit	LI	1684.0	7.2%	122.0	25	$1,854.61	42.40%	99.00%	$1.026	10.86	41,114	41,114	32,940

Measure ID	Measure Name	Home Type (SF/MF)	ROB vs. Retrofit vs. NC	Income Target	Base Annual kWh	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Base Saturation	EE Saturation	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
608	Improved Attic/Roof Insulation (R-19 to R-49)	SF	Retrofit	LI	1568.0	0.4%	6.0	25	$1,456.50	42.40%	48.00%	$16.388	1.62	105,174	105,174	80,754
609	Improved Wall Insulation (R-0 to R-11)	SF	Retrofit	NLI	1706.0	8.1%	138.0	25	$2,558.08	42.40%	99.00%	$1.251	9.53	263,580	263,580	211,140
610	Improved Wall Insulation (R-0 to R-11)	SF	Retrofit	LI	1706.0	8.1%	138.0	25	$2,558.08	42.40%	99.00%	$1.251	9.53	46,506	46,506	37,260
615	Improved Air Sealing	SF	Retrofit	NLI	7126.0	8.6%	611.0	15	$721.50	9.40%	50.00%	$0.110	4.62	12,937,314	12,937,314	9,961,744
616	Improved Air Sealing	SF	Retrofit	LI	7126.0	8.6%	611.0	15	$721.50	9.40%	50.00%	$0.110	4.62	2,283,307	2,283,307	1,758,458
617	Improved Duct Sealing	SF	Retrofit	All	1770.0	1.8%	31.0	20	$300.00	0.50%	50.00%	$0.745	1.21	41,075	41,075	31,651
618	Energy Star Windows	SF	ROB	All	7126.0	10.3%	734.0	25	$416.40	9.40%	27.00%	$0.038	10.98	26,694,846	26,694,846	7,977,846
619	Improved Attic/Roof Insulation (R-0 to R-49)	SF	Retrofit	NLI	9255.0	26.0%	2410.0	25	$1,854.61	9.40%	99.00%	$0.052	10.40	1,019,430	1,019,430	819,400
620	Improved Attic/Roof Insulation (R-19 to R-49)	SF	Retrofit	NLI	7126.0	3.9%	281.0	25	$1,456.50	9.40%	48.00%	$0.350	1.55	6,187,901	6,187,901	4,753,115
621	Improved Attic/Roof Insulation (R-0 to R-49)	SF	Retrofit	LI	9255.0	26.0%	2410.0	25	$1,854.61	9.40%	99.00%	$0.052	10.40	180,750	180,750	144,600
622	Improved Attic/Roof Insulation (R-19 to R-49)	SF	Retrofit	LI	7126.0	3.9%	281.0	25	$1,456.50	9.40%	48.00%	$0.350	1.55	1,091,966	1,091,966	838,785
623	Improved Wall Insulation (R-0 to R-11)	SF	Retrofit	NLI	10065.0	29.2%	2939.0	25	$2,558.08	9.40%	99.00%	$0.059	9.15	1,243,197	1,243,197	999,260
624	Improved Wall Insulation (R-0 to R-11)	SF	Retrofit	LI	10065.0	29.2%	2939.0	25	$2,558.08	9.40%	99.00%	$0.059	9.15	220,425	220,425	176,340
625	Improved Floor Insulation (R-0 to R-19)	SF	Retrofit	NLI	8095.0	12.0%	969.0	25	$1,660.41	9.40%	60.00%	$0.116	5.08	16,413,891	16,413,891	12,801,459
626	Improved Floor Insulation (R-19 to R-30)	SF	Retrofit	NLI	7126.0	2.0%	141.0	25	$1,660.41	9.40%	45.00%	$0.795	0.71	3,284,031	0	0
627	Improved Floor Insulation (R-0 to R-19)	SF	Retrofit	LI	8095.0	12.0%	969.0	25	$1,660.41	9.40%	60.00%	$0.116	5.08	2,896,341	2,896,341	2,257,770
628	Improved Floor Insulation (R-19 to R-30)	SF	Retrofit	LI	7126.0	2.0%	141.0	25	$1,660.41	9.40%	45.00%	$0.795	0.71	579,510	0	0
630	Improved Duct Sealing	SF	NC	All	1343.0	3.1%	41.0	20	$220.00	42.40%	0.00%	$0.413	1.72	857,187	857,187	654,237
635	Improved Air Sealing	SF	NC	All	5899.0	8.1%	480.0	15	$550.00	9.40%	0.00%	$0.107	4.99	2,224,320	2,224,320	1,698,240
636	Improved Duct Sealing	SF	NC	All	1343.0	3.1%	41.0	20	$220.00	9.40%	0.00%	$0.413	1.71	189,994	189,994	145,058
637	Energy Star Windows	SF	NC	All	5899.0	2.9%	173.0	25	$125.40	9.40%	0.00%	$0.049	12.70	801,682	801,682	612,074
638	Improved Attic/Roof Insulation (R-49 - Grade II to Grade I)	SF	NC	All	5899.0	0.0%	2.0	25	$34.65	9.40%	0.00%	$1.170	0.09	9,268	0	0
639	Improved Wall Insulation (R-20 - Grade III to Grade I)	SF	NC	All	5899.0	4.4%	259.0	25	$108.95	9.40%	0.00%	$0.028	19.13	1,200,206	1,200,206	916,342
640	Improved Floor Insulation (R-30 - Grade II to Grade I)	SF	NC	All	5899.0	0.8%	48.0	25	$92.40	9.40%	0.00%	$0.130	4.67	222,432	222,432	169,824
643	Improved Duct Sealing	MF	Retrofit	All	828.0	2.1%	17.0	20	$178.38	36.20%	50.00%	$0.807	1.03	265,489	265,489	204,374
644	Energy Star Windows	MF	ROB	All	884.0	11.1%	98.0	25	$247.50	36.20%	19.50%	$0.170	12.42	2,464,014	2,464,014	729,218
648	Improved Duct Sealing	MF	NC	All	586.0	2.7%	16.0	20	$132.00	36.20%	0.00%	$0.635	1.39	31,728	31,728	24,224
700	HVAC (Equipment)															
701	AC Tune-Up	SF	Retrofit	All	1770.0	10.0%	177.0	5	$115.00	3.20%	40.00%	$0.148	0.50	1,546,752	0	0
702	Central AC Tier 1 (15 SEER)	SF	ROB	All	1264.0	11.6%	146.0	18	$1,220.00	3.20%	20.00%	$0.688	0.26	854,784	0	0
703	Central AC Tier 2 (16 SEER)	SF	ROB	All	1264.0	16.2%	205.0	18	$1,629.00	3.20%	20.00%	$0.654	0.33	1,193,984	0	0
704	ECM Furnace Fan - heating	SF	Retrofit	All	-	-	393.0	18	$200.00	25.80%	20.00%	$0.042	2.57	42,991,842	42,991,842	31,815,708
705	ECM Furnace Fan - heating and cooling	SF	Retrofit	All	-	-	484.0	18	$200.00	1.60%	20.00%	$0.034	5.52	3,283,456	3,283,456	2,430,648
706	HE Ventilation Fan	SF	ROB	All	141.3	62.0%	87.6	19	$43.50	4.00%	13.00%	$0.039	2.99	1,615,694	1,615,694	623,624
707	Room AC - Energy Star	SF	ROB	All	328.0	9.1%	30.0	12	$40.00	86.80%	20.00%	$0.146	0.63	3,190,194	0	0
708	Room AC - SEHA Tier 1	SF	ROB	All	328.0	13.1%	43.0	12	$80.00	86.80%	20.00%	$0.204	0.45	4,438,136	0	0
709	Room AC - SEHA Tier 2	SF	ROB	All	328.0	17.1%	56.0	12	$120.00	86.80%	20.00%	$0.235	0.39	5,779,899	0	0
710	Ductless Mini-Split HP (Replacing Electric Baseboard)	SF	Retrofit	All	23792.0	43.0%	10220.0	15	$9,000.00	0.90%	0.00%	$0.082	1.09	41,227,110	41,227,110	31,162,343
712	Central AC Tier 1 (15 SEER)	SF	NC	All	1343.0	11.5%	155.0	18	$1,220.00	16.60%	0.00%	$0.648	0.39	617,892	0	0
713	Central AC Tier 2 (16 SEER)	SF	NC	All	1343.0	16.2%	217.0	18	$1,629.00	16.60%	0.00%	$0.618	0.33	863,412	0	0
714	ECM Furnace Fan - heating	SF	NC	All	-	-	393.0	18	$200.00	13.00%	0.00%	$0.042	2.57	2,519,130	2,519,130	1,922,949
715	ECM Furnace Fan - heating and cooling	SF	NC	All	-	-	484.0	18	$200.00	1.00%	0.00%	$0.034	5.52	239,096	239,096	181,500
716	HE Ventilation Fan	SF	NC	All	141.3	62.0%	87.6	19	$43.50	4.00%	0.00%	$0.039	2.99	172,835	172,835	131,926
717	Room AC - Energy Star	SF	NC	All	328.0	9.1%	30.0	12	$40.00	65.00%	0.00%	$0.146	0.63	336,315	0	0
718	Room AC - SEHA Tier 1	SF	NC	All	328.0	13.1%	43.0	12	$80.00	65.00%	0.00%	$0.204	0.45	467,852	0	0
719	Room AC - SEHA Tier 2	SF	NC	All	328.0	17.1%	56.0	12	$120.00	65.00%	0.00%	$0.235	0.39	609,296	0	0
720	Ductless Mini-Split HP (Replacing Electric Baseboard)	SF	NC	All	18710.0	40.9%	7657.0	15	$5,500.00	5.00%	0.00%	$0.067	1.36	18,869,575	18,869,575	14,407,393
722	AC Tune-Up	MF	Retrofit	All	828.0	10.0%	83.0	5	$115.00	8.40%	40.00%	$0.316	0.24	317,477	0	0
723	Central AC Tier 1 (15 SEER)	MF	ROB	All	591.0	11.5%	68.0	18	$989.00	8.40%	20.00%	$1.197	0.08	173,940	0	0
724	Central AC Tier 2 (16 SEER)	MF	ROB	All	591.0	16.2%	96.0	18	$1,398.00	8.40%	20.00%	$1.199	0.18	243,516	0	0
725	ECM Furnace Fan - heating	MF	Retrofit	All	-	-	393.0	18	$200.00	12.50%	20.00%	$0.042	2.57	3,390,804	3,390,804	2,508,519
726	ECM Furnace Fan - heating and cooling	MF	Retrofit	All	-	-	484.0	18	$200.00	1.80%	20.00%	$0.034	5.52	601,128	601,128	443,828
727	Room AC - Energy Star	MF	ROB	All	328.0	9.1%	30.0	12	$40.00	83.20%	20.00%	$0.146	0.63	518,365	0	0
728	Room AC - SEHA Tier 1	MF	ROB	All	328.0	13.1%	43.0	12	$80.00	83.20%	20.00%	$0.204	0.45	721,111	0	0
729	Room AC - SEHA Tier 2	MF	ROB	All	328.0	17.1%	56.0	12	$120.00	83.20%	20.00%	$0.235	0.39	939,121	0	0
730	Ductless Mini-Split HP (Replacing Electric Baseboard)	MF	Retrofit	All	12520.0	43.3%	5419.0	15	$4,500.00	8.90%	0.00%	$0.077	1.17	36,621,151	36,621,151	27,296,386
732	Central AC Tier 1 (15 SEER)	MF	NC	All	586.0	11.6%	68.0	18	$989.00	8.40%	0.00%	$1.197	0.23	15,312	0	0
733	Central AC Tier 2 (16 SEER)	MF	NC	All	586.0	16.2%	95.0	18	$1,398.00	8.40%	0.00%	$1.211	0.18	21,344	0	0
734	ECM Furnace Fan - heating	MF	NC	All	-	-	393.0	18	$200.00	12.50%	0.00%	$0.042	2.57	269,205	269,205	205,539
735	ECM Furnace Fan - heating and cooling	MF	NC	All	-	-	484.0	18	$200.00	1.80%	0.00%	$0.034	5.52	46,948	46,948	36,300
736	Room AC - Energy Star	MF	NC	All	328.0	9.1%	30.0	12	$40.00	83.20%	0.00%	$0.146	0.63	46,530	0	0
737	Room AC - SEHA Tier 1	MF	NC	All	328.0	13.1%	43.0	12	$80.00	83.20%	0.00%	$0.204	0.45	64,672	0	0
738	Room AC - SEHA Tier 2	MF	NC	All	328.0	17.1%	56.0	12	$120.00	83.20%	0.00%	$0.235	0.39	84,224	0	0
739	Ductless Mini-Split HP (Replacing Electric Baseboard)	MF	NC	All	11507.0	42.8%	4921.0	15	$2,500.00	8.90%	0.00%	$0.047	1.87	2,401,448	2,401,448	1,830,612

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Measure ID	Measure Name	ROB vs. Retrofit vs. NC	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
100	Appliances, Computers, Office Equipment										
102	Energy Star office equipment including computers, monitors, copiers, multi-function machines.	ROB	25%	858.0	4	$300.00	$0.087	0.96	40,396,099	0	0
103	Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	Retrofit	70%	867.8	4	$35.70	$0.010	8.18	44,809,450	44,809,450	32,006,750
104	EZ Save Monitor Power Management Software	Retrofit	15%	30.0	2	$26.00	$0.510	0.17	4,087,116	0	0
150	Ventilation										
151	Dual Enthalpy Economizer - from Fixed Damper	ROB	22%	3400.0	10	$800.00	$0.017	3.52	67,401,437	67,401,437	37,598,081
152	Dual Enthalpy Economizer - from Dry Bulb	ROB	16%	2500.0	10	$400.00	$0.011	5.18	49,019,227	49,019,227	27,344,059
153	Demand-Controlled Ventilation	ROB	25%	8000.0	15	$2,100.00	$0.018	13.52	67,554,336	67,554,336	32,349,964
157	Variable Speed Drive Control, 15 HP	Retrofit	30%	12000.0	20	$3,465.00	$0.014	5.99	16,903,863	16,903,863	13,110,801
158	Variable Speed Drive Control, 5 HP	Retrofit	30%	4000.0	20	$1,925.00	$0.024	3.60	46,579,404	46,579,404	36,127,440
159	Variable Speed Drive Control, 40 HP	Retrofit	30%	32000.0	20	$6,280.00	$0.010	8.82	46,579,404	46,579,404	36,127,440
160	Improved Duct Sealing	ROB	7%	0.6	20	$0.20	$0.018	4.85	38,540,173	38,540,173	13,970,813
161	Electronically-Commutated Permanent Magnet Motors (ECPMs)	ROB	14%	947.0	18	$200.00	$0.012	7.39	5,367,992	5,367,992	2,319,503
162	High Volume Low Speed Fans	Retrofit	15%	184.0	10	$7,000.00	$3.804	0.02	1,180,662	0	0
200	Pools										
201	Energy Efficient Pool Pump with controls	ROB	67%	1235.0	10	$450.00	$0.036	2.12	3,844,346	3,844,346	2,819,187
202	Solar Pool Heating	Retrofit	40%	46072.7	20	$4,000.00	$0.004	19.85	419,885	419,885	331,488
203	Heat Pump Pool Heater	Retrofit	75%	9411.8	10	$2,500.00	$0.027	3.37	1,828,061	1,828,061	1,340,578
204	High efficiency spas/hot tubs	ROB	40%	250.0	10	$300.00	$0.120	0.75	206,766	0	0
300	Envelope										
302	Integrated Building Design	ROB	40%	530000.0	30	$166,226.40	$0.010	10.95	16,668,581	16,668,581	4,444,955
303	Energy Efficient Windows	ROB	20%	7.0	30	$0.51	$0.002	37.26	46,474,699	46,474,699	8,114,630
304	Ceiling insulation to R32	Retrofit	2%	0.1	15	$1.04	$0.516	0.17	4,989,800	0	0
305	Below Grade Insulation to R6	Retrofit	1%	0.0	30	$1.04	$1.026	0.08	2,273,890	0	0
306	Wall Insulation to R12	Retrofit	2%	0.1	15	$4.20	$2.396	0.04	3,792,880	0	0
307	Roof Insulation to R-18	Retrofit	4%	0.0	20	$1.36	$3.887	0.02	5,365,419	0	0
320	Water Heating										
321	Heat Pump Water Heater	ROB	43%	14155.0	14	$4,067.01	$0.021	4.30	22,553,607	22,553,607	12,717,497
322	Booster Water Heater	ROB	13%	625.0	10	$951.37	$0.152	0.59	1,043,569	0	0
323	Point of Use Water Heating	Retrofit	7%	345.0	10	$664.85	$0.193	0.46	361,787	0	0
324	Solar Water Heating System	Retrofit	60%	19835.9	20	$26,400.00	$0.067	1.29	13,370,627	13,370,627	10,555,758
325	High Efficiency Electric Water Heater	ROB	5%	256.0	13	$70.00	$0.021	4.22	763,798	763,798	27,978
326	Low Flow Pre-Rinse Spray Nozzle (included in 2006 Federal Standards) (Electric HW)	Retrofit	55%	1227.0	5	$35.00	$0.006	18.92	3,809,293	3,809,293	2,902,318
327	Faucet Aerators	Retrofit	9%	89.0	10	$6.00	$0.007	13.28	1,737,285	1,737,285	1,042,371
328	Low-Flow Showerheads	Retrofit	12%	304.0	10	$30.90	$0.010	8.81	241,245	241,245	144,747
329	Commercial Dishwasher (Under Counter Hi-Temp, Electric DHW)	ROB	43%	7471.0	10	$1,000.00	$0.013	6.69	686,281	686,281	498,258
330	Commercial Dishwasher (Single Tank Conveyor Hi-Temp, - Electric DHW)	ROB	32%	19235.0	20	$270.00	$0.001	122.79	233,564	233,564	58,391
331	Commercial Clothes washers - Water Heating Savings	ROB	55%	426.6	10	$360.00	$0.084	1.67	839,719	839,719	545,081
333	Ozone Commercial laundry System	Retrofit	65%	194219.8	7	$65,000.00	$0.048	1.89	525,342	525,342	262,671
334	Drain water Heat Recovery Water Heater	ROB	25%	251.3	20	$350.00	$0.070	1.24	1,579,196	1,579,196	614,132
335	Hot Water Circulation Pump Time-Clock	Retrofit	5%	1673.0	10	$132.00	$0.008	11.34	539,990	539,990	359,993
336	Hot Water (DHW) Pipe Insulation	Retrofit	2%	33.0	6	$15.00	$0.076	1.19	184,266	184,266	140,042
337	Refrigeration Heat Recovery	Retrofit	10%	1825.0	15	$2,861.00	$0.105	0.84	715,890	0	0
340	Space Cooling - Chillers										
341	Centrifugal Chiller, 0.51 kW/ton, 300 tons	ROB	15%	21600.0	25	$16,200.00	$0.030	2.86	14,366,843	14,366,843	4,031,293
342	Centrifugal Chiller, 0.51 kW/ton, 500 tons	ROB	15%	36000.0	25	$27,000.00	$0.030	2.86	14,366,843	14,366,843	4,031,293

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Measure ID	Measure Name	ROB vs. Retrofit vs. NC	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
343	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	ROB	33%	80000.0	25	$60,000.00	$0.030	2.86	1,161,217	1,161,217	325,834
344	Chiller Tune Up/Diagnostics - 300 ton	Retrofit	8%	15200.0	10	$5,100.00	$0.034	2.52	5,405,610	5,405,610	3,243,366
345	Chiller Tune Up/Diagnostics - 500 ton	Retrofit	8%	25600.0	10	$8,500.00	$0.033	2.54	5,405,610	5,405,610	3,243,366
360	HVAC Controls										
361	Programmable Thermostats	Retrofit	4%	1637.0	5	$28.00	$0.003	24.54	17,925,500	17,925,500	13,200,350
362	EMS install	Retrofit	10%	0.5	10	$0.29	$0.058	5.07	34,734,957	34,734,957	26,931,509
363	EMS Optimization	Retrofit	1%	0.1	5	$0.06	$0.225	1.87	2,392,365	1,728,501	1,836,001
364	Hotel Guest Room Occupancy Control System	ROB	0%	342.0	15	$100.00	$0.019	4.46	359,601	359,601	189,264
380	Space Cooling - Unitary and Split AC										
381	HVAC Advanced Tune-Up	ROB	10%	826.0	2	$450.00	$0.272	0.31	6,637,172	0	0
382	High Efficiency AC - Unitary & Split Systems (CEE Tier 1)	ROB	26%	3379.0	15	$910.00	$0.018	4.84	16,236,917	16,236,917	7,731,865
383	High Efficiency AC - Unitary & Split Systems (CEE Tier 2)	ROB	29%	3767.0	15	$1,200.00	$0.021	4.09	21,463,032	21,463,032	10,860,811
384	Ductless (mini split)	Retrofit	30%	1596.0	15	$910.00	$0.074	2.29	14,544,772	14,544,772	11,312,600
385	PTAC	ROB	9%	46.7	15	$75.00	$0.107	0.81	219,519	219,519	0
400	Cooking										
401	Energy Star HE Steamer	ROB	55%	9774.0	12	$1,500.00	$0.013	10.07	1,440,595	1,440,595	825,341
402	HE Combination Oven	ROB	66%	12745.8	10	$8,442.00	$0.066	1.35	404,472	404,472	278,074
403	Energy Star Electric convection oven	ROB	12%	1859.0	12	$50.00	$0.002	40.65	74,676	74,676	42,783
404	Energy Star HE Fryer	ROB	6%	1179.0	12	$260.00	$0.018	4.96	195,689	195,689	112,114
405	Energy Star High Efficiency Griddle	ROB	15%	2595.0	12	$60.00	$0.002	47.29	379,672	379,672	217,520
406	Induction Cooktops	ROB	20%	784.0	11	$3,000.00	$0.348	0.26	122,567	0	0
407	Energy Star HE Holding Cabinet	ROB	60%	3942.0	12	$1,800.00	$0.038	2.39	1,181,897	1,181,897	677,129
408	Demand Ventilation Control	ROB	60%	2500.0	12	$10,000.00	$0.333	0.27	487,941	0	0
500	Lighting										
501	Lamp & Ballast Retrofit (HPT8 Replacing T12)	ROB	17%	50.8	13	$37.00	$0.056	1.57	20,942,483	20,942,483	9,005,049
502	Lamp & Ballast Retrofit (HPT8 Reduced Wattage Replacing Standard T8)	ROB	35%	87.9	13	$37.00	$0.032	2.72	6,305,820	6,305,820	0
503	High Efficiency Fluorescent Fixture (HP T8 Troffer Replacing T12)	ROB	25%	84.4	13	$97.00	$0.088	1.00	30,874,508	30,874,508	0
504	High Efficiency Fluorescent Fixture (HP T8 Reduced Wattage Replacing T8)	ROB	33%	115.1	13	$97.00	$0.065	1.36	5,993,251	5,993,251	0
505	Fluorescent Fixture with Reflectors	ROB	29%	98.9	13	$85.50	$0.066	1.33	64,889,670	64,889,670	39,628,479
506	Low Glare Recessed T5/HP T8 (replacing T12)	ROB	34%	108.8	13	$171.00	$0.121	0.73	42,185,141	0	0
507	Low Glare Recessed T5/HP T8 Reduced Wattage (replacing T8)	ROB	49%	209.7	13	$171.00	$0.063	1.41	9,006,473	9,006,473	0
508	New Fluorescent Fixtures T5/HP T8 (replacing T12)	ROB	15%	46.1	13	$88.00	$0.147	0.60	18,631,911	0	0
509	New Fluorescent Fixtures T5/HP T8 reduced wattage (replacing T8)	ROB	55%	167.6	13	$80.00	$0.037	2.40	10,123,400	10,123,400	0
510	Pendant Mounted Indirect Fluorescent Fixtures	ROB	13%	28.7	15	$99.00	$0.230	0.38	87,049	0	0
511	High Intensity Fluorescent Fixture (replacing HID)	ROB	45%	389.0	13	$213.00	$0.042	2.10	4,826,285	4,826,285	1,539,558
512	HID Fixture Upgrade - Pulse Start Metal Halide	ROB	21%	320.0	15	$37.50	$0.008	11.30	0	0	0
513	CFL Fixture	Retrofit	38%	57.3	13	$76.00	$0.102	0.86	3,254,602	0	0
514	CFL Screw-in	Retrofit	68%	148.0	3	$3.00	$0.007	12.63	32,832,917	32,832,917	21,269,261
515	Ceramic Metal Halide	ROB	72%	420.3	15	$105.00	$0.017	5.30	278,581	278,581	133,627
516	Metal Halide Track	Retrofit	72%	382.0	15	$291.67	$0.051	1.74	278,581	278,581	200,440
517	Halogen Infra-Red Bulb	ROB	20%	40.0	1	$6.00	$0.115	0.76	580,378	0	0
518	Induction Fluorescent 23W	ROB	43%	49.9	9	$22.00	$0.049	1.76	1,253,902	1,253,902	902,188
519	Integrated Ballast MH 25W	ROB	72%	185.4	9	$35.00	$0.021	4.12	419,162	419,162	301,588
520	Cold Cathode Downlight	ROB	76%	249.7	11	$81.00	$0.028	3.07	294,058	294,058	185,340
522	LED Downlight	ROB	84%	275.9	13	$81.00	$0.023	3.91	2,535,487	2,535,487	1,309,562
523	LED Exit Sign	ROB	88%	96.4	13	$47.00	$0.038	2.35	2,391,489	2,391,489	0

Efficiency Maine - Commercial Measure Database

Measure ID	Measure Name	ROB vs. Retrofit vs. NC	% Savings	Annual kWh Savings	Useful Life	Incremental /Full Cost	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
524	LED Outdoor Area Fixture	ROB	66%	751.6	13	$341.00	$0.035	2.53	60,430,583	60,430,583	37,117,595
525	LED Parking Garage Fixture	ROB	71%	635.1	13	$343.00	$0.042	2.12	4,122,620	4,122,620	2,536,997
526	LED Pin Based Lamp	ROB	73%	194.3	7	$39.50	$0.027	3.14	5,048,938	5,048,938	3,317,751
527	LED Screw In	ROB	81%	165.4	13	$55.00	$0.026	3.45	31,268,307	31,268,307	15,856,887
528	LED Traffic / Pedestrian Signals	ROB	92%	485.3	10	$102.67	$0.021	4.08	0	0	0
529	LED Wallpack	ROB	73%	657.0	13	$120.00	$0.014	6.28	21,651,111	21,651,111	13,307,894
550	Lighting Controls										
551	Controls for HID (Hi/Lo)	Retrofit	30%	78.3	9	$50.00	$0.071	1.21	6,123,317	6,123,317	4,886,284
552	Controls for H.I.F.	ROB	42%	152.9	10	$74.00	$0.048	1.78	15,626,359	15,626,359	12,114,818
553	Daylight Dimming	Retrofit	30%	89.0	9	$288.00	$0.360	0.24	53,856,308	0	0
554	Daylight Dimming - New Construction	Retrofit	30%	252.0	9	$288.00	$0.127	0.68	5,987,567	0	0
555	Remote Mounted Occupancy Sensor	ROB	30%	592.0	10	$120.00	$0.020	4.25	43,470,206	43,470,206	33,922,003
556	Switch Mounted Occupancy Sensor	ROB	30%	353.0	10	$59.00	$0.017	5.16	43,470,206	43,470,206	33,922,003
557	15% More Efficient Design - New Construction	ROB	15%	27000.0	15	$4,000.00	$0.010	8.95	13,750,567	13,750,567	7,078,446
558	30% More Efficient Design - New Construction	ROB	30%	54000.0	15	$8,000.00	$0.010	8.95	28,044,268	28,044,268	14,518,981
600	Refrigeration										
605	Commercial Reach-In Freezer - Tier 1	ROB	34%	2403.0	9	$123.33	$0.006	14.88	5,007,643	5,007,643	3,739,885
615	Commercial Reach-In Freezer - Tier 2	ROB	54%	3810.7	9	$246.67	$0.007	11.80	7,941,098	7,941,098	5,930,694
608	H.E. Evaporative Fan Motors	Retrofit	30%	462.5	15	$60.00	$0.009	10.02	78,408,662	78,408,662	62,139,187
610	Door Heater Controls	Retrofit	13%	3500.0	10	$300.00	$0.010	9.88	11,518,948	11,518,948	9,156,872
601	Vending Miser for Soft Drink Vending Machines	Retrofit	46%	1635.0	10	$160.00	$0.007	8.66	33,186,629	33,186,629	24,336,861
602	Refrigerated Case Covers	Retrofit	6%	2900.0	4	$150.00	$0.013	6.56	2,920,501	2,920,501	2,256,751
606	Commercial Ice-makers	ROB	14%	368.5	9	$50.00	$0.015	5.63	5,649,131	5,649,131	4,142,696
609	Zero-Energy Doors	ROB	20%	1800.0	10	$290.00	$0.016	5.26	17,363,968	17,363,968	13,730,006
604	Commercial Reach-In Cooler - Tier 1	ROB	35%	837.7	9	$125.00	$0.017	5.12	3,732,553	3,732,553	2,787,603
614	Commercial Reach-In Cooler - Tier 2	ROB	61%	1450.0	9	$250.00	$0.019	4.43	6,461,044	6,461,044	4,825,337
612	Floating Head Pressure Control	Retrofit	8%	2000.0	10	$734.00	$0.037	2.31	6,790,258	6,790,258	5,375,025
611	Discus and Scroll Compressors	ROB	8%	1500.0	13	$825.00	$0.042	2.05	10,221,185	10,221,185	5,729,895
616	ECM case fan motors	ROB	33%	550.0	5	$120.00	$0.044	1.93	17,842,736	17,842,736	13,787,569
607	Evaporator Fan Motor Controls	Retrofit	30%	2600.0	15	$2,254.00	$0.058	1.50	12,874,283	12,874,283	10,222,651
618	Refrigeration Heat Recovery	Retrofit	10%	1825.0	15	$2,861.00	$0.105	0.84	8,102,518	0	0
613	LED Lighting in Refrigeration	Retrofit	50%	150.4	15	$250.00	$0.111	0.78	15,232,183	0	0
617	Efficient low-temp compressor	ROB	1%	283.5	13	$552.00	$0.150	0.58	1,335,272	0	0
603	Refrigeration Economizer	Retrofit	30%	600.0	15	$2,558.00	$0.284	0.30	4,049,477	0	0
700	Space Heating										
701	High Efficiency Heat Pump	ROB	8%	2918.0	15	$1,000.00	$0.023	3.84	2,506,620	2,506,620	1,172,250
702	Hydronic Heat Pump	ROB	34%	10875.0	15	$3,465.00	$0.021	4.13	11,922,579	11,922,579	5,740,501
703	Ductless (mini split)	Retrofit	30%	1596.0	15	$2,625.00	$0.110	2.29	10,645,160	10,645,160	8,279,569
715	Compressed Air										
716	Efficient Air Compressors	ROB	19%	18424.2	10	$5,002.00	$0.027	3.29	1,447,749	1,447,749	1,004,535
717	Automatic Drains	ROB	75%	650.0	5	$200.00	$0.062	1.45	5,151,333	5,151,333	3,571,679
718	Cycling Dryers	ROB	35%	1170.0	10	$750.00	$0.064	1.39	1,213,928	1,213,928	837,349
719	Low Pressure Drop-Filters	Retrofit	3%	1105.1	3	$40.00	$0.012	7.41	257,048	257,048	178,443
720	Air-Entraining Air Nozzles	Retrofit	46%	800.0	10	$14.00	$0.002	51.00	8,165,493	8,165,493	6,202,448
721	Receiver Capacity Addition	ROB	10%	9158.8	10	$2,000.00	$0.022	4.09	865,007	865,007	600,425
740	Transformers										
741	Energy Efficient Transformers - CEE Tier 1	ROB	1%	295.0	30	$1,306.00	$0.148	0.61	1,195,986	0	0
742	Energy Efficient Transformers - CEE Tier 2	ROB	1%	480.8	30	$1,478.00	$0.102	0.88	437,286	0	0
780	Other										
784	Energy Star Compliant Single Door Refrigerator	ROB	20%	95.0	12	$30.00	$0.026	3.27	935,029	935,029	588,722
785	Commercial Clothes washers - Non-Water Heating Savings	ROB	55%	47.4	10	$40.00	$0.084	1.00	213,298	213,298	0

Efficiency Maine - Industrial Measure Database

Measure ID	Measure Name	ROB vs. Retrofit vs. NC	% Savings	Useful Life	Incremental /Full Cost	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
150	Ventilation									
151	Dual Enthalpy Economizer - from Fixed Damper	ROB	22.0%	10	$800.00	$0.0295	3.52	5,392,200	5,392,200	4,159,697
152	Dual Enthalpy Economizer - from Dry Bulb	ROB	16.0%	10	$400.00	$0.02	5.18	3,921,600	3,921,600	3,025,234
153	Demand-Controlled Ventilation	ROB	25.0%	15	$2,100.00	$0.02	13.52	7,747,114	7,747,114	3,709,886
157	Variable Speed Drive Control, 15 HP	Retrofit	30.0%	20	$3,465.00	$0.02	5.99	5,244,000	5,244,000	4,045,371
158	Variable Speed Drive Control, 5 HP	Retrofit	30.0%	20	$1,925.00	$0.04	3.60	5,244,000	5,244,000	4,045,371
159	Variable Speed Drive Control, 40 HP	Retrofit	30.0%	20	$6,280.00	$0.01	8.82	5,244,000	5,244,000	4,045,371
160	Improved Duct Sealing	ROB	7.0%	20	$0.20	$0.03	4.85	1,668,340	1,668,340	611,725
161	Electronically-Commutated Permanent Magnet Motors (ECPMs)	ROB	14.0%	18	$200.00	$0.02	7.39	615,600	615,600	266,000
162	High Volume Low Speed Fans	Retrofit	15.0%	10	$7,000.00	$4.69	0.02	908,743	0	0
300	Building Envelope									
303	Energy Efficient Windows	ROB	20.0%	30	$0.51	$0.0042	37.26	12,859,200	12,859,200	2,245,257
304	Ceiling insulation to R32	Retrofit	1.9%	15	$1.04	$0.6958	0.17	1,670,205	0	0
305	Below Grade Insulation to R6	Retrofit	0.7%	30	$1.04	$1.7807	0.08	780,055	0	0
306	Wall Insulation to R12	Retrofit	1.7%	15	$4.20	$3.2319	0.04	1,273,785	0	0
307	Roof Insulation to R-18	Retrofit	4.0%	20	$1.36	$5.7203	0.02	1,837,766	0	0
320	Water Heating									
321	Heat Pump Water Heater	ROB	43.0%	14	$4,067.01	$0.0272	4.30	2,185,099	2,185,099	1,232,198
324	Solar Water Heating System	Retrofit	60.0%	20	$26,400.00	$0.0979	1.29	4,146,606	4,146,606	3,273,636
325	High Efficiency Electric Water Heater	ROB	5.3%	13	$70.00	$0.0274	4.22	236,875	236,875	8,677
334	Drain water Heat Recovery Water Heater	ROB	25.0%	20	$350.00	$0.1025	1.24	1,276,055	1,276,055	496,244
335	Hot Water Circulation Pump Time-Clock	Retrofit	5.0%	10	$132.00	$0.0097	11.34	285,794	285,794	213,046
336	Hot Water (DHW) Pipe Insulation	Retrofit	2.0%	6	$15.00	$0.0867	1.19	99,494	99,494	72,962
337	Refrigeration Heat Recovery	Retrofit	9.8%	15	$2,861.00	$0.1410	0.84	93,918	0	0
340	Space Cooling - Chillers									
341	Centrifugal Chiller, 0.51 kW/ton, 300 tons	ROB	15.0%	25	$16,200.00	$0.0480	2.86	982,029	982,029	275,554
342	Centrifugal Chiller, 0.51 kW/ton, 500 tons	ROB	15.0%	25	$27,000.00	$0.0480	2.86	982,029	982,029	275,554
343	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	ROB	33.0%	25	$60,000.00	$0.0480	2.86	3,583,118	3,583,118	1,005,412
344	Chiller Tune Up/Diagnostics - 300 ton	Retrofit	8.0%	10	$5,100.00	$0.0414	2.52	390,857	390,857	234,514
345	Chiller Tune Up/Diagnostics - 500 ton	Retrofit	8.0%	10	$8,500.00	$0.0409	2.54	390,857	390,857	234,514
360	HVAC Controls									
361	Programmable Thermostats	Retrofit	4.1%	5	$28.00	$0.0038	24.54	3,387,325	3,387,325	2,550,457
362	EMS install	Retrofit	10.0%	10	$0.29	$0.0720	5.07	8,349,678	8,349,678	6,471,000
363	EMS Optimization	Retrofit	0.5%	5	$0.06	$0.2527	1.87	68,460	68,460	52,539
380	#VALUE!									
381	HVAC Advanced Tune-Up	ROB	10.0%	2	$450.00	$0.2888	0.31	6,323,369	0	0
382	High Efficiency AC - Unitary & Split Systems (CEE Tier 1)	ROB	25.8%	15	$910.00	$0.0242	4.84	11,126,406	11,126,406	5,298,288
383	High Efficiency AC - Unitary & Split Systems (CEE Tier 2)	ROB	28.8%	15	$1,200.00	$0.0287	4.09	14,707,619	14,707,619	7,442,410
384	Ductless (mini split)	Retrofit	30.0%	15	$910.00	$0.0996	2.29	9,966,857	9,966,857	7,752,000
500	Lighting									
501	Lamp & Ballast Retrofit (HPT8 Replacing T12)	ROB	16.7%	13	$37.00	$0.0730	1.57	976,742	976,742	52,419
502	Lamp & Ballast Retrofit (HPT8 Reduced Wattage Replacing Standard	ROB	34.5%	13	$37.00	$0.0422	2.72	555,667	555,667	0
503	High Efficiency Fluorescent Fixture (HP T8 Troffer Replacing T12)	ROB	24.6%	13	$97.00	$0.1150	1.00	1,439,964	1,439,964	0
504	High Efficiency Fluorescent Fixture (HP T8 Reduced Wattage Replacing	ROB	32.8%	13	$97.00	$0.0844	1.36	528,123	528,123	0
505	Fluorescent Fixture with Reflectors	ROB	28.7%	13	$85.50	$0.0866	1.33	5,803,376	5,803,376	3,504,106
506	Low Glare Recessed T5/HP T8 (replacing T12)	ROB	33.6%	13	$171.00	$0.1574	0.73	1,967,483	0	0
507	Low Glare Recessed T5/HP T8 Reduced Wattage (replacing T8)	ROB	49.3%	13	$171.00	$0.0816	1.41	793,647	793,647	0
508	New Fluorescent Fixtures T5/HP T8 (replacing T12)	ROB	14.9%	13	$88.00	$0.1911	0.60	868,978	0	0
509	New Fluorescent Fixtures T5/HP T8 reduced wattage (replacing T8)	ROB	55.5%	13	$80.00	$0.0478	2.40	892,071	892,071	0
511	High Intensity Fluorescent Fixture (replacing HID)	ROB	44.6%	13	$213.00	$0.0548	2.10	38,245,962	38,245,962	22,497,625
523	LED Exit Sign	ROB	87.7%	13	$47.00	$0.0488	2.35	2,319,374	2,319,374	509,753
524	LED Outdoor Area Fixture	ROB	65.6%	13	$341.00	$0.0454	2.53	7,087,061	7,087,061	4,353,139

Efficiency Maine - Industrial Measure Database

Measure ID	Measure Name	ROB vs. Retrofit vs. NC	% Savings	Useful Life	Incremental /Full Cost	Levelized Cost (- Admin)	Total Resource Cost (TRC) Ratio	Technical Potential (kWh) Savings per Measure by 2021	Economic Potential (kWh) Savings per Measure by 2021	Achievable Electricity (kWh) Savings per Measure by 2021
529	LED Wallpack	ROB	73.2%	13	$120.00	$0.0183	6.28	2,097,352	2,097,352	1,288,272
550	Lighting Controls									
551	Controls for HID (Hi/Lo)	Retrofit	30.0%	9	$50.00	$0.0859	1.21	14,844,158	14,844,158	11,845,338
552	Controls for H.I.F.	ROB	42.3%	10	$74.00	$0.0597	1.78	14,176,087	14,176,087	9,944,419
555	Remote Mounted Occupancy Sensor	ROB	30.0%	10	$120.00	$0.0250	4.25	11,461,489	11,461,489	8,522,646
556	Switch Mounted Occupancy Sensor	ROB	30.0%	10	$59.00	$0.0206	5.16	323,273	323,273	257,965
780	Other									
784	Energy Star Compliant Single Door Refrigerator	ROB	20.0%	12	$30.00	$0.0336	3.27	3,360,086	3,360,086	2,117,127
102	Energy Star office equipment including computers, monitors, copiers,	ROB	25.0%	4	$300.00	$0.0963	0.96	6,583,656	0	0
103	Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	Retrofit	70.0%	4	$35.70	$0.0113	8.18	4,847,035	4,847,035	2,908,221
104	EZ Save Monitor Power Management Software	Retrofit	15.0%	2	$26.00	$0.5375	0.17	814,964	0	0
800	Machine Drive									
801	Sensors & Controls	ROB	3.0%	15	$0.00	$0.0130	9.51	36,773,810	36,773,810	17,356,303
802	Energy Information System	ROB	1.0%	15	$0.00	$0.0571	2.17	11,757,694	11,757,694	5,548,563
803	Electric Supply System Improvements	ROB	3.0%	15	$0.00	$0.0094	13.25	37,551,692	37,551,692	17,724,683
804	Advanced Efficient Motors	ROB	2.3%	25	$0.00	$0.0314	4.64	21,912,440	21,912,440	6,204,671
805	Industrial Motor Management	ROB	1.0%	5	$0.00	$0.0177	5.63	9,603,248	9,603,248	6,798,258
806	Advanced Lubricants	ROB	2.6%	1	$0.00	$0.0661	1.44	5,586,062	5,586,062	3,954,080
807	Motor System Optimization (Including ASD)	ROB	19.0%	15	$0.00	$0.0087	21.21	215,125,712	215,125,712	101,584,670
808	Pump System Efficiency Improvements	ROB	17.0%	15	$0.00	$0.0075	16.61	21,532,071	21,532,071	10,163,701
809	Fan System Improvements	ROB	3.5%	15	$0.00	$0.0224	5.54	4,178,221	4,178,221	1,971,840
820	Process Cooling & Refrigeration									
821	Sensors & Controls	ROB	3.0%	15	$0.00	$0.0130	9.51	3,768,712	3,768,712	1,814,440
822	Energy Information System	ROB	1.0%	15	$0.00	$0.0571	2.17	1,228,978	1,228,978	591,666
823	Electric Supply System Improvements	ROB	3.0%	15	$0.00	$0.0094	13.25	3,852,312	3,852,312	1,854,764
824	Improved Refrigeration	ROB	16.4%	15	$0.00	$0.0031	40.54	11,708,334	11,708,334	5,727,463
830	Process Heating									
831	Sensors & Controls	ROB	3.0%	15	$0.00	$0.0130	9.51	5,144,095	5,144,095	2,498,148
832	Energy Information System	ROB	1.0%	15	$0.00	$0.0571	2.17	1,676,520	1,676,520	814,123
833	Electric Supply System Improvements	ROB	3.0%	15	$0.00	$0.0094	13.25	5,261,258	5,261,258	2,555,211