New Jersey Energy Efficiency and Distributed Generation Market Assessment

Appendices A through F

Final Report to
Rutgers University
Center for Energy, Economic and Environmental Policy

KEMA, Inc.
Burlington, MA

A RESIDENTIAL CRITERIA SCORES

A.1 INTRODUCTION

The likelihood of success criterion incorporated a number of factors to measure the advantage of the efficiency measures to the community at large. In particular, environmental impact, effect on low-income ratepayers, contribution to security, reliability, and diversity, and smart-growth compatibility are all elements of this criterion. The need for program criteria measured the programs in relation to its alignment with other programs, value chain leverage, and threshold investment necessary to make an impact. The rationale for assigning values to these criteria, by measure, follows. First, measures currently made use of by the New Jersey Clean Energy Program are considered. Then, potential additional measures are described.

A.2 GENERAL DISCUSSION

New Jersey's energy efficiency programs are currently run by the state's seven utilities through the New Jersey Clean Energy Program (NJCEP). New Jersey is one of the few states where the gas and electric utilities have coordinated to combine gas and electric programs. The New Jersey Board of Public Utilities (NJBPU) is expected to release an RFP for program management services later in 2004 that would result in the management of the programs being transferred from the utilities to the selected contractor in early 2005.

Several of the NJCEP's residential initiatives have been recognized by national energy efficiency experts in recent years. NJCEP's 'Cool Advantage,' 'Comfort Partners,' and 'New Jersey for ENERGY STAR Homes' programs were all recognized by the American Council for Energy Efficiency (ACEEE) in 2003. In addition, ACEEE recognized other regional programs in which NJCEP participated.

Over the years, NJCEP has partnered with national, regional, and state and local organizations on several energy efficiency initiatives. Five of the seven utilities, the New Jersey Office of Clean Energy, and the NJCEP are all formally ENERGY STAR partners. In addition, several organizations within the state (small businesses to utilities to state government programs) work with ENERGY STAR to promote energy efficiency through advertising, consumer education, public relations, in-store outreach, dollar incentives, and employee training. Many state programs also partner with Northeast Energy Efficiency Partnerships (NEEP) and the Consortium for Energy Efficiency (CEE). Furthermore, the NJCEP has worked with state and local government agencies such as the Department of Community Affairs and local housing authorities to promote energy efficiency. New Jersey has also utilized available federal resources with projects funded through the State Energy Office, Low Income Home Energy Assistance Program (LIHEAP), and Weatherization Assistance Program, among others.

Partnering with local, regional, and national organizations, NCEP has contributed to programs goals while leveraging external resources and achieved multiple benefits.

The scoring for measures geared toward low-income customers tend to rank societal benefits higher than those for other customers. The need for program criterion is in part measured by the availability of national, regional, and local programs, as well as level of private sector involvement. The scoring for the SBC-Related criteria tend to be the same or slightly lower for low-income customer measures due to the additional private sector investment that non-low income customer measures attract. Ease and feasibility of implementation also play a role.

A.2.1 Existing Measures

New Jersey has made substantial efforts to promote energy efficiency measures for decades. Overall, their efforts have made a significant impact to transform the market. The New Jersey Clean Energy Program continues to promote highly efficient products and practices. The following describes some of these efforts, and notes the estimated state of transformation, existing barriers, and potential savings.

High Performance Windows

High performance windows provide a number of benefits for residential customers. According to the ENERGY STAR program, ENERGY STAR qualifying windows, doors and skylights can cut energy bills by up to 15%.[i] In addition to reducing energy use and costs bills, high-performance windows can help reduce peak loads. This in turn allows for smaller HVAC equipment and increased electricity reliability. Furthermore, high-performance windows can increase comfort, reduce condensation, and reduce fading of housing interiors.[ii]

Nationally, significant transformation of the residential windows market has taken place. In New Jersey, the market share of highly efficient windows was up to roughly a quarter in 2002, according to the Northeast Energy Efficiency Partnerships (NEEP). Meanwhile, NEEP estimated an overall market share of eight northeastern states at 43% in 2002[1], with the highest market share in Massachusetts at an estimated 54%. In comparison, the Northwest Energy Efficiency Alliance (NEEA) reported a market penetration rate of 75%, following a regional campaign.[iii]

Several market barriers for efficient windows exist, including high first cost. In addition, lack of consumer awareness of the benefits and means of installing efficient windows pose problems. National and regional organizations such as the ENERGY STAR Program, NEEP, and the Efficient Windows Collaborative work to overcome these barriers. The New Jersey Clean Energy Program also promotes efficient windows through its ENERGY STAR II Program and its New Jersey for ENERGY STAR Homes Program.[iv]

[1] States include NJ, NY, CT, RI, MA, VT, NH, and ME.

The scoring of this measure reflects the relative success of promoting high efficiency windows in other regions and the market barrier of the relatively high first cost.

	Existing Homes	New Construction	Low Income
Likelihood of Success	5	5	5
Market Barriers	4	3	5

Duct Sealing / Duct Leakage Diagnostics & Mitigation

Duct leakage can increase outside air infiltration and contribute to moisture and mold problems. Sealing and insulating ducts can improve comfort by reducing humidity levels and reducing drafts, and cut HVAC energy usage. Sealing and insulating supply and return ducts in unconditioned spaces have the greatest potential for energy savings. According to the ENERGY STAR program and HVAC experts interviewed for a 2001 XENERGY study, sealing ductwork can save energy in homes by about 20 to 25%. The ENERGY STAR Program estimates that the average family could save up to $150 annually.[v]

According to a 2001 study, XENERGY estimated potential energy savings of 18.4% (± 3.5%) cooling and 22.3% (± 4.1%) heating of baseline usage from outdoor air duct leakage reduction. Furthermore, the study noted that outdoor air leakage reduction and refrigerant charge correction were potentially the greatest HVAC energy saving measures for the population studied. The same study found that homes averaged an outdoor air leakage rate of 329 CFM_{25}, with outdoor air leakage airflow being about 34% of supply airflow. The average total duct leakage was 608 CFM_{25}.[2] Furthermore, 8% of ducts inspected had been sealed, the majority with duct tape.[vi]

Although duct sealing is relatively new and national activity in this area is fairly low, the NJCEP has made use of it in their nationally recognized Comfort Partners and ENERGY STAR Homes programs.[vii] Duct leakage reduction is a simple procedure, and according to ACEEE, costs are relatively low. Primary barriers include low consumer awareness and difficulty in demonstrating the value of an 'intangible service.'[viii]

Scores for this measure reflect the low levels of duct sealing in New Jersey homes and the ample potential savings, along with the relative ease and low cost of application.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4.5	4.5	4.5
Market Barriers	5	4	5

[2] With 38% of all systems having a leakage greater than 608 CFM_{25}.

Duct Insulation

Duct insulation has notable impact on the energy usage and indirectly affects the sizing of the heating and cooling equipment. Poor duct insulation most dramatically reduces home energy performance when the ducts are in unconditioned spaces (i.e. attics, crawl spaces, and basements).

According to a 2001 on-site survey, a large portion of New Jersey homes is already well insulated. 32% of New Jersey homes had R6-level duct insulation. In addition, of the homes that had ducts in unconditioned spaces (89%), 54% had insulation on the ducts. Furthermore, the areas that could benefit the most from insulation (attics and crawl spaces) had the highest occurrence of insulation on ducts, 83 and 100%, respectively. The report estimated that up to 4.7% cooling and 6.9% heating energy savings could be achieved by insulating with R8 insulation.[ix] The NJCEP currently promotes proper duct insulation through its Comfort Partners and New Jersey for ENERGY STAR Homes programs.[x]

The scoring of this measure is slightly lower than duct sealing and duct diagnostics and mitigation measure because a larger portion of New Jersey homes has their ducts already well insulated. Additional and higher-level insulation could still provide additional energy savings, and is relatively inexpensive.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4.5	4.5	4.5
Market Barriers	3	3	3

High Efficiency Refrigerators

According to the EPA, ENERGY STAR has savings of 10% over standard equipment, resulting in approximately additional savings of $4 per year.[xi]

New Jersey's active promotion of high efficiency refrigerators helped the state reach an estimated market share of 15.2% in 1999 (± 3%).[xii] The estimated 2001 percentage of sales was roughly 17% statewide and nationally. Estimated 2002 sales were about 23% statewide and 20% nationally.[xiii3] In 2003, the average market share of ENERGY STAR refrigerators in the northeast was about 17-22%.[xiv] For New Jersey, ENERGY STAR estimates a 2003 market share of 30%.[xv] The residential refrigerator market is well on its way to transformation, and regions with active programs to promote highly efficient refrigerators generally have higher market shares.[xvi]

The NJCEP ENERGY STAR II program promote efficient refrigerators. In addition, its Comfort Partners program includes a refrigerator replacement program and also promotes highly efficiency refrigerators.[xvii]

[3] Report analysis includes information on NJ. Represents response from 30% of the market.

This measure's scoring takes into account New Jersey's significant transformation of the refrigerator market (almost one third are Energy Star qualified) while acknowledging that sustained efforts will likely continue to provide energy savings.

	Existing Homes	New Construction	Low Income
Likelihood of Success	3.5	3.5	5
Market Barriers	2	2	3

High Efficiency Dishwashers

Highly efficient dishwashers are significantly more efficient than standard equipment. According to the ENERGY STAR Program, ENERGY STAR qualified dishwashers provide 25% additional energy savings above standard equipment. However, cost savings are not substantial. The EPA estimates that ENERGY STAR qualified dishwashers can save residential customers about $8 per year compared to conventional models.[xviii] They also estimate savings of $100 over its lifetime, due to less use of hot water.[xix]

The percentage share of ENERGY STAR qualified dishwashers has grown tremendously in the past five years. In 1999, the estimated market share of ENERGY STAR qualifying dishwashers in New Jersey was 9.7% (±1.3%).[xx] The EPA estimated an average national market penetration of ENERGY STAR qualified dishwashers for 2000 at 20%.[xxi] The ENERGY STAR program estimates almost a 60% market share of ENERGY STAR qualified dishwashers for New Jersey in 2003.[xxii] The market has largely been transformed. The NJCEP currently promotes efficient dishwashers through its ENERGY STAR II Program.[xxiii]

This measure's scoring acknowledges the significant market share that highly efficiency dishwashers have achieved in New Jersey, as well as the success of past efforts.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	4
Market Barriers	2	2	3

High Efficiency Clothes Washers

According to the EPA, ENERGY STAR qualifying clothes washers provide 38% additional savings in energy over standard equipment. Furthermore, they estimate that ENERGY STAR qualifying clothes washers can save residential customers $41 per year over standard equipment. [xxiv]

National efforts to transform the clothes washers market have largely paid off. In the state of New Jersey, the estimated market share as ENERGY STAR in 1999 was 8.1% (±1.6%).[xxv] Estimates of 2002 and 2001 statewide percentage of sales are 20% and 12%, respectively – both

above estimated national rates.[xxvi4] The ENERGY STAR program estimates that ENERGY STAR qualified clothes washers represented 28% of the market in New Jersey, in 2003.[xxvii] An ACEEE 2003 report notes that nationally, the residential clothes washer market is largely transformed.[xxviii] The NJCEP currently promotes efficient dishwashers through its ENERGY STAR II Program.[xxix]

The scoring of this measure reflects the relative success of promoting high efficiency clothes washers in New Jersey while acknowledging room the potential for additional savings.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	4
Market Barriers	1	1	1

High Efficiency Room Air Conditioner

According to the EPA, ENERGY STAR qualifying room air conditioners (RAC) provide 10% additional savings in energy over standard equipment.[xxx] Furthermore, they estimate that replacing a 10-year-old RAC with a new, ENERGY STAR qualified one save residential customers roughly $14 per year.[xxxi] In 1999, the estimated incremental cost was 15% over standard equipment.[xxxii]

Efforts to transform the market for RAC have made an impact. In the state of New Jersey, the estimated market share as ENERGY STAR in 1999 was 12.3% (±2.8%).[xxxiii] Estimates of 2002 and 2001 statewide percent of sales are 46% and 21%, respectively. Both rates are above estimated national rates of 34 % and 12%, respectively.[xxxiv5] The ENERGY STAR Program estimates a 2003, statewide market share of ENERGY STAR qualified RAC of 40%.[xxxv]

New Jersey is currently promoting highly efficiency RAC's with a $25 mail-in rebate on the purchase of ENERGY STAR qualified RAC until September 2004, through its ENERGY STAR II Program.[xxxvi]

The scoring of this measure reflects the relative success of promoting high efficiency RAC's in New Jersey. In addition, continued promotion of highly efficient RAC's is likely possible, given Maine, New Hampshire, and Vermont's predicted Energy Star RAC market shares of over 60%.[xxxvii]

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	4
Market Barriers	1	1	2

[4] Report analysis includes information on NJ. Represents response from 30% of the market.

[5] Report analysis includes information on NJ. Represents response from 30% of the market.

High Efficiency Central Air Conditioning

Central air conditioning (CAC) accounts for a large portion of residential electricity use, contributing particularly to peak demand. According to the ENERGY STAR Program qualifying products (SEER 12, 13) use 24% less energy than standard new equipment.[xxxviii]

The market share of high efficiency residential heating, ventilation, and air conditioner (HVAC) equipment in New Jersey is higher than the national average. A 2001 study of New Jersey by XENERGY found that 28% of air conditioners and heat pumps in 2001, were of a SEER 13 or 14 standard. This compared to a national market penetration for SEER 12 equipment of 20%.[xxxix] Furthermore, the market share of efficient central air conditioners has continued to rise. A 2003 report by ACEEE notes that the market share of SEER 13 air conditioners in New Jersey was 35% in 2002.[xl]

The same ACEEE report notes that the national residential air conditioner market has not quite, but is likely to transform. In addition, areas with active promotion, market share is higher. With few to no physical or technical limits on the adoption of high efficiency central air conditioners, energy efficiency program efforts will likely continue to successfully diminish market barriers.

The NJCEP continues to promote highly efficient CACs through its nationally recognized Cool Advantage and New Jersey for ENERGY STAR Homes programs. NJCEP is currently offering cash incentives for the purchase and installation of them.[xli]

This measure will be greatly impacted by the appliance standard changes that will be enacted in 2006 when SEER 13 will become the baseline.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	3
Market Barriers	2	2	3

High Efficiency Heat Pumps

The ENERGY STAR Program notes that ENERGY STAR qualified air source (SEER 12, 13) have the ability to provide up to 20% energy savings compared to standard new models, respectively.[xlii] According to a 2001 on-site survey, 28% of the heat pumps observed were either SEER 13 or SEER 14. This compared to an estimated national market penetration of 20% for SEER 12 and higher.[xliii] The NJCEP continues to promote high efficiency air source heat pumps through its Cool Advantage and New Jersey for ENERGY STAR Homes programs.[xliv]

New Jersey's market share for highly efficient heat pumps is above the national average. However, continued promotion of highly efficient heat pumps will likely keep providing significant savings.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	3
Market Barriers	2	2	3

Geothermal Heat Pumps

Geothermal heat pumps can be used to help meet heating, air conditioning, and hot water needs. ENERGY STAR qualified geothermal heat pumps (3.3 to 3.6 COP) have the ability to provide up to 60% energy savings compared to standard new models, respectively.[xlv] It is important to note, however, that while there is little to no technical or physical limits on the ability to install air source heat pumps, geothermal heat pumps may not be accessible for all homes. The NJCEP promotes geothermal heat pumps as part of its New Jersey ENERGY STAR Homes program.[xlvi]

The scoring of this measure reflects the physical limitations and lack of information that inhibits the use of this measure. However, it also reflects the significant energy and cost savings that this measure can provide. The key market barrier for this technology is high first cost.

	Existing Homes	New Construction	Low Income
Likelihood of Success	2.5	2.5	2.5
Market Barriers	5	4	5

Proper HVAC Installation (sizing, charging, air flow)

A 2003 ACEEE study noted that national residential central air conditioner installation and maintenance practices are active but limited. However, New Jersey's programs are some of the most active.[xlvii] A 2001 on-site survey of New Jersey found that the sizing of cooling systems is likely more accurate than previously, but that cooling systems were still oversized by about 23% as compared to Manual J load calculations. In contrast, the heating equipment was oversized in about 93% of the homes (±25%). Furthermore, 30% of measured airflows over cooling coils were within manufacture recommendations and 53% were less than recommended.[xlviii]

The same 2001 study estimated the following energy savings (over baseline usage):

Correction Measure	Cooling	Heating
Charge	11%	-
Sizing	3%	7%
Air Flow	2%	-

In addition, the EPA notes that incorrect refrigerant levels can result in a 5 to 20% reduction in efficiency and premature component failure. Furthermore, EPA estimates that nationally, roughly 75% of installed cooling equipment may have an incorrect amount of refrigerant.[xlix]

The NJCEP continues to promote proper installation through its Warm Advantage and Cool Advantage programs.[l] The scoring of this measure reflects the relatively large need for improved HVAC installation practices. Contractor training and consumer information can help improve these practices.

	Existing Homes	New Construction	Low Income
Likelihood of Success	3	3	4
Market Barriers	5	4	5

Programmable Thermostats

According to the EPA, ENERGY STAR qualifying programmable thermostats can provide up to 20% energy savings above standard new products[li], savings up to $100 per year in energy costs.[lii]

The New Jersey Clean Energy Program promotes the use of programmable thermostats under its Comfort Partners, low income housing program, and its Energy Star II Program.[liii] However, it recently discontinued Warm Advantage and Cool Advantage rebates for ENERGY STAR qualifying programmable thermostats.[liv]

The national market penetration of ENERGY STAR qualifying products was estimated to be 36% in 2000.[lv]

Programmable thermostats are relatively easy to implement and can provide significant energy savings. In addition, it is an especially practical measure for many low-income families.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	4
Market Barriers	2	1	4

High-Efficiency Gas Furnaces

The ENERGY STAR Program estimates that ENERGY STAR qualified furnaces (which have the same 90% AFUE rating as NJCEP promoted furnaces) are roughly 15% more efficient than standard equipment. National efforts to promote high-efficiency gas furnaces is relatively high. Furthermore, New Jersey is a relatively active region in promoting this measure.[lvi] 2003 estimates of the New Jersey market share for high-efficiency gas furnaces was 39%, an 8% increase over 2002 data.[lvii] A 2001 on-site survey found that 27% of gas furnaces observed in New Jersey had an AFUE of 90% or greater.[lviii] The EPA estimated that the national market penetration of ENERGY STAR qualifying furnaces in 2000 was 27%.[lix]

The New Jersey Clean Energy Program promotes highly efficient gas furnaces through its Warm Advantage and New Jersey for ENERGY STAR Homes programs.[lx]

Previous successes and additional potential yield relatively high scores for this measure. The Likelihood of Success score is slightly lower for low-income homes, given the long lifetime of furnaces, high replacements costs and lack of authority to make purchasing decisions for renters. Such reasons also contribute to higher Need for Program scores for low-income homes.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	3
Market Barriers	2	2	5

High-Efficiency Gas Boilers

According to the EPA, ENERGY STAR qualified gas and oil boilers (85% AFUE or better) used 10% less energy than standard equipment.[lxi] A 2001 on-site survey found that none of the observed boilers met standards of 85% AFUE.[lxii] High incremental cost and 'split incentives' for landlords and building managers[6] seem to continue to be a market barrier for New Jersey. The NJCEP, however, is currently promoting highly efficient gas boilers through its Warm Advantage and New Jersey for ENERGY STAR Homes programs.[lxiii]

The scoring of this measure are comparable to gas furnaces, with like energy savings and a similar rationale for scoring.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	3
Market Barriers	2	2	5

Efficient Lighting: Compact Fluorescent Lamps (CFLs), Fixtures, and Torchieres

According to the ENERGY STAR program, ENERGY STAR qualified CFLs last up to 10 times longer than a standard incandescent bulb while using 66% less energy. Furthermore, they estimate that replacing a 100-watt incandescent with a 32-watt CFL can save roughly $30 in energy costs over the life of the bulb.[lxiv] The ENERGY STAR Program estimates that ENERGY STAR qualified CFL fixtures save 66% of the energy used by standard fixtures. Also, halogen torchiere lamps burn at temperatures of up to 1,000 degrees. ENERGY STAR qualified CFL torchieres burn at one-tenth the temperature and can lower operating costs by up to 85 %.[lxv]

A 1999 study of New Jersey found that only 11% of consumers had a CFL bulb installed. In addition, 10% of the general population and 12% of new construction uses compact fluorescent

[6] Landlords and building managers responsible for equipment choices have little incentive to pay higher first costs to install efficient equipment because they tend not to be responsible for energy bills.

fixtures (self-reported).[lxvi] In 2000 the estimated national market penetration of CFLs was 3 to 5%, and 3% for CFL fixtures.[lxvii]

The NJCEP continues to promote CFLs, fixtures, and torchieres through its New Jersey for ENERGY STAR Homes, and Comfort Partners programs. In addition, New Jersey is working in conjunction with the 2004 Change a Light, Change the World lighting campaign.[lxviii]

Continued promotion of CFLs in the Northeast is helping to overcome market barriers such as high first cost and limited product availability. The relative ease of implementation and low replacement costs provide for high Likelihood of Success scores.

	Existing Homes	New Construction	Low Income
Likelihood of Success	5	5	5
Market Barriers	4	4	5

Load Control – Cycling

Cycling programs can help to reduce peak loads, especially in the summer. Currently, Conectiv Power Delivery, Public Service Electric & Gas, and Jersey Central Power & Light all have active cycling programs.[lxix] Eligible equipment ranges by utility but overall includes central air conditioners, heat pumps, water heaters, and motors (NJCEP).

The scoring of this measure reflects the past successes of the program and significant potential peak demand savings, but also recognizes the barrier of limited participation and difficulty in program implementation.

	Existing Homes	New Construction	Low Income
Likelihood of Success	3.5	3.5	3.5
Market Barriers	4	4	4

Tank / Pipe Wrap

Tank and pipe wrap is a fairly inexpensive means to save energy. Apart from some space constraints, it is also a highly feasible and easy measure to effect. Hot water energy consumption savings are in the area of 10 to 15%. Using these numbers a 2003 XENERGY study of the Northwest cites 24.4% energy savings.[lxx] The NJCEP uses tank / pipe wrap as a means to save energy through its Comfort Partners Program.[lxxi]

The scoring of this measure reflects the high savings and low costs of implementing this measure.

	Existing Homes	New Construction	Low Income
Likelihood of Success	5	5	5
Market Barriers	4	4	4

Blower Door Air Sealing

Air sealing can cut heating and cooling costs as well as improve comfort. According to DOE, residential consumers can save 10% or more on energy bills by mitigating air leaks.[lxxii]

According to a 1994 PSE&G new construction baseline study, new construction homes in New Jersey had air infiltration problems. Existing homes, especially low-income homes, were more likely to have greater leaks. A 1999 XENERGY study of New Jersey determined that due to a healthy performance contracting industry, less utility support is necessary for non-low-income residents. In addition, the installation costs of air sealing are typically less than those for insulation.[lxxiii]

The New Jersey Clean Energy Program includes air sealing as part of its New Jersey for ENERGY STAR Homes and Comfort Partners programs.[lxxiv]

The scoring of this measure reflects the relatively low cost of implementation and success of past efforts. Access to contractor in absence of a program is a barrier.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	4
Market Barriers	4	3	5

Low-Flow Fixtures

Low-flow fixtures such as faucet aerators and efficient showerheads decrease water consumption by reducing water flow. Reducing water consumption eases water-heating needs and saves energy. Low-flow fixtures are fairly easy to install, and are relatively inexpensive but may not fit on older fixtures. Faucet aerators save roughly 73 kWh each while low-flow showerheads save about 363 kWh per fixture.[lxxv] The NJCEP's Comfort Program promotes low-flow fixtures as a means of saving energy.[lxxvi]

The scoring of this measure reflects the ease of implementation and continued potential for this measure.

	Existing Homes	New Construction	Low Income
Likelihood of Success	5	5	5
Market Barriers	2	1	3

High-Efficiency Domestic Water Heaters (DHW)

According to the ENERGY STAR program, water heating uses 14% or more of residential energy use. This year, the Federal government increased DHW standards, bringing them close to the same energy factor as best-performing models (please see table below).[lxxvii]

	Energy Factor (Best-Performing Model)	2004 Federal Standard (Minimum Energy Factor)
Gas Storage (gal.)		
40	.65	.594
50	.65	.575
75	.59	.5275
100	.48	.48
Electric Storage (gal.)		
40	.95	.9172
50	.95	.904
75	.92	.871
100	.91	.838

However, according to the ENERGY STAR program, heat pump water heaters use 1/3 to 1/2 has much electricity as standard electric resistance water heaters.[lxxviii] ACEEE noted in 2003 that the overall level of effort to promote heat pump water heaters was low, but increasing.[lxxix]

The NJCEP promotes efficient DHW through its Cool Advantage and New Jersey for ENERGY STAR programs.[lxxx]

The scoring of this measure acknowledges the lower need for gas and electric storage DHW programs given more stringent federal standards. However, heat pump water heaters can provide significant additional savings, and the market can benefit from their promotion.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	4	4
Market Barriers	3	2	3

Insulation: Ceiling, Wall, Floor / Basement

Insulation can mean savings in heating and cooling costs, as well as improved comfort with even temperature throughout a home. However, proper installation of insulation (including full coverage and adequate positioning) can have a significant impact on its effectiveness. The Department of Energy (DOE) estimates that by increasing the amount of thermal insulation in existing homes or purchasing additional insulation for new homes, U.S. homeowners may be able to reduce their energy bills by as much as 10 to 50%.[lxxxi]

Information regarding the current status of insulation practices in New Jersey is limited. A 1994 baseline study by PSE&G found that existing, and especially low-income housing, was likely to have lower average insulation levels than new housing. It also determined that in new construction, ceiling and floor / basement insulation practices were inadequate though wall insulation was generally adequate. Furthermore, in 1999, the cost barriers of ceiling insulation were lower than wall insulation.[lxxxii]

National organizations currently working to improve insulation practices include the ENERGY STAR Program and the North American Insulation Manufacturers Association. The New Jersey Clean Energy Program includes ceiling, wall, and floor/basement insulation measures as part of Comfort Partners, low-income program and its New Jersey for ENERGY STAR Homes, residential new construction program.[lxxxiii]

The scoring of this measure reflects the relative ease of implementation (especially given the range of available technologies) and the significant potential energy savings.

	Existing Homes	New Construction	Low Income
Likelihood of Success	4	5	5
Market Barriers	3	3	4

A.2.2 Potential Additional Measures

The following describe additional energy efficiency analyzed for the assessment that the NJCEP may consider adding to its array of existing ones.

Solar DHW

According to the Department of Energy, compared to electric water heaters, solar DHW can save up to 50-85% annually on water heating utility costs. In addition, solar DHW can contribute to significant carbon dioxide reduction.[lxxxiv] High first cost is a market barrier for solar DHW's. Limited information about the market penetration of solar DHW is available. The market penetration rate of solar heating devices in Hawaii, a state with high energy costs and significant solar potential, is over 15%.[lxxxv]

Solar DHW have limited application and a high first cost, but are able to provide significant energy and emissions savings. This measure is generally not cost effective. The scoring of this measure reflects both the challenges and benefits of this measure.

	Existing Homes	New Construction	Low Income
Likelihood of Success	3	5	3
Market Barriers	5	4	5

Cooking

Convection ovens and induction cooktops are two means to improve the energy efficiency of cooking in homes. Convection ovens save energy by reducing cooking temperatures and time. They achieve this by using a fan to help circulate heat in the oven, providing an even heat distribution. Induction cooktops use electromagnetic induction to □ransfer heat from the cooktop to a cooking pan. With no heating elements involved, induction cooktops are safer than standard ranges. Both devices are relatively easy to implement, with no installation costs, and can provide savings of roughly 5%.[lxxxvi] Incremental costs are, however, higher. Please see an outline of costs, below.[lxxxvii]

Equipment Type	Measure Cost: Efficient Cooking	
	Equipment Cost	Incremental Cost
Base Cooking	$700	
Convection Oven	$1,200	$500
Induction Cooktop	$1,539	$839

The scoring of this measure reflects the medium-to-high incremental costs.

	Existing Homes	New Construction	Low Income
Likelihood of Success	3	2	4
Market Barriers	3	2	3

[i] National average; Energy Star program, http://www.energystar.gov/index.cfm?c=windows_doors.pr_windows

[ii] Efficient Windows Collaborative, 2003, http://www.efficientwindows.org/benefits.cfm

[iii] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[iv] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[v]XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study." and http://www.energystar.gov/index.cfm?c=ducts.pr_ducts_benefits

[vi] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[vii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[viii] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[ix] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[x] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[xi] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[xii] RLW Analytics, Inc. March 2001. "The New Jersey ENERGY STAR Products Working Group Appliance and Windows Baseline Studies: Final Report."

[xiii] XENERGY Inc., "Final Report: Phase 1 Evaluation of the Efficiency Vermont Efficient Products Program." June 10, 2002.

[xiv] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[xv] Energy Star Program. "2003 Sales Data – National, State, and Regional." March 2004. Available online: http://www.energystar.gov/index.cfm?c=manuf_res.pt_appliances.

[xvi] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[xvii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[xviii] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[xix] Energy Star Program, http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers

[xx] RLW Analytics, Inc. March 2001. "The New Jersey ENERGY STAR Products Working Group Appliance and Windows Baseline Studies: Final Report."

[xxi] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[xxii] Energy Star Program. "2003 Sales Data – National, State, and Regional." March 2004. Available online: http://www.energystar.gov/index.cfm?c=manuf_res.pt_appliances.

[xxiii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[xxiv] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[xxv] RLW Analytics, Inc. March 2001. "The New Jersey ENERGY STAR Products Working Group Appliance and Windows Baseline Studies: Final Report."

[xxvi] XENERGY Inc., "Final Report: Phase 1 Evaluation of the Efficiency Vermont Efficient Products Program." June 10, 2002.

[xxvii] Energy Star Program. "2003 Sales Data – National, State, and Regional." March 2004. Available online: http://www.energystar.gov/index.cfm?c=manuf_res.pt_appliances.

[xxviii] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[xxix] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[xxx] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[xxxi] National average, Energy Star program, http://www.energystar.gov/index.cfm?c=roomac.pr_room_ac

[xxxii] RLW Analytics, Inc. March 2001. "The New Jersey ENERGY STAR Products Working Group Appliance and Windows Baseline Studies: Final Report."

[xxxiii] Ibid.

[xxxiv] XENERGY Inc., "Final Report: Phase 1 Evaluation of the Efficiency Vermont Efficient Products Program." June 10, 2002.

[xxxv] Energy Star Program. "2003 Sales Data – National, State, and Regional." March 2004. Available online: http://www.energystar.gov/index.cfm?c=manuf_res.pt_appliances.

[xxxvi] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website

[xxxvii] Energy Star Program. "2003 Sales Data – National, State, and Regional." March 2004. Available online: http://www.energystar.gov/index.cfm?c=manuf_res.pt_appliances.

[xxxviii] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[xxxix] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[xl] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[xli] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website

[xlii] Energy Star program, http://www.energystar.gov/index.cfm?c=airsrc_heat.pr_as_heat_pumps

[xliii] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[xliv] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[xlv] Energy Star program, http://www.energystar.gov/index.cfm?c=geo_heat.pr_geo_heat_pumps

[xlvi] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[xlvii] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[xlviii] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[xlix] Energy Star program, http://www.energystar.gov/index.cfm?c=heat_cool.pr_properly_sized

[l] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[li] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[lii] Energy Star program, http://www.energystar.gov/index.cfm?c=heat_cool.pr_hvac

[liii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[liv] New Jersey Clean Energy Program, http://www.njcleanenergy.com/html/1residential/1_cool_advantage_1march04.html

[lv] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[lvi] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[lvii] New Jersey Clean Energy Program. "New Jersey Clean Energy Program Report submitted to the New Jersey Board of Public Utilities." December 2003.

[lviii] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[lix] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[lx] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxi] Energy Star program, http://www.energystar.gov/index.cfm?c=boilers.pr_boilers

[lxii] XENERGY Inc. November 2001. "New Jersey Residential HVAC Baseline Study."

[lxiii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxiv] Energy Star program, http://www.energystar.gov/index.cfm?c=cfls.pr_cfls

[lxv] Department of Energy, http://www.eere.energy.gov/consumerinfo/energy_savers/virtualhome/508/lighting.html

[lxvi] Opinion Dynamics Co and Regional Economic Research. November 1999. "Baseline Study of the New Jersey Residential Lighting Market."

[lxvii] Environmental Protection Agency (EPA). "ENERGY STAR – The Power to Protect the Environment Through Energy Efficiency." July 2003. EPA 430-R-03-008.

[lxviii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxix] Ibid.

[lxx] Xenergy Inc. December 2003. "Phase II DSM Assessment Prepared for Northwestern Energy."

[lxxi] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxxii] Department of Energy, http://www.eere.energy.gov/consumerinfo/energy_savers/winter/winter.html

[lxxiii] Xenergy Inc. August 1999. "New Jersey Comprehensive Resources Analysis Market Assessment."

[lxxiv] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxxv] Xenergy Inc. December 2003. "Phase II DSM Assessment Prepared for Northwestern Energy."

[lxxvi] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxxvii] Energy Star program, www.energystar.gov/ia/prod_development/new_specs/downloads/water_heaters/DOE_waterheaterletter_final_1.6.04.pdf

[lxxviii] Ibid.

[lxxix] S. Nadel, J. Thorne, H. Sachs, B. Prindle, and R. N. Elliott. "Market Transformation: Substantial Progress from a Decade of Work." April 2003. Report Number A036.

[lxxx] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxxxi] Insulation Contractors of America. "Frequently Asked Questions About Insulation." 2002. Available online: http://www.insulate.org/frameset.php?thePage=consumer.html

[lxxxii] Xenergy Inc. August 1999. "New Jersey Comprehensive Resources Analysis Market Assessment."

[lxxxiii] New Jersey Clean Energy Program. 2004 Program Descriptions, Marketing Plans and Budgets. Available online: http://www.state.nj.us/bpu/cleanEnergy/2004programsv5.pdf and NJCEP Website.

[lxxxiv] Department of Energy, http://www.eere.energy.gov/consumerinfo/energy_savers/virtualhome/508/solar_water_heater.html

[lxxxv] Solar Energy Industries Association, http://www.seia.org/learn/energytypes.asp#shotwater

[lxxxvi] Xenergy Inc. December 2003. "Phase II DSM Assessment Prepared for Northwestern Energy."

[lxxxvii] Xenergy Inc. December 2003. "Phase II DSM Assessment Prepared for Northwestern Energy."

B COMMERCIAL & INDUSTRIAL CRITERIA SCORES

The following section provides detail regarding the decision-making process and ultimate score assignments for the measure and program factors relating to "Market Barriers" and a "Likelihood of Success." The "Market Barriers " a score is related to the number and magnitude of the market barriers to the increased market penetration of the technology. The "Likelihood of Success" score is based on the current installation activities for the Commercial and Industrial (C&I) sectors. This activity is viewed relative to the available measures and efficiencies of each found in the marketplace; what the state of the technology will be over the next 10 to 15 years in efficiency; the relative cost of improved efficiency versus the standard measure; whether the measure is being promoted currently via state, regional, or national initiatives; and a need for the technology based on current economic and political activity.

B.1 COOLING AND HEATING MEASURES

Since 1999, the New England Energy Partners (NEEP), a regional coordinated energy efficiency initiative, has implemented activity to promote the Consortium for Energy Efficiency (CEE) unitary cooling equipment standards as well as improved contractor practices. These standards and practices are designed to save energy through the proper installation and sizing of packaged heating, ventilation, and air-conditioning (HVAC) equipment.

The NEEP initiative was developed in the "Cool Choice Program" whose activities promote the installation of high-efficiency HVAC equipment and practices and includes:

- Technical and market research,
- Equipment incentives and coordinated marketing of high-efficiency equipment,
- Customer education, and
- Trade ally outreach.

A joint New Jersey utility initiative was developed that encompassed the NEEP Cool Choice Program during 2000–2001.[i] This blanket C&I program was labeled the "SmartStart Buildings Program."[ii] It is anticipated that this New Jersey program will transform the elements of the cooling markets, including the efficiency baseline of equipment specification. This program also lays the groundwork for an upgrade to New Jersey's commercial building code by advancing efficient equipment and practices. This program uses specialized marketing and services for targeted market segments, which is the shared responsibility of a program implementation contractor and utility field staff and marketing representatives.[iii]

B.1.1 High-Efficiency Chillers

In their 1998 paper, Nadel and Suozzo[iv] give optimization of chiller and tower systems a 3 on their likelihood of success scale. Since that earlier assessment, Nadel has reevaluated the marketplace and upgraded their findings. Manufacturers have advanced the efficiency state of the technology and are addressing the marketing on a case-by-case basis given the relatively small current marketplace. Research organizations such as Oak Ridge National Labs and others have active programs for developing improvements to this technology.

Chillers are an expensive item to purchase and install. It is sometimes necessary to make major building modifications to allow installation. And, each system has its unique problems and issues that must be addressed in order to benefit from the use of the new chillers. Therefore, early retirement is generally not considered. However, if chlorofluorocarbons (CFCs) are an issue, this may become an attractive option for serious consideration.

Nadel found that there are substantial energy and non-energy benefits that could be accrued from installation of this technology. Also, the building operators who would use it tend to be sophisticated in their understanding of the technology and its alternatives. Therefore, Nadel determined that the Likelihood of Success in 2002 should be raised to 3.5. New Jersey currently promotes this technology through the SmartStart Building Program. More marketing might be useful to gain the attention of building system designers in order to be seriously considered for use as an early replacement opportunity, since economics for this situation are becoming favorable.

High-Efficiency Chiller Installation	Retrofit	New Construction
Likelihood of success	2.0	4.0
Market Barriers Score	3.0	2.5
Market barriers	– Expensive – Small market – Unique system issues – R&D still ongoing	– Expensive – Small market – Unique system issues – R&D still ongoing

Early Chiller Replacement	Retrofit	New Construction
Likelihood of success	2	Not Applicable
Market Barriers Score	3.0	Not Applicable
Market barriers	– Very expensive – Small market – R&D still ongoing	– Technology not applicable

B.1.2 Chiller Optimization

Chiller optimization can potentially reduce operating costs significantly if the appropriate rate signals are provided by the utility. Optimization, or recalibrating the existing chiller system to coincide with schedules and equipment use, is accomplished through timed tie-ins with other

heat-producing equipment and systems. Studies by leading professional engineers have shown that given adequate real time price (RTP) signals, simple payback of optimization can be as low as 1.5 years, and energy and demand savings can be quite dramatic during peak periods.[v] However as mentioned earlier, each chiller has its unique issues that must be addressed to properly optimize the systems.

Currently, there are no time of use (TOU) rate schedules for C&I customers in New Jersey (they have been tried and dropped), largely due to the long length of the on-peak period. [the states 1500 largest customers are on RTP and the BPU has an ongoing proceeding to determine if the number of ciustomers on RTP should be expanded] Until economics are favorable for offering of RTP or TOU rates involving shorter peak periods than currently exist, this option will be of limited interest to customers. It is an offering under the current SmartStart program.

Chiller Optimization	Retrofit	New Construction
Likelihood of success	2.5	Not applicable
Market Barriers Score	4.0	Not applicable
Market barriers	– No favorable RTP rates – Unique system issues	– Technology not applicable

B.1.3 Desiccant Cooling

Desiccant cooling is a new technology developed in response to the CFC refrigerant issues regarding the environment. Since they remove moisture from the air, they are useful in areas where high humidity is a problem. They can be configured to use any fuel type including natural gas, solar thermal energy, and waste heat. Through use of alternative fuels to electricity, this option can provide reduced electric consumption and peak demand. Desiccant chillers are expensive and are still considered somewhat experimental.[vi] And, as with most large cooling equipment, this system has its unique issues pertaining to each potential installation. This is currently a SmartStart option.

Desiccant Chiller	Retrofit	New Construction
Likelihood of success	1.0	2.0
Market Barriers Score	2.0	4.0
Market barriers	– Expensive – Small market – Unique system issues – R&D still ongoing	– Expensive – Small market – Unique system issues – R&D still ongoing

B.1.4 VAV Systems

Variable air volume (VAV) systems are the normal design criteria for most commercial heating and cooling situations for both large and small buildings. They provide better occupant comfort

and produce energy savings over constant air volume systems. Since they have been available for some time, their incremental cost is reasonably low. As with any system, the key to the long-run benefit in energy and cost savings is for regular maintenance. Utility programs usually address the marketing of these benefits and the New Jersey SmartStart Buildings program offers incentives for installation of VAV systems. They are widely accepted now, thus few market barriers exist.

Variable Air Volume Systems	Retrofit	New Construction
Likelihood of success	2.0	4.0
Market Barriers Score	1.0	1.0
Market barriers	None	None

B.1.5 High Efficiency Direct Expansion (DX) Units – AC and HP

This measure is an application where CEE recommendations have been adopted by the American Society of Heating, Refrigerating, and Air Conditioning Engineers as their equipment standard. Original CEE "Tier 1" efficiency levels have now been adopted, and "Tier 2" levels are found in equipment available for purchase in increasing amounts.[vii]

In their 1998 paper, Nadel and Suozzo give Tier 2 commercial packaged air-conditioning (AC) a 4 on their likelihood of success scale, and Tier 1 commercial packaged AC a 5.[viii] Given the current ASHRAE standards, Nadel has stated the likelihood of success for Tier 2 should remain at 4 to encourage adoption of this as the standard, with Tier 1 no longer relevant for program marketing.

The scores for the DX Heat Pump (HP) units should be similar to those of the AC given the intense utility and manufacturer marketing over the past 20 years of the HP application and its value within New Jersey since it is now a well-known and accepted technology.

Obviously with the accepted standard, there are more Tier 1 units available and at a lower cost than the more efficient Tier 2 units. As time goes by, the incremental costs associated with installing the higher efficiency units are relatively small over the standard unit making them a more accepted measure. The New Jersey SmartStart Building program provides incentives for tier 2 only.

High Efficiency DX AC & HP – Tier 2	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.0	2.0
Market barriers	– Tier 1 units are lower first cost	– Tier 1 units are lower first cost

B.1.6 High Efficiency Window AC Units

These units are rated and promoted by the ENERGY STAR® program and their use is encouraged through incentives provided for in the New Jersey SmartStart Buildings program. Economically, they make sense given the long summer peak season in New Jersey and can be utilized in areas where DX units are not applicable.

Although window units tend to be smaller in BTU output, they use less energy than the larger systems. The annual energy savings are smaller than the DX units, but they are very cost-effective for their application. They are also becoming readily available in the marketplace due to the increased emphasis on the impact of summer peak energy use by the utilities and government agencies. There will likely be a movement towards acceptance of efficiency standards for this equipment type within the next several years.[ix]

Typical units available now are lower in incremental cost to purchase. These units, when they fail, are generally when they are replaced. Thus, whatever is readily available at that time (typically during a very hot period) is what is purchased regardless of the efficiency level. Therefore, these barriers will have to be overcome to gain typical acceptance of the higher efficiency units until standards are in place.

High Efficiency Window AC Units	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	3.0	3.0
Market barriers	– Typical units are lower first cost – Units replaced when most needed & when inventory is potentially low	– Typical units are lower first cost

B.1.7 High Efficiency Electric & Gas Furnaces and Gas Boilers

The decision to install a high efficiency gas furnace or boiler involves the acceptance of the moderate incremental cost above the standard furnace and boiler expense. The technologies, however, are some of the more cost-effective energy-using choices available to building owners—for both new construction and retrofit.

In their 1998 paper, Nadel and Suozzo give high efficiency commercial gas furnaces and boilers a 4 and ENERGY STAR® furnaces and boilers a 3 on their likelihood of success scale.[x] Nadel has amplified his assessment of each in his 2002 report to indicate the need to promote them for the sake of standards development.[xi]

ENERGY STAR® has been quite successful in identifying and labeling higher efficiency technologies for the public to recognize. They have been so successful that approximately 40 percent of the public knows what an ENERGY STAR®-labeled product denotes for the consumer.

Thus, the recognition will allow for increased market acceptance of the product. The New Jersey SmartStart Buildings program currently promotes these technologies directly through the prescriptive incentives.[xii]

These technologies are expected to come under the umbrella of national efficiency standards within the next several years. The need for a program is moderate in order to stimulate the incremental product purchase and to help to ensure that high efficiency standards for them are instituted, but recognizing the New Jersey program incentives now marketed to building owners and managers. This current program and the increased recognition through ENERGY STAR® involvement makes each technology an ideal candidate for program success.

High Efficiency Gas Furnaces and Boilers	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.5	2.5
Market barriers	– Typical units are lower first cost – No national standards	– Typical units are lower first cost – No national standards

B.1.8 Proper HVAC Installation

In their 1998 paper, Nadel and Suozzo give high quality commercial AC installation and maintenance a 3 on their likelihood of success scale.[xiii] Given the advent of increased efficiency HVAC technologies, educational initiatives regarding proper equipment installation make eminent sense—the equipment cannot perform as designed if improperly installed.

The education and training required must be coordinated with the equipment manufacturers and system designers and be targeted towards HVAC technicians and HVAC technical schools. These are not easy target markets since they must take time off from their service time to attend training workshops. One-on-one training through the equipment manufacturers is possible. And continued "reminders" of good techniques reinforce the learning. Although the current state of installation education is good, additional emphasis would improve the overall efficiency of any HVAC system.

The likelihood of success score under the retrofit and renovation scenarios for this activity is moderate given the time and effort required for the installer. Therefore, the need for the program increases. This option has been discussed within the collaborative over the past 3 years. A number of pilot initiatives and training have been conducted in this area.

Proper HVAC Installation Education	Retrofit	New Construction
Likelihood of success	2.5	2.5
Market Barriers Score	4.0	4.0
Market barriers	– Strictly voluntary activity – Requires coordination with manufacturers	– Strictly voluntary activity – Requires coordination with manufacturers

B.1.9 Roof Insulation

Roof insulation is a measure that has been promoted by government agencies and utilities since the mid-1970s. There are many manners of increased roof insulation. The limiting factor is the available area for insulation installation beneath the roofing structure, thus retrofit opportunities could be limited.

In the past, little or no insulation was installed in this area for commercial property. Given current building codes and building practices, this has changed and most do include a nominal amount. However, of all the measures promoted for energy efficiency, building insulation is one of the most well known to the public.

Insulation is relatively inexpensive compared to other building materials and energy saving options. High program success would result if promoted with incentives for new construction as most builders appreciate the value of this measure.

Roof Insulation	Retrofit	New Construction
Likelihood of success	2.0	4.0
Market Barriers Score	3.0	2.0
Market barriers	– Strictly voluntary activity – Requires coordination with manufacturers	– Strictly voluntary activity – Requires coordination with manufacturers

B.2 INTERIOR LIGHTING MEASURES

B.2.1 Interior Lighting

For over a decade, the U.S. Department of Energy (DOE) has actively promoted efficient lighting development and purchase through its Green Lights Program (now merged with ENERGY STAR®). The original emphasis of this effort was in the C&I market, but it influenced the residential market because it was the first serious and full-scale energy conservation effort promoted by the U.S. Government since the oil crisis of the 1970s. Since then, lighting efficiency and technologies has progressed rapidly with the new technologies gaining shelf space. Many utilities throughout the nation recognized the incredible opportunities for electricity savings to be gained by improved C&I lighting. Many of these lighting programs became the

cornerstone for other C&I efficiency initiatives. All in all, increased efficiency lighting and technologies have been the measures providing the best and easiest opportunities for many customers.

Nadel feels that lighting has been promoted significantly through the past decade and the message is out that the use of efficient lighting is one of the major electricity savers for old and new buildings. New Jersey SmartStart Buildings also actively promotes incentives for the purchase of some of the latest technologies. New Jersey has also conducted a number of demonstration, training sessions. New Jersey also has a Performance Lighting track as part of the SmartStart Programs. Many of the lighting technologies and efficiency levels are prime for inclusion in codes and standards over the next several years.

B.2.2 T-8 Lamps and Electronic Ballasts

The use of energy-efficient electronic ballasts and T-8 lamps in the C&I sector has become commonplace due to government programs (Green Lights and ENERGY STAR®), regional cooperative initiatives, and other utility initiatives.[xiv] T-8 lamps are regularly stocked in supply warehouses and are now the usual choice for new and replacement applications.

In the 1998 paper, Nadel and Suozzo gave T-8 lamps with electronic ballasts a 4 on their likelihood of success scale.[xv] Currently, all efficient lighting upgrades rank a bit lower on Nadel's scaling[xvi] due to the number of program offerings and the huge opportunity for code upgrades in the next several years. The emphasis in the past has provided for a major market transformation already so most will purchase the T-8 lamps with associated ballasts with or without program support. The SmartStart program for this reason does not provide rebates for T-8's.

T-8 Lamps/Electronic Ballasts	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	1.0	1.0
Market barriers	None	None

There are new T-8 lamps and ballasts that are considered "super" measures as they provide extended lifetimes over the current T-8 lamps and the ballasts operate on reduced power. Both give maximum life for the equipment with related energy savings. These options are of higher first cost, therefore a program for these upgrades (possibly a replacement program to the earlier) will help to introduce these very favorable technologies.[xvii] New Jersey SmartStart Buildings provides incentives for the installation of Super T-8 lamps and electronic ballast combination.

Super T-8 Lamps/Super Electronic Ballasts	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	4.0	4.0
Market barriers	– Incremental cost is high – Brand new technologies – Little market recognition	– Incremental cost is high – Brand new technologies – Little market recognition

B.2.3 Reflectors

Proper lighting design is key to the reduction of energy use. Simple reduction in the number of fixtures or lamps, although they save energy, might jeopardize the amount of available overhead lighting lumens. Therefore, proper placement of fixtures and the use of reflectors (when the system is well designed) will provide greater indoor lumens at a total lower cost. These fixtures require cleaning to operate efficiently over time, so often reflectors can be fitted within the current fixtures at the regular time of lighting maintenance. Both retrofit and new construction will benefit from the use of this measure, and they are so popular now that they are being implemented on a regular basis. Given the lack of market barriers, this may not be an appropriate place for significant program intervention.

Reflectors	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	1.0	1.0
Market barriers	None	None

B.2.4 Interior HID

End users usually consider high intensity discharge (HID) lamps as being large, very bright, exterior light sources often without good color rendering properties. HID lamps require ballasts and a special fixture. Over the years, due to the energy savings, this technology has gained acceptance for outdoor applications. However, there are new HID replacement fluorescent lamps and efficient fixtures now available that produce greater and more consistent light output over longer lifetimes resulting in 50 percent or greater energy savings over traditional HID applications. This HID fluorescent measure has the additional advantage of being dimmable, making it a favorable option for the lighting of large interior spaces.[xviii] The New Jersey SmartStart Buildings program offers prescriptive incentives for the purchase and use of HID fixtures and custom incentives for the HID Fluorescents.

HID Fixtures	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	2.0	2.0
Market barriers	– Require new fixture from traditional	– Require new fixture from traditional

HID Fluorescent Fixtures	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	4.0	4.0
Market barriers	– Incremental cost is high – Brand new technology – Little market recognition – Requires special installation	– Incremental cost is high – Brand new technology – Little market recognition – Requires special installation

B.2.5 CFL Lamps and Fixtures

During 1998 when Nadel and Suozzo were reviewing technologies, they suggested that screw-in CFLs receive a 3 on their likelihood of success scale.[xix] This is because at that time, CFLs were a fairly new technology, especially within the commercial market. In the six years since that study, CFLs are considered "business as usual" for most screw-in applications where removal by the public is not an issue. CFLs offer incredible benefits over traditional incandescent bulbs and make significant sense for application. In areas where the public has access, CFLs are often removed (stolen) so hotels/motels will use the much less expensive incandescent bulbs since the CFLs would have to be replaced more often than usual in those instances. CFLs are hard to "wire" to make them permanent and then become difficult to replace in the long run. There are new lamps that are being produced and promoted in areas where the public has access to them. One is the torchiere lamp (or one lamp fluorescent fixture), now readily available as a floor lamp; another is the new Berkeley lamp, an integrated desk lamp for hotels, motels, and offices that provide CFL lighting, surge protected power, and an Ethernet/Broadband Internet connection. Both of these technologies are more complicated for lamp removal than the simple screw-in CFL option.

CFLs in general are significantly more energy efficient than incandescent alternatives. They also have longer lifetimes than that of the incandescent bulbs. This translates to overall lower maintenance costs for the energy payer. Although they have a higher first cost, the cost has dropped significantly in the last 10 years so that they can compete quite favorably to the long-life specialty incandescent bulbs. The color rendering, an issue in the past for users, has also improved. Reliability of the small, enclosed ballast is high. Some older fixtures are configured with a lampshade harp that is too small to facilitate CFL lamp usage. Screw-in CFLs can too easily be replaced with incandescent bulbs as well when fast replacement must take place. To overcome these issues, some utility programs promote the use of fixtures with hard-wired CFL ballasts that will only accept CFL lamps (the New Jersey SmartStart Building only provides

incentives for this CFL option). However, manufacturers of lamps are accommodating new units for CFL use. This is one area where market transformation has been extremely successful through the many programs provided over the last several years and the desire and cooperation of the manufacturers to advance the efficiency of their products.

CFL Lamps & Fixtures	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.0	1.0
Market barriers	– Incremental cost is slightly higher than incandescent option – Can require special installation	– Incremental cost is slightly higher than incandescent option

One Lamp Fluorescents/Berkeley Lamps	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	4.5	4.0
Market barriers	– Incremental cost is higher – New option with little market recognition	– Incremental cost is higher – New option with little market recognition

B.2.6 Exit Signs

Innovations in the light-emitting diode (LED) and its color availability opened the opportunities for use within the commercial lighting market. One area that has had significant market transformation success is for exit sign use. Where in the past an incandescent bulb or small fluorescent lamp was used behind the sign, LEDs have been wired to allow for significant energy reduction and a significantly longer lifetime as opposed to the earlier options. The LED signs also result in lowered maintenance costs.[xx]

LED exit signs are highly rated and promoted in the ENERGY STAR® program and have been marketed by utilities and manufacturers alike. It is being accepted as the technology of choice for first-time installation and is being folded into the maintenance and replacement programs by building operators.

The 1998 Nadel and Suozzo paper listed LED exit signs as 5 on their likelihood of success scale.[xxi] This was due to the LED exit sign being a new option eight years ago. It is now a standard option and probably can be reduced in programmatic need.

LED Exit Signs	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.0	2.0
Market barriers	– Incremental cost is higher – Requires wiring installation	– Incremental cost is slightly higher

B.2.7 Occupancy Sensors

In their paper, Nadel and Suozzo suggested that occupancy sensors receive a 3 on their likelihood of success scale.[xxii] This was due to the fact that these sensors can be complicated to install, can be difficult to control if based on timers, and can be annoying to the user. Some sensors can be very simple to implement, but these usually only control one lamp, which would provide limited energy benefit.

The choice of sensing location is key for successful implementation. Often the wrong choice or improper installation allows the lamp to turn off at inopportune times. Experiences where lights have been turned off where there is little movement in the room or during the nighttime when ambient lighting is not available has discouraged the use of this technology, even when the incremental cost is low and potential savings is high. At worst, the measure is installed and the user overrides it.

There are new and improved occupancy sensors that require more elaborate installation. These include switches at central locations where the sensor can be overridden for special times (such as in a hotel/motel where the check-in clerk can deactivate the sensor at the front desk) and units in rooms that sense occupation based on temperature control (if the AC unit is turned on, the occupancy sensor is overridden) or even newer technologies where the sensor detects occupant body temperature in the room.

All of these sensors require program promotion as they are not typically installed and/or used to their best benefit. The New Jersey SmartStart Buildings program offers prescriptive incentives for reasonably simple sensor purchases and use, but there may not be a significant enough incentive to stimulate installation of the newer and more complicated central- or temperature-based systems.

Occupancy Sensors	Retrofit	New Construction
Likelihood of success	3.0	3.5
Market Barriers Score	3.5	3.5
Market barriers	– Incremental cost can be high – Requires wiring installation – Some new options have limited market recognition – Incentive may be too low for central/newer system	– Incremental cost can be high – Requires wiring installation – Some new options have limited market recognition – Incentive may be too low for central/newer system

B.2.8 Daylight Dimming Controls

Daylight dimming controls can offer significant opportunity for large energy savings. They are not often installed in new buildings nor are they considered seriously for retrofit. Several issues relating to this lack of market acceptance is that there are many ideas regarding what amount of light is necessary, what amount is comfortable, and how controllable the lighting is within a workspace. Early systems also failed due to technology limitations. Building managers and designers often overlight the areas with the idea that the overhead lamps can be removed and task lighting can provide what work area lighting is desirable. The energy saving potential is so high and the use so infrequent, there is a Market Barriers Score provision. This technology is marketed in the New Jersey SmartStart Building program, but would fall under the custom incentive area – a more complicated program application process for the participant. In their 1998 paper, Nadel and Suozzo gave daylight dimming controls a 2 on their likelihood of success scale.[xxiii] This number is higher now that the technology has improved.

Daylight Dimming Systems	Retrofit	New Construction
Likelihood of success	3.0	3.5
Market Barriers Score	4.0	4.0
Market barriers	– Incremental cost is high – Requires significant re-wiring installation – Have limited market acceptance due to first unit failures in past – Incentive may be too small and application process too complicated for participation	– Incremental cost is high – Requires significant re-wiring installation – Have limited market acceptance due to first unit failures in past – Incentive may be too small and application process too complicated for participation

B.3 EXTERIOR LIGHTING

B.3.1 Mercury Vapor to High Intensity Discharge Fluorescents (High Pressure Sodium)

Although high-pressure sodium (HPS) lamps are more energy efficient than traditional mercury vapor (MV) lamps, standard HPS lamps have had poor color rendering. Improvements in these lamps have been made that provides more desirable color rendering properties.[xxiv] Cost is not a major issue, especially if the MV lamp requires replacement anyway as the cost of the new lamp is comparable to the older MV (even for the improved HPS lamps).[xxv] If the MV lamp is operating properly, it may be more difficult to justify the increased incremental costs associated with changing the lighting, but the energy savings are significant. This option is offered as part of the New Jersey SmartStart Buildings program under its custom incentives.

HPS Replacement for MV	Retrofit	New Construction
Likelihood of success	2.0	4.0
Market Barriers Score	4.0	3.0
Market barriers	– Incremental cost is high – Have limited market acceptance due to poor color rendition in past – Incentive may be too small and application process too complicated for participation	– Incremental cost is high – Have limited market acceptance due to poor color rendition in past – Incentive may be too small and application process too complicated for participation

B.3.2 Exterior Incandescent to HID

As in the interior situation, changeover from exterior incandescent bulbs to HID lamps produce energy savings, longer life, and brighter lighting. Color rendition, although much improved in the technology, may not be much of an issue when used outdoors. Incandescents have a very low first cost, so their replacement cost is not a major concern. HID lamps require ballast installation and the adding of a new fixture.[xxvi] The cost difference is significant. However, the energy savings and maintenance reduction provides a very cost-effective choice for the building owner. This option is contained with the New Jersey SmartStart Buildings custom incentives.

HID Replacement for Incandescents–Outdoor	Retrofit	New Construction
Likelihood of success	2.0	2.5
Market Barriers Score	3.0	3.0
Market barriers	– Incremental cost is high – Incentive may be too small and application process too complicated for participation	– Incremental cost is high – Incentive may be too small and application process too complicated for participation

B.3.3 Photocell Controls

Photocell technology has been available for many years and often come packaged with new fixtures. New photocell controls can also be added to an existing outdoor fixture fairly easily. Costs are currently reasonably low for this technology. The savings potential is highest when used in conjunction with the less energy-efficient lighting technologies. This technology would fall under the New Jersey SmartStart Buildings prescriptive incentives.

Photocell Controls	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.0	1.0
Market barriers	– Require wiring installation	– Require wiring installation

B.4 SYSTEMS MEASURES

Energy studies over the past several years are demonstrating the value of improving the components of building systems, either through the installation of higher efficiency replacements or accomplishing operations and/or maintenance improvements on a regular basis. These are areas of energy savings that have long been ignored or unknown and hold promise for reduction of energy and peak load where other options are unavailable or undesirable.

B.4.1 O&M Improvement

After equipment is installed and calibrated, often time goes on for years before building operators think about performing maintenance on the systems to ensure maximum performance. Even simple things like removing dust and dirt from areas around motors are overlooked as they seem low-priority when competing with the limited time available in the workday. Program experience, including some in the Northeast, demonstrates the potential for energy savings of between 6 percent to 14 percent in C&I facilities just from improved equipment operation and maintenance. NEEP is considering promoting options for operator training and certification and improved practices to increase efficiency, comfort, and productivity.[xxvii] The SmartStart program provided funding for several NEEP building operation courses and some pilot activity. [it was halted in 2003 but was included in the 2004 program]

There are often difficulties in budgeting O&M dollars since some managers see O&M as a place to save money, not spend it, even though O&M improvements are usually of low or no cost. Barriers besides little allotted budget and time also include the need to perform this activity on an ongoing and long-term basis, often forgotten in the grand scheme of building operations.

Operations & Maintenance on Systems	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	4.0	4.0
Market barriers	– Realization of the need – Budget & time constraints – Long ongoing process	– Incremental cost is high – Brand new technologies – Little market recognition

B.4.2 Commissioning & Recommissioning (Retrocommissioning)

Commissioning and recommissioning is probably one of the most overlooked yet potentially valuable activities that can be performed in an existing building. It is normal practice for new buildings to have their systems installed, and possibly commissioned (made to operate in the way they were designed to achieve maximum effectiveness and energy efficiency). As time goes by, these systems age and fall out of maximum efficiency operation. Also, sometimes the interiors of the buildings change (new walls are added or removed, new occupants utilize varying

equipment) and the level at which the system was originally commissioned is no longer applicable. Therefore, recommissioning system equipment helps to reduce the overall energy use in the building. Thorne and Nadel found in 2003 that achievable energy savings found in field results can range from 5 percent to 20 percent, often with paybacks of two years or less.[xxviii] In their 1998 paper, Nadel and Suozzo give recommissioning a 3 on their likelihood of success scale.[xxix]

It should be noted here that, often to save time and money or because there are few trained and knowledgeable service contractors to perform this activity, new buildings are occupied without system commissioning having taken place. So, performing this activity in new facilities will also ultimately save energy.

Recommissioning not only can save energy, but it can also improve occupant comfort and sometimes extend the life of the equipment. However, it is often difficult for facility management staff to receive O&M budgeted dollars for this purpose—although, it is often not as expensive an activity as sometimes perceived.

Commissioning & Recommissioning	Retrofit	New Construction
Likelihood of success	3.0	4.0
Market Barriers Score	4.0	4.0
Market barriers	– Lack of time & budget – Perceived high cost – Available knowledgeable contractor	– Lack of time & budget – Perceived high cost – Available knowledgeable contractor

B.5 MOTORS

Motors are an area where efficiency improvements have been achieved through equipment design that takes advantage of new electronic technology. Many utilities have promoted the installation of high efficiency motors over the past decade. However, when motors need to be replaced, often the action of least cost is to install a rewound older unit. Until this supply is exhausted and the benefits of the use of newer efficient units are appreciated, this practice will likely continue.

B.5.1 High Efficiency Motors

In 1998, NEEP coordinated the Premium Motors Working Group to develop a regional market transformation strategy for premium motors including common goals, objectives, and program requirements. To date, about 95 percent of motor distributors and dealers in the participating states are involved in a special promotion that offers incentives and technical information for CEE-complying premium efficiency motors. The sponsoring utilities are also marketing this program directly to their C&I customers.

NEEP is working with initiative sponsors in New England, New Jersey, and New York to promote premium efficiency motors as the standard for motors sold in the Northeast region for C&I uses. The Northeast Premium Efficiency Motors Initiative is now offering incentives for motors that meet the CEE standard for premium motors purchased in New Jersey and several New England states. Other initiative activities include coordinated marketing, technical assistance to trade allies and customers, and program evaluation. This initiative is actively coordinated with U.S. DOE's Motor Challenge Program.[xxx] New Jersey participates in the NEEP motor initiative fully and offers an incentive for purchase of three-phase high efficiency motors in its SmartStart Buildings program.

There are many different manufacturers of high efficiency motors. However, pre-EPACT (U.S. Energy Policy Act for motor efficiency enhancement) motors are still available through vendors and are sold at low prices.[xxxi]

A training curriculum has been developed by the Energy Center of Wisconsin, the Hydraulic Institute, and the Motor Challenge Program that educates the industry on fluid system optimization principles - - pump and fan systems training.[xxxii] This training and curriculum may serve as a model for the rest of the nation. It is also possible to purchase a motor with a higher efficiency and a lower price. In addition, the savings possible from properly sizing a motor (installations often utilize oversized motors due to older design criteria and practices) can offset any additional costs associated with an increased efficiency. Since cost is an issue with motors, the likelihood of success might be higher in new construction than in retrofit projects.

In the 1998 paper, Nadel and Suozzo give premium efficiency motors a 3 on their likelihood of success scale.[xxxiii] In 2002 Nadel felt that the technology would only be accepted by a limited number of sophisticated building managers.[xxxiv] Therefore, this technology seems to need a market push for wider acceptance.

High Efficiency Motors	Retrofit	New Construction
Likelihood of success	2.0	3.0
Market Barriers Score	3.0	3.0
Market barriers	– Lack of knowledge regarding benefits – Higher cost – Large inventory of older motors available – Possible small market of sophisticated users	– Lack of knowledge regarding benefits – Higher cost – Large inventory of older motors available – Possible small market of sophisticated users

B.5.2 Motor Downsizing

A properly sized motor will operate more efficiently because it operates at a higher load factor. However, common practice was to oversize to guarantee that adequate motor power was available for the application. Although common practice, it is unnecessary and should be discouraged. The energy savings that are possible from properly sizing a motor can offset any additional costs associated with the purchase of an increased efficiency[something is missing in this sentence]. Since cost is an issue with motors, the likelihood of success is higher in the renovation scenario. Because of the high savings potential, the Market Barriers Score was set at 3 for both scenarios.

Motor Downsizing	Retrofit	New Construction
Likelihood of success	2.0	3.0
Market Barriers Score	3.0	3.0
Market barriers	– Lack of knowledge regarding benefits – Higher cost	– Lack of knowledge regarding benefits – Higher cost

B.5.3 Improved Motor Rewind Practices

Each year hundreds of large industrial motors are rewound for continued use in the replacement market. Recently developed national shop standards and training for quality, energy efficient motor rewinds offer opportunities to increase energy savings in large, high-load-hour motors.

In their 1998 paper, Nadel and Suozzo give high quality motor repair practices a 3 on their likelihood of success scale.[xxxv] Nadel feels similarly in his 2002 paper but feels that it has a limited market.

Improved Motor Rewind Practices	Retrofit	New Construction
Likelihood of success	2.0	3.0
Market Barriers Score	3.0	3.0
Market barriers	– Lack of knowledge regarding benefits – Higher cost – Large inventory of older motors available – Possible small market of sophisticated users	– Lack of knowledge regarding benefits – Higher cost – Large inventory of older motors available – Possible small market of sophisticated users

B.5.4 Variable Speed Drives

The Electric Power Research Institute (EPRI) has promoted the use of variable speed drives (VSD) through the development of their software program called ASDMaster. ASDMaster assists in the design and purchase of an electronic AC adjustable speed drive by specifying the best ASD for the specific application. System effects are analyzed with the program.[xxxvi]

Given that the motor responds only to the immediate need, it saves energy. In addition to this potential for energy savings, the use of a VSD may allow for better control of the process. The use of VSDs has become more common, although the incremental cost is still high. Currently they tend to be purchased for new systems. New Jersey offers incentives towards their purchase via the SmartStart Buildings program.

Variable Speed Drives	Retrofit	New Construction
Likelihood of success	3.0	4.0
Market Barriers Score	4.0	2.0
Market barriers	– Lack of knowledge regarding benefits – Higher cost	– Lack of knowledge regarding benefits – Higher cost

B.6 PROCESS SUPPORT, PROCESS OVERHAUL, ADDITIONAL PROCESS O& M

The study of a process can result in energy savings at low capital expenditure if the process can be improved through minor adjustments. If properly adjusted, increased reliability, increased productivity, and decreased energy usage are all possible.

A more complete study and evaluation of an industrial process has the possibility of producing greater benefits than a minor adjustment. However, the costs associated with the overhaul can be high, and the system might need to be taken down for a time.

Finding experts in the process to review practices and equipment in both cases above might prove to be somewhat difficult. These activities are included in the New Jersey SmartStart Buildings program under the custom track.

Process Support	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	4.0	4.0
Market barriers	– Possibly expensive – Limited experts available	– Possibly expensive – Limited experts available

B.7 COMPRESSED AIR SYSTEMS

The mission of the Compressed Air Challenge (CAC) is to develop and provide resources that educate industry on the opportunities to increase net profits through compressed air system optimization. An efficient compressed air system can increase productivity and ensure higher product quality. A reliable compressed air system translates to more cost effective product production as well as on-time delivery and increased customer satisfaction.[xxxvii]

National and regional research has identified repair and optimization of industrial compressed air systems as a major opportunity for cost-effective energy efficiency. The development of a national compressed air initiative now offers opportunities for action in the Northeast. NEEP is considering options for coordinated regional efforts to promote such practices.[xxxviii]

Air compressors are an expensive item to purchase and install. It is sometimes necessary to make major building modifications to allow for their installation.

Misconceptions about how to decrease the energy and power used by a compressed air system are common. Books have been written for decades that say that using colder air for the intake to an air compressor will decrease the power consumption. This has recently been found to be not true, and under certain conditions the use of colder intake air will decrease the energy consumption.[xxxix]

In their 1998 paper, Nadel and Suozzo give industrial air compressors a 3 on their likelihood of success scale.[xl] Nadel feels, in his 2002 paper, that this option is promising for significant energy reduction, but the market size is small.[xli] New Jersey has had a number of utility sponsored "Compressed Air Challenge" courses.

Process Support	Retrofit	New Construction
Likelihood of success	2.0	3.0
Market Barriers Score	3.0	3.0
Market barriers	– Expensive – Limited Market	– Expensive – Limited Market

B.8 LOW EMITTING DIODE (LED) TRAFFIC LIGHTS

LED traffic lights are becoming more common, but they are still more expensive than incandescent traffic lights and reputedly have problems with poor, clear visibility in bright sunlight. Although they are incrementally more expensive then their incandescent counterparts, upgrades can be made reasonably cost-effectively to existing equipment during bulb replacement. Thus, most areas are retrofitting them chiefly when the bulbs burn out. Because these lights have high operating hours and the energy savings are great, the need for a program is high. The 1998 paper states that Nadel and Suozzo give red only traffic lights a 5 and red/green lights a 4 on their likelihood of success scale.[xlii] The SmartStart program includes incentives for

LED traffic lights (retrofit only since LEDs are required for new traffic lights) and also includes walk/don't walk signs.

LED Traffic Light	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	4.0	4.0
Market barriers	– Expensive	– Expensive

B.9 Refrigeration Doors & Curtains

These options consist of plastic strip curtains or similar devices that are installed on open refrigeration cases, cooler doors, or refrigerated loading docks. They do not restrict access to the inside. Some reluctance was originally reported by storeowners when they were first introduced in the marketplace as they feared that their appearance could dissuade people from making purchases. They are becoming more common, and are much less expensive than installing a solid door.[xliii] Cooling losses can be significant. Therefore, the use of these options are cost-effective means to lowering cooling costs.

Refrigeration Doors & Curtains	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	3.0	3.0
Market barriers	– Appearance may discourage use	– Appearance may discourage use

B.10 High Efficiency Water Heaters

B.10.1 Gas and Electric Storage Water Heaters

The incremental costs associated with the purchase and installation of high efficiency water heaters (instead of the standard efficiency unit) are relatively small given the emphasis on such since the 1970s. New models are generally of high efficiency. In the 1998 paper, Nadel and Suozzo give both high efficiency gas storage water heaters and high efficiency electric water heaters a 5 on their likelihood of success scale since they are so prevalent in the market.[xliv] The need for market promotion may be diminished as the market seemingly has already been transformed.

Storage Water Heaters	Retrofit	New Construction
Likelihood of success	4.5	4.5
Market Barriers Score	1.5	1.5
Market barriers	None	None

B.10.2Heat Pump Water Heaters

Heat pump water heaters are more expensive than traditional gas water heaters. If not ducted to the outside, they can increase heating loads in the space, though this may be considered a cooling "bonus" in certain building types with large, localized cooling loads. However, they use less energy since they utilize heat found in the ambient air. Past experience saw technology issues with this option, but the problems have been resolved and heat pump water heating is a potentially reliable and energy saving option. In their paper, Nadel and Suozzo give heat pump water heaters a 2 on their likelihood of success scale.[xlv]

Heat Pump Water Heaters	Retrofit	New Construction
Likelihood of success	1.0	2.0
Market Barriers Score	3.0	3.0
Market barriers	– Higher incremental cost – Technology not well understood	– Higher incremental cost – Technology not well understood

B.11 LOW FLOW WATER FIXTURES

Low flow fixtures are commonplace in the marketplace now. These options were promoted significantly during the 1970s and 1980s and the market has transformed to make most all available options ultimately energy efficient. Therefore new construction will install energy efficient fixtures. The major market for altering customer thought is in the retrofit market where a program might influence a building owner to change out old fixtures early. Thus, incentives would have to be significant and cover most, if not all, of the fixture and installation costs.

Low Flow Water Fixtures	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.0	1.5
Market barriers	– Higher incremental cost – Technology not well understood	– Higher incremental cost – Technology not well understood

B.12 WINDOW FILM

Window film not only helps to keep cooling energy costs down, it reduces glare and can help minimize fading of carpet and furniture, thereby delaying the need to replace these items.[xlvi] In a study prepared for Pacific Gas and Electric, XENERGY and others found that the likelihood of success for commercial window film was a 3.[xlvii] Given the low cost for this option, it is a useful and cost-effective means for cooling cost reduction, especially for the retrofit market. Other window glazes might be more desirable from a building "look" perspective if this is for a new construction situation.

Window Film	Retrofit	New Construction
Likelihood of success	3.0	3.0
Market Barriers Score	1.0	3.0
Market barriers	None	– Degrades easily if scratched or ripped

B.13 ENERGY MANAGEMENT SYSTEM (EMS)

Energy management systems are sometimes considered as expendable upgrades and are often placed at the bottom of the priority list in building design and improvement. However, they are usually cost effective by ensuring that the systems run according to the building schedule. Lighting and heating loads can be reduced when the EMS synchronizes these end-uses with times when the building is unoccupied. In order for these systems to reduce energy costs over their lifetimes, they must be maintained periodically and recalibrated when building operation or occupants change. Many of the new construction projects typically incorporate such a system due to the complexities of system operations.

Energy Management Systems	Retrofit	New Construction
Likelihood of success	3.0	4.0
Market Barriers Score	4.0	2.0
Market barriers	– High installation cost – Requires regular O&M	– High installation cost – Requires regular O&M

B.14 OTHER APPLICATIONS

B.14.1LCD Monitors, Power Management, Office Electronics

The development of low power computer monitors (Liquid Crystal Display or LCD) was performed in the late 1980s and 1990s where the technology is now very affordable, has a small footprint for reduced office space, and is the technology of choice for a significant portion of computer purchasing customers. This and other electronic elements have been promoted for use to protect other equipment and to reduce electric consumption. Often, this equipment is part of a normal equipment purchase and there is significant information available through the computer manufacturers and vendors regarding the value of the use of the equipment. Program push probably is not key at this point for making a market transformation.

LCD Monitors and Efficient Office Equipment	Retrofit	New Construction
Likelihood of success	4.0	4.0
Market Barriers Score	2.0	2.0
Market barriers	– Slight incremental cost increase	– Slight incremental cost increase

[i] www.neep.org.

[ii] www.njsmartstartbuildings.com.

[iii] *NEW JERSEY 2000-2004 Energy Efficiency Four-Year Plan: Commercial & Industrial Electric and Gas Energy Efficiency Programs*. Energy Efficient C&I Construction Program.

[iv] Nadel, Steven, and Margaret Suozzo. 1998. "Selecting Technologies and Practices for New Market Transformation Initiatives." Proceedings from the 1998 ACEEE Summer Study on Energy Efficiency in Buildings. Pg 7.237-7.251.

[v] Meckler, Milton, P.E., CPC. 2002. "Do the Math: Chiller Plan Optimization Strategies." www.esmagazine.com, posted 10/30/2002 from *Engineered Systems Magazine.*

[vi] www.nrel.com.

[vii] Nadel, Steven. 2002. "Screening Market Transformation Opportunities: Lessons from the Last Decade, Promising Targets for the Next Decade." Report Number U022. American Council for an Energy-Efficient Economy. August 2002.

[viii] Nadel and Suozzo, 1998.

[ix] Nadel, 2002.

[x] Nadel and Suozzo, 1998.

[xi] Nadel, 2002.

[xii] www.njsmartstartbuildings.com.

[xiii] Nadel and Suozzo, 1998.

[xiv] Calwell, Chris, Danielle Dowers, and Doug Johnson. "How Far Have We Come? Remaining Opportunities for Upgrading Fluorescent Ballasts and Lamps." May 1998. http:\\www.esource.com.

[xv] Nadel and Suozzo, 1998.

[xvi] Nadel, 2002.

[xvii] Thomas, Jennifer, and Steve Nadel. "Commercial Lighting Retrofits: A Briefing Report for Program Implementers." Report Number A032. American Council for an Energy-Efficient Economy. April 2003.

[xviii] Thorne and Nadel. 2003. "Retrocommissioning: Program Strategies to Capture Energy Savings in Existing Buildings." Report Number A035. American Council for an Energy-Efficient Economy. June 2003.

[xix] Nadel and Suozzo, 1998.

[xx] Sardinsky, Robert, and Sue Hawthorne. "LED Exit Signs: Improved Technology Leads the Way to Energy Savings." April 1994. http:\\www.esource.com.

[xxi] Nadel and Suozzo, 1998.

[xxii] *Ibid*.

[xxiii] *Ibid*.

[xxiv] Iowa State University. Conference documentation: "Building Lighting and Air Distribution Systems" Ames, IA. May 20, 1991.

[xxv] Grainger. Catalog no. 389. 1998-1999. Pg 955-65.

[xxvi] *Ibid*.

[xxvii] http:\\www.neep.org.

[xxviii] Thorne and Nadel, 2003.

[xxix] Nadel and Suozzo, 1998.

[xxx] http:\\www.neep.org.

[xxxi] *Atlantic City Electric Company's Demand Side Management (DSM) Programs in NJ*. DRAFT. February 1999.

[xxxii] http:\\www.motor.doe.gov.

[xxxiii] Nadel and Suozzo, 1998.

[xxxiv] Nadel, 2002.

[xxxv] Nadel and Suozzo, 1998.

[xxxvi] http:\\www.motor.doe.gov.

[xxxvii] http:\\www.knowpressure.org.

[xxxviii] http:\\www.neep.org.

[xxxix] Smith, Karen, and Howard Shapiro. "Energy Savings Opportunities for Positive Displacement Air Compressors." Proceedings of the ASHRAE Summer Conference. 1996.

[xl] Nadel and Suozzo, 1998.

[xli] Nadel, 2002.

[xlii] *Ibid*.

[xliii] Research conducted by Abou-Seido, Ehab I. for Ph.D. Dissertation. 1996.

[xliv] Nadel and Suozzo, 1998.

[xlv] *Ibid*.

[xlvi] http://www.tri-statewindowtint.com/html/about.html.

[xlvii] American Council for An Energy-Efficient Economy, XENERGY Inc., and E-Source. *Volume 1: Selecting Targets for New Market Transformation Initiatives, Phase II*, March 1998. Pg 10.

C

ZERO ENERGY HOMES

Brief Summary of Findings	
Case One	Single Family
Case Two	Multi-Family

Market Penetration Model Assumptions		
Payback at which Market Penetration Begins		
Case One Payback	Years	8
Case Two Payback	Years	8
Standard Market Penetration Rates		
Maximum Annual Growth Rate	%	75%
Maximum Market Penetration By Home	%	75%
Case One (See Market Accelerators)		
Maximum Annual Growth Rate	%	75%
Maximum Market Penetration By Home	%	75%
Maximum Market Penetration (MW)	%	75%
Case Two (See Market Accelerators)		
Maximum Annual Growth Rate	%	75%
Maximum Market Penetration By Home	%	55%
Maximum Market Penetration (MW)	%	55%

Brief Summary of Findings	
Case One	**2014**
Annual Installed (MW)	5.8
Cum. Installed (MW)	7.2
Annual Policy Cost (Year 10)	$ 21,937,156
Annual Policy Cost $/Watt (Year 10)	$ 3.85
Case Two	**2014**
Annual Installed (MW)	1.3
Cum. Installed (MW)	1.6
Annual Policy Cost (Year 10)	$ 4,988,848
Annual Policy Cost $/Watt (Year 10)	$ 3.83

Technical Potential

		2004	2008	2015	2020
Case One					
Annual Single Family Housing Starts		22,000	22,893	24,545	25,797
Annual New Housing Market Annual Adjustor					
Typical New Single Family Peak Load	kW	3	3	3	3
Total New Single Family Peak Load	MW	66	69	74	77
Technical Potential Based on Load					
Typical Rated PV System Size Per House	kW	3.0	3.0	3.0	3.0
Estimated Technical Potential	% of Total Single Family Load	100%	100%	100%	100%
Total Technical Potential	MW	66.0	68.7	73.6	77.4
Existing PV	MW				
Actual Technical Potential	MW	66.0	68.7	73.6	77.4
Technical Potential Based on New Homes					
Estimated Technical Potential	% of New Homes	100%	100%	100%	100%
Total Technical Potential	New Homes	22,000	22,893	24,545	25,797
Existing PV	New Homes				
Actual Technical Potential	New Homes	22,000	22,893	24,545	25,797
Case Two					
Annual Multi-Family Housing Starts		8,000	8,325	8,925	9,381
Annual New Housing Market Annual Adjustor					
Typical New Multi-Family Peak Load	kW	6	6	6	6
Total New Multi-Family Peak Load	MW	48	50	54	56
Technical Potential Based on Load					
Typical Rated PV System Size Per House	kW	3.0	3.0	3.0	3.0
Estimated Technical Potential	% of Total Single Family Load	50%	50%	50%	50%
Total Technical Potential	MW	24.0	25.0	26.8	28.1
Existing PV	MW				
Actual Technical Potential	MW	24.0	25.0	26.8	28.1
Technical Potential Based on New Homes					
Estimated Technical Potential	% of New Homes	100%	100%	100%	100%
Total Technical Potential	New Homes	8,000	8,325	8,925	9,381
Existing PV	New Homes				
Actual Technical Potential	New Homes	8,000	8,325	8,925	9,381

Policy Options

		2004	2008	2015	2020
Case One					
Cost Reducers					
Rebate	$/kW	$ 5,500	$ 4,480	$ 3,128	$ 2,421
Rebate Annual Adjustment Factor	%	-5.0%			
Year of Policy Sunset	End of Year	0			
Effective New Jersey PV Tax Credit	%	0.0%	0.0%	0.0%	0.0%
Year of Policy Sunset	End of Year	0			
Federal Residential PV Tax Credit (in Energy Bill)	% ($2000 cap)	15.0%	15.0%	15.0%	15.0%
Year of Policy Sunset	End of Year	0			
Revenue Sources					
Renewable Energy Certificate	$/kWh	$ 0.050	$ 0.041	$ 0.028	$ 0.022
REC Annual Adjustment Factor	%	-5.0%			
Year of REC Sunset	End of Year	0			
Property Tax Exemption for PV	Yes/ No	No	No	No	No
Property Tax	%	0.5%			
Year of Policy Sunset	End of Year	0			
Other					
Mortgage Interest Rate Reduction	%	0.000%	0.000%	0.000%	0.000%
Annual Adjustment Factor		0.0%			
Miscellaneous (Modeled as $ Rebate Per Home)	$	$ -	$ -	$ -	$ -
Quantifiable Builder Incentives					
Value of Reduced Development Time Realized by Homebuyer	$	$ -	$ -	$ -	$ -
Market Accelerators					
Impact on Maximum Growth Rate	%	0%			
Impact on Maximum Market Penetration	%	0%			
Case Two					
Cost Reducers					
Rebate	$/kW	$ 5,500	4,480	3,128	2,421
Rebate Annual Adjustment Factor	%	-5.0%			
Year of Policy Sunset	End of Year	0			
New Jersey PV Tax Credit		0.0%			
Effective New Jersey PV Tax Credit	%	0.0%	0.0%	0.0%	0.0%
Year of Policy Sunset	End of Year	0			
Federal Residential PV Tax Credit (in Energy Bill)	% ($2000 cap)	15.0%	15.0%	15.0%	15.0%
Year of Policy Sunset	End of Year	0			
Revenue Sources					
Renewable Energy Certificate	$/kWh	$ 0.050	$ 0.041	$ 0.028	$ 0.022
REC Annual Adjustment Factor	%	-5.0%			
Year of REC Sunset	End of Year	0			
Property Tax Exemption for PV	Yes/ No	No	No	No	No
Property Tax	%	0.5%			
Year of Policy Sunset	End of Year	0			
Other					
Mortgage Interest Rate Reduction		0.000%	0.000%	0.000%	0.000%
Annual Adjustment Factor		0.0%			
Miscellaneous (Modeled as $ Rebate Per Home)		$ -	$ -	$ -	$ -
Quantifiable Builder Incentives					
Value of Reduced Development Time Realized by Homebuyer		$ -	$ -	$ -	$ -
Market Accelerators					
Impact on Maximum Growth Rate		0%			
Impact on Maximum Market Penetration		-20%			

Technology Specifications and Costs

		2004	2008	2015	2020
Case One Technology					
Technology		BIPV	BIPV	BIPV	BIPV
Typical Rated System Size	DC kW	3.0	3.0	3.0	3.0
Performance Deflator	%	0%	0%	0%	0%
Actual System Rated Output	DC kW	3.0	3.0	3.0	3.0
Bundle with Energy Efficiency		Yes			
Case Two Technology					
Technology		BIPV	BIPV	BIPV	BIPV
Typical Rated System Size	DC kW	3.0	3.0	3.0	3.0
Performance Deflator	%	0%	0%	0%	0%
Actual System Rated Output	DC kW	3.0	3.0	3.0	3.0
Bundle with Energy Efficiency		Yes			
Case One Costs					
BIPV Installed Cost	$/kW	$ 8,465	$ 6,247	$ 3,481	$ 2,269
Cost Reduction Curve	Conservative, Base, Optimistic	Optimistic			
Year of Cost Shift	End of Year	0			
Size of Cost Reduction	%	0			
Total System Cost	$	$ 25,395	$ 18,741	$ 10,443	$ 6,808
Builder Mark-up	%	10%	10%	10%	10%
Installed Cost to Home Buyer (not including policy options)	$	$ 27,935	$ 20,615	$ 11,487	$ 7,489
Rebate		$ 16,500	$ 13,439	$ 9,385	$ 7,262
Builder Incentives		$ -	$ -	$ -	$ -
Cost Before Tax Incentives		$ 11,435	$ 7,176	$ 2,102	$ 227
Federal Tax Incentive		$ 1,715	$ 1,076	$ 315	$ 34
State Tax Incentive (taken net of Fed Tax Incentive)		$ -	$ -	$ -	$ -
PV Cost After Tax Incentives		**$ 9,719**	**$ 6,099**	**$ 1,787**	**$ 193**
Energy Efficiency Installed Cost		$ 4,000	**$ 3,842**	**$ 3,581**	**$ 3,406**
Annual O&M Costs	$/kW/yr	$ 20	$ 20	$ 20	$ 20
Inverter Replacement Costs	% of System Cost In Years 11/21	0%			
Insurance Cost Impacts	$/kW/yr	$ -	$ -	$ -	$ -
Incremental PV Property Tax	$	$ 57.17	$ 35.88	$ 10.51	$ 1.14
Case Two Costs					
BIPV Installed Cost	$/kW	$ 8,465	$ 6,247	$ 3,481	$ 2,269
Cost Reduction Curve	Conservative, Base, Optimistic	Optimistic			
Year of Cost Shift	End of Year	0			
Size of Cost Reduction	%	0			
Total System Cost	$	$ 25,395	$ 18,741	$ 10,443	$ 6,808
Builder Mark-up	%	10%	10%	10%	10%
Installed Cost to Home Buyer (not including policy options)	$	$ 27,935	$ 20,615	$ 11,487	$ 7,489
Rebate		$ 16,500	$ 13,439	$ 9,385	$ 7,262
Builder Incentives		$ -	$ -	$ -	$ -
Cost Before Tax Incentives		$ 11,435	$ 7,176	$ 2,102	$ 227
Federal Tax Incentive		$ 1,715	$ 1,076	$ 315	$ 34
State Tax Incentive (taken net of Fed Tax Incentive)		$ -	$ -	$ -	$ -
PV Cost After Tax Incentives		**$ 9,719**	**$ 6,099**	**$ 1,787**	**$ 193**
Energy Efficiency Installed Cost		$ 4,000	**$ 3,842**	**$ 3,581**	**$ 3,406**
Annual O&M Costs	$/kW	$ 20	$ 20	$ 20	$ 20
Inverter Replacement Costs	% of System Cost In Years 11/21	0%			
Insurance Cost Impacts	$/kW	$ -	$ -	$ -	$ -
Incremental PV Property Tax	$	$ 57.17	$ 35.88	$ 10.51	$ 1.14

New Home Cost and Mortgage

		2004	2008	2015	2020
No PV Home Case One					
No PV Home Typical Cost	$	$ 400,000	$ 400,000	$ 400,000	$ 400,000
New Home Cost Annual Adjustment Factor	%	0.00%			
Typical Down Payment	%	20%	20%	20%	20%
	$	$ 80,000	$ 80,000	$ 80,000	$ 80,000
No PV Home Typical Mortgage	$	$ 320,000	$ 320,000	$ 320,000	$ 320,000
No PV Home Mortage Interest Rate	%	6.00%	6.00%	6.00%	6.00%
Mortgage Payment Adjustment Factor ($2004)		-2.00%			
Typical Debt Term	Years	30	30	30	30
PV Home Case One					
PV Home Typical Cost	$	$ 415,435	$ 411,018	$ 405,683	$ 403,633
Typical Down Payment	%	20%	20%	20%	20%
	$	$ 83,087	$ 82,204	$ 81,137	$ 80,727
Incremental Cost	$	$ 3,087	$ 2,204	$ 1,137	$ 727
PV Home Typical Mortgage	$	$ 332,348	$ 328,815	$ 324,547	$ 322,906
PV Home Mortage Interest Rate	%	6.00%	6.00%	6.00%	6.00%
Typical Debt Term	Years	30	30	30	30
No PV Home Case Two					
No PV Home Typical Cost	$	$ 800,000	$ 800,000	$ 800,000	$ 800,000
New Home Cost Annual Adjustment Factor	%	0.00%			
Typical Down Payment	%	20%	20%	20%	20%
	$	$ 160,000	$ 160,000	$ 160,000	$ 160,000
No PV Home Typical Mortgage	$	$ 640,000	$ 640,000	$ 640,000	$ 640,000
No PV Home Mortage Interest Rate	%	6.00%	6.00%	6.00%	6.00%
Mortgage Payment Adjustment Factor ($2004)		-2.00%			
Typical Debt Term	Years	30	30	30	30
PV Home Case Two					
PV Home Typical Cost	$	$ 815,435	$ 811,018	$ 805,683	$ 803,633
Typical Down Payment	%	20%	20%	20%	20%
	$	$ 163,087	$ 162,204	$ 161,137	$ 160,727
Incremental Cost	$	$ 83,087	$ 82,204	$ 81,137	$ 80,727
PV Home Typical Mortgage	$	$ 652,348	$ 648,815	$ 644,547	$ 642,906
PV Home Mortage Interest Rate	%	6.00%	6.00%	6.00%	6.00%
Typical Debt Term	Years	30	30	30	30
Federal Personal Income Tax Rate	%	30.00%	30.00%	30.00%	30.00%

Solar Resource and Performance

Case One					
Capacity Factor (based on zone)	%	12.6%			
Annual Generation (1st Year of Project)	kWh	3,311			
Annual Degradation		0.8%			
% Generation During Summer	%	64.0%			
		2004	**2008**	**2015**	**2020**
Annual Energy Efficiency Savings	$	$ 700.00	$ 728.42	$ 788.78	$ 829.01
Annual Energy Efficiency Savings Adjustment Factor	%	1.0%			
Case Two					
Capacity Factor (based on zone)	%	12.6%			
Annual Generation (1st Year of Project)	kWh	3,311			
Annual Degradation		0.8%			
% Generation During Summer	%	64.0%			
		2004	**2008**	**2015**	**2020**
Annual Energy Efficiency Savings	$	$ 700.00	$ 728.42	$ 788.78	$ 829.01
Annual Energy Efficiency Savings Adjustment Factor	%	1.0%			

Electricity Rate and Costs

Case One		**Winter**	**Summer**		
Electricity Rate	$/kWh	$ 0.1170	$ 0.1170		
		2004	**2008**	**2015**	**2020**
Prorate Levelized Cost	$/kWh	$ 0.1170	0.1218	0.1305	0.1372
Electricity Cost Annual Adjustment Factor	%	1.0%			
Case Two		**Winter**	**Summer**		
Electricity Rate	$/kWh	$ 0.1170	$ 0.1170		
		2004	**2008**	**2015**	**2020**
Prorate Levelized Cost	$/kWh	$ 0.1170	0.1218	0.1305	0.1372
Electricity Cost Annual Adjustment Factor	%	1.0%			

D

EXPANSION GENERATOR ASSESSMENT

D.1 DISTRIBUTED GENERATION POTENTIAL VIA TURBO EXPANDER OR EXPANSION ENGINE

At least since 1978, expansion engines have been installed internationally to generate electricity from natural gas system pressure reductions. This technology reclaims energy currently lost at gas pressure reduction sites along interstate, intrastate and local distribution company pipelines. The process can also be accomplished using a turbo expander and works by installing in line and in parallel with existing pressure reducing equipment, a turbine or expansion engine through which the natural gas is expanded. This expansion process is a necessary step in the distribution of natural gas and is currently done through expansion valves and other ancillary equipment. The expansion process moves the gas from a "high pressure" state of between 600 and 1200 psi to a "distribution pressure" of less than 12 psi. Currently the energy generated by the expansion is not captured in any practical manor. The turbo expander or expansion engine creates the needed pressure reduction while simultaneously generating electricity.

Stephen D. Galowitz, President of Delta Pressure Generation Systems, is marketing these technologies in the United States. He has projected the technical potential for these technologies generating capacity in New Jersey to be 100 MW. His projection is based on annual gas consumption in New Jersey and other simplified assumptions. Given limited information, his total technical potential value assumes that a turbo expander or expansion engine is installed at every pressure reducing station in New Jersey. This is not technically or economically feasible.

In order to develop a true estimate of technical potential, the New Jersey gas distribution system must be studied and each pressure reducing station evaluated for feasibility. These systems are large therefore it is unlikely that each site could accommodate such a system. In addition, a better understanding of operation and maintenance issues and costs associated with the turbo expander technology would be required. A study of this magnitude is beyond the scope of work being addressed in this project. However, the preliminary investigation carried out by KEMA, has garnered the following information on this technology and its potential use in New Jersey. Most of the technical features information, detailed in the appendix, came from Stephen Galowitz, and has not been verified by KEMA.

The Turbo Expander or the Expansion Engine looks to have limited feasibility in the New Jersey market. Only a handful of sites would be available for this technology for reasons of technical

constraint.[1] Installation risk and uncertain economic viability pose additional barriers that, at first glance, make the pursuit of the technology impractical.

D.2 SERVICE TERRITORY LANDSCAPE

The two major natural gas utilities of New Jersey, South Jersey Gas Co. and Public Service Electric and Gas (PSE&G), both cite only a few potential locations for the gas expansion technology. South Jersey Gas Co.'s territory includes some very large customers who have the capacity to use the required volume and pressure on a daily basis. However, none of these users do so, for a variety of reasons. According to PSE&G, there are 12 metering stations that have the pressure and flow needed for potential turbo expander site in their service territory.[2] The few PSE&G customers that have the minimum flow rate requirement are gas-fired generators, many of which are peaking units and operate on an interruptible rate. In order to be economically viable, the expansion gas technology would need to operate with greater, more assured uptime.

With steady operation necessary but limited potential uptime a current reality, the expander technology is, for the most part, not viable for these territories. The few sites that meet physical constraints would need further individual consideration to see if such technology is practical. On whole, this technology currently does not seem widely feasible for the New Jersey market.

D.3 ADDITIONAL DETAILS

D.3.1 Technology History

- There have been a number of installations of the turbo expander in Europe the success or a failure of these installations was not investigated. A list of installations, provided by Delta Pressure Generation Systems, is in Figure E-1.
- There was an installation of this type of system in the PSE&G territory in 1986. This system generated electricity until 1998 when it was shut down permanently. The system is now sitting abandoned at the PSE&G pressure reducing station.
- A PSE&G staff member speculated that the maintenance cost associated with the turbo expander system made it such that it was no longer cost effective for the owners to continue operation.
- This same staff member reported that this installation was considered a nuisance by neighbors and complaints were received regarding the equipment being noisy and occasionally smelling.

[1] According to Dresser Inc., a manufacturer of expansion engines, the technology requires a limited inlet pressure of 120 psi and a minimum flow of 12 MMscf/day. The turbine expander and expansion engine have similar specifications.

[2] PSE&G has a total of 50 metering stations that have a minimum flow rate of 12 MMscf/day during the winter. In the summer only about 12 of these 50 metering stations have the minimum flow rate.

Figure D–1
Existing Dresser Turbo Expander Installations

Customer	Industry	Country	Reclaimed Power	Cylinders	Expansion Stages	Power Application	Pre-Heat Source	Cooling Appliaction	Delivered
Copenhagen	Municipality	Denmark	350 kW	5	1	Steam Compressor	Waste Heat		1978
Heye	Glass Factory	Germany	620 kW	4	2	Air Compressor	Waste Heat		1979
Lübeck	Municipality	Germany	1.5 MWe	6	1	10kV Generator	Cogen		1988
Lemgo	Municipality	Germany	365 kWe	2	2*	400 V Generator	District Heat		1989
Heilbronn	Municipality	Germany	750 kWe	3	1	10kV Generator	Landfill Gas		1990
Düren	Municipality	Germany	630 kWe	3	1	400 V Generator	Gas Boiler		1991
Felsenkeller	Brewery	Germany	275 kWe	2	2*	400 V Generator	Gas Turbine Waste Heat	Beer & Storage	1991
Herford	Municipality	Germany	350 kWe	2	1	400 V Generator	Gas Boiler		1991
Baden-Baden	Municipality	Germany	440 kWe	2	2	400 V Generator	Cogen		1992
Münster	Municipality	Germany	1.4 MWe	6	1	400 V Generator	Gas Boiler		1992
Thüringische	Manufacturer	Germany	500 kWe	3	2*	400 V Generator	District Heat		1992
Neuwied	Municipality	Germany	470 kWe	2	1	400 V Generator	Cogen		1992
Bremen	Municipality	Germany	1.5 MWe	6	1	400 V Generator	Gas Boiler		1993
Pisa	Municipality	Italy	565 kWe	3	3	400 V Generator	Gas Boiler		1993
Pforzheim	Municipality	Germany	2.0 MWe	6 + 4	2*	10Vk Generator	Gas Boiler		1993
Lüdenscheid	Municipality	Germany	750 kWe	3	1	10 kV Generator	Gas Boiler		1994
Hannover	Municipality	Germany	480 kWe	3	1	400 V Generator	District Heat		1994
Bergamo	Utility	Italy	1.325 MWe	4 + 3	3 + 2*	6 kV Generator	Cogen & Gas Boiler		1995
Arnhem	Utility	Holland	1.225 MWe	5	1	10 kV Generator	Cogen		1995
Assen	Utility	Holland	460 kWe	2	1	400 V Generator	Cogen		1996
Groningen	Utility	Holland	2.08 MWe	6 + 3	1	11 kV Generator	Cogen	AC for Offices	1996
Puertollano	Fertilizer mfr	Spain	890 kWe	5	2	6.3 kV Generator			1998
Pinneberg	Municipality	Germany	140 kWe	4**	1	400 V Generator	Gas Boiler		1998
Emmen	Utility	Holland	100 kWe	4**	1	400 V Generator	Waste Heat		1999
Foggia	Utility	Italy	840 kWe	4	2	400 V Generator	Gas Boiler		2000
Aachen	Municipality	Germany	775 kWe	4	1	400 V Generator	Cogen		2003

Total Generating Capacity: 20.780 MW

* 2 Stage expansion: inclusive of intermediate pressure regulation

** Type 7 expansion engine (smallest in the family of expansion engines)

Source: Dresser Inc. (20040614RefList04).

D.3.2 Technical Features

- The system produces approximately 1 MW, for each 35 MMCF of gas flow, with a pressure reduction ratio of 3 to 1.
- Preheating of the gas is required necessitating the additional installation of a gas turbine or a combustion engine. The addition of this component, while increasing initial and maintenance cost can increase the total generation output of the system.
- Where there may exist waste heat from a near by process, the gas may be preheated with this waste heat stream.
- The system can co-generate refrigeration which can be used. The economic feasibility of implementing this feature will depend on the sites proximity to a refrigeration user.
- The system could be taken offline in a period in which there is not sufficient pressure drop or throughput.
- The expansion engine has superior ability to operate with high efficiency during turndown.
- System sizing is based on projected pressure drops and flows. Systems can be sized to have capacity factors of 90% or more.
- The turbo expander outage rate is approximately 1 week every 5 years.

- The expansion engine outage rate is 5 days per year plus 2 weeks every 5 years.
- According to Dresser Inc., a manufacturer of expansion engines, the technology requires a limited inlet pressure of 120 psi and a minimum flow of 12 MMscf / day.[3]

D.3.3 Economic Factors

- Installed cost varies based on site conditions and on the system size. Costs per site would be within a range of $800/kw to $1,600/kw.
- The economically feasible expander power generation size is 1MW to 10MW.
- Annual maintenance cost for the expansion engine is in excess of $30,000.
- Annual maintenance cost of the turbo expander is less than $5,000.

[3] According to conversations with manufacturers, the turbine expander and expansion engine have similar specifications.

E DATA SOURCES AND MARKET SEGMENTATION

E.1 SOURCES OF DATA AND MARKET SEGMENTATION

This section describes the sources used to develop the market assessment of energy efficiency potential in New Jersey. This study builds on a solid foundation of related work completed in the areas of market potential and market transformation program screening and ranking. Specifically, KEMA's 1999 *Comprehensive DSM Assessment* study for the New Jersey Utilities served as a model for the calculation of the statewide market potential. Other baseline studies for New Jersey over the last 4 years were also used as source material together with KEMA's recent market characterizations in California and Montana.

Tables E-1 summarizes the data used for the technical and market potential analyses from the baseline studies completed for New Jersey since 1999. Following the table are descriptions of how the data were used in the analyses and what the final market segmentations were for each class. KEMA requested data from the utilities but received limited customer-level data from them. This is because the end use level information is no longer maintained by the utilities since they no longer perform end use load forecasting. As a result, the analysis begins with the information from the prior statewide baseline analyses supplemented and updated as best as possible with other sources.

Table E-1
Summary of Baseline Data Sources

Source	Data Items
The New Jersey ENERGY STAR Products Working Group Appliance and Windows Baseline Studies: Final Report. March 2001.	Saturation and cost premium of high performance Energy Star windows, saturations and incremental costs of Energy Star clothes washers, dishwashers, refrigerators and room air conditioners.
Baseline Study of the New Jersey Residential Lighting Market. November 1999.	Saturation of compact fluorescent lighting, number of lamps.
Residential New Construction Attitude and Awareness Baseline Study. May 2001.	Household size, heating fuel saturations, and number of units constructed by type.
New Jersey Residential HVAC Baseline Study. November 2001.	Equipment saturation and efficiencies of central air conditioners, heat pumps, gas furnaces and gas boilers; HVAC tune-up savings data; household characteristics and insulation levels.
New Jersey Electric & Gas Utilities: Commercial Energy Efficient Construction Baseline Study. January 2000.	Energy efficient measure saturations and baseline equipment saturations for lighting and HVAC systems by building type.

KEMA obtained total 2003 energy consumption and revenues for the residential, commercial and industrial customer classes for each of the New Jersey electric and gas utilities from utility filings for EIA and FERC. These data also include number of customers by customer class. Some of the 2003 PSE&G electricity numbers were extrapolated from 2002 EIA and 2003 PSG&E data. As discussed below, the individual utility data were aggregated to the statewide level and reconciled to the totals of end use energy consumption and number of customers represented by these data.

E.2 RESIDENTIAL DATA

Energy Sales by House Type

Applying the split of single and multifamily units for PSE&G and GPU to the total number of customers in 2003 gave us the total energy consumption for single and multifamily housing types. Housing data from the other utilities was not available for this study. These data were adjusted such that the saturations and unit energy consumption (UECs) for each end use summed to obtain the total energy by house type. These sums of the total energy sales by house type were reconciled to the sum of the residential energy consumption from EIA for each utility. Gas sales data by house type were taken from the prior study and scaled up to 2003 for all gas utilities.

Number of Customers by House Type

US census data was used to obtain the relative number of households by income level for New Jersey. These data sere compared to JCP&L data from the previous study to develop estimates of the number of low-income households for the state. Low-income households are estimated to represent 17 percent of the total residential households. New construction activity was based on permit data and the forecast for New Jersey was provided by the Rutgers Economic Advisory Service (R/ECON™) at the Rutgers Center for Urban Policy Research.

Appliance/End Use Unit Energy Consumption

The UECs from the prior study served as the starting point to estimate end use consumption. These were adjusted to account for a number of factors: the increase in the saturation of gas heat, the increase in the saturation of central air conditioning, and the decrease in the saturation of electric heat. A limited amount of heating saturation information was obtained from the EIA for those utilities where the number of customers on a heating rate is reported separately. The UECs were also adjusted so that the calculated total energy consumption from the UECs agreed with the total residential consumption from EIA.

Appliance/End Use Contribution to Peak Demand

PJM forecast data was used to obtain summer and winter demand. These peak demands were allocated to the customer classes based on load factors from the previous study. The contribution to peak demand was allocated to each end use using assumed coincidence factors which take into account the timing of the peak and general usage patterns of the appliance or end use.

Stock Efficiencies

The baseline studies provided some information on the stock efficiencies of residential HVAC equipment. For other end uses adjustments were made to the previous study to reflect the turnover and replacement of equipment with more efficient stock consistent with the UEC adjustments. New construction stock efficiency was derived, in part, from the baseline and evaluation studies.

Appliance/End Use Saturations

No new data were received on appliance saturations because the utilities no longer perform saturation studies for end use load forecasting. The saturations were updated as best as possible using the limited information in the baseline studies and the assumptions and information consistent with adjusting UECs.

Residential Market Segmentation

The residential customer class analysis was done by the following segments:

- existing households
- new construction
- low income households

Each segment was analyzed for both single family and multifamily homes.

E.3 COMMERCIAL AND INDUSTRIAL DATA

Commercial and Industrial Annual Energy Sales by SIC Code/Building Type

The commercial sales by building type are based on the prior study data from PSE&G and GPU. The twelve GPU building types were combined into eight building types consistent with the PSE&G data. Similarly, the sales for industrial building types represented by NAICs codes were combined such that only the largest industry groups representing the majority of sales were analyzed separately. The remaining groupings were combined and analyzed together. Total

commercial and industrial sales were adjusted and reconciled to the sum of 2003 EIA data by service territory.

For the commercial gas class, the building type segmentation followed the same scheme used for the electric analysis. The gas industrial class was segmented into large and small users based on consumption. Gas sales by building type from the prior study were scaled up to 2003 FERC sales data to form the baseline for the analysis.

Energy and Demand Data by Building Type and End Uses

Energy splits by end use for each building type were estimated using the New Jersey information obtained from PSE&G, GPU and Conectiv and employed the bottoms-up approach described below. The data were first combined into a consistent set of end uses. The end use energy consumption was then calculated as the product of square footage, end use market share, and energy use intensities (EUI). This product was then compared with known control totals and reasonable midpoints developed for each variable to represent the combined utilities.

Stock Efficiencies

The stock efficiencies were adjusted to reflect the turnover in equipment and the gradual increase in efficiencies. Adjustments to the efficiencies used in the prior study were made consistent with adjustments to the EUIs.

Equipment Saturations

Information from the prior study was the starting point for equipment saturations. As with the residential analysis, the saturations were adjusted to reflect a gradual shift from electric to gas heating and an increase in the saturation of electric cooling as indicated in the Commercial Construction Baseline study.

Commercial Segmentation

The gas and electric commercial customer class analysis was done by the following segments:

- Office
- Retail
- Health
- Education
- Warehouse
- Grocery

- Lodging
- Miscellaneous Commercial

This set of building types represent the highest level of detail for the set of data received from the three electric utilities.

Industrial Segmentation

The industrial customer class analysis was segmented by the SICs shown in Table E-2. The corresponding NAICS groups are also given.

Table E-2
Industrial Customer Class SIC and Corresponding NAICS

2-Digit SIC Rank	SIC	NAICS
Largest	SIC 28, Chemicals & Allied Products	325*, 211, 311, 331
2nd largest	SIC 33, Primary Metal Industries	331*, 332, 324, 335
3rd largest	SIC 30, Rubber & Misc Plastics Products	313, 315, 316, 325, 326*, 337, 339
4th largest	SIC 20, Food & Kindred Products	111, 311*, 312
5th largest	SIC 32, Stone/Clay/Glass/Concrete Products	312, 327*, 332
Other industrial	Multiple SICs	Multiple

* Primary NAICS classification (small portions of the other NAICS classifications are also included)

E.3.2 Utility Rate and Cost Data

Retail Rates

An average base year electricity rate (in $/kwh) was developed for each of the three customer classes based on the EIA revenue and consumption data. Similarly, an average base year natural gas rate (in $/therm) was calculated for the three customer classes using FERC revenue and consumption data for sales customers. The energy rates were used to calculate the customer payback of energy efficient measures. The paybacks were used as a quality control check of some of the interim results, and payback is also used as an input to the market penetration model. The base year rates were forecast over time using escalation rates derived from the avoided cost forecast. The electricity rate forecast is shown in Figure E-1 and the gas rate forecast is shown in Figure E-2.

Avoided Costs

Navigant Consulting developed the avoided electricity costs for four time periods as shown in Figure E-3. The time periods selected are based on a review of the retail electricity rates for each utility and the time periods used in the previous study. The definition of the time periods is shown in Table E-3. Navigant also provided the corresponding monthly natural gas costs used to project the electricity avoided costs. These data were averaged over the summer and winter months to obtain the projection of natural gas avoided costs. These are shown in Figure E-4.

Table E-3
Time Period Definitions

Time Period	Definition
Summer Peak	June – September - weekdays 8:00 am to 10:00 pm
Summer Off-Peak	June – September - 10:00pm to 8am, all weekend hours and all holiday hours
Winter Peak	October – May - weekdays 8:00 am to 10:00 pm
Winter Off-peak	October – May - 10:00 pm to 8:00 am, all weekend hours, and all holiday hours

Figure E-1
Rate Forecast – Electricity

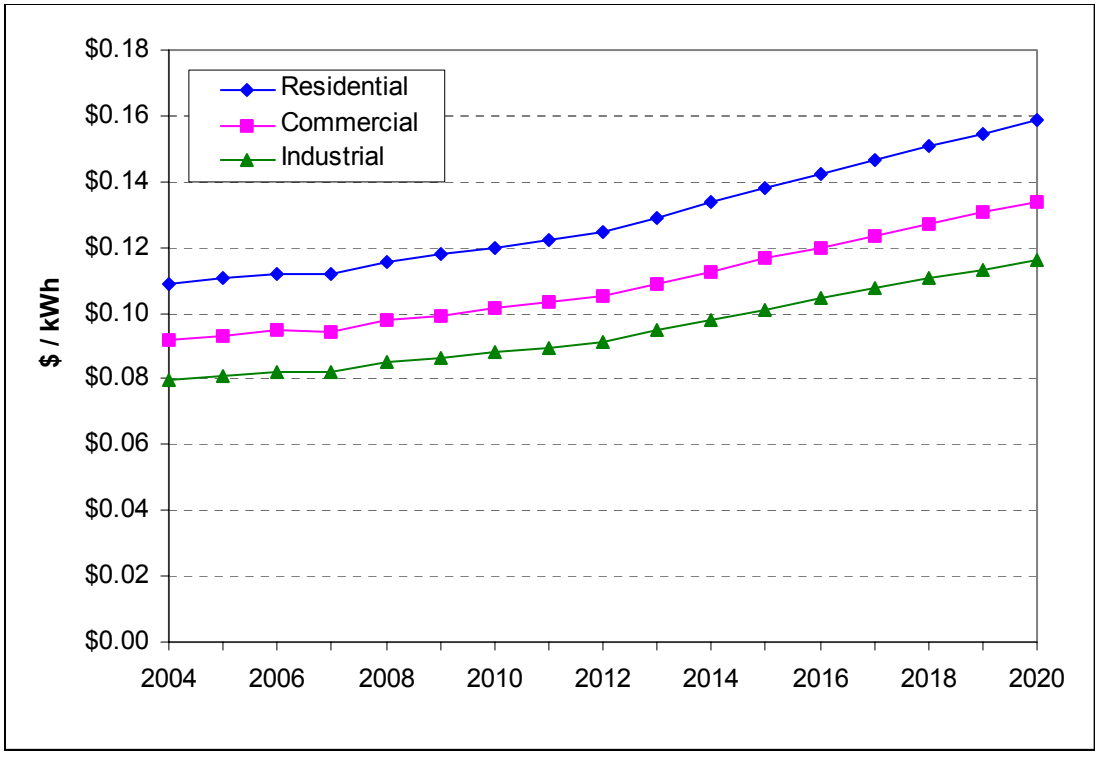


Figure E-2
Rate Forecast - Gas

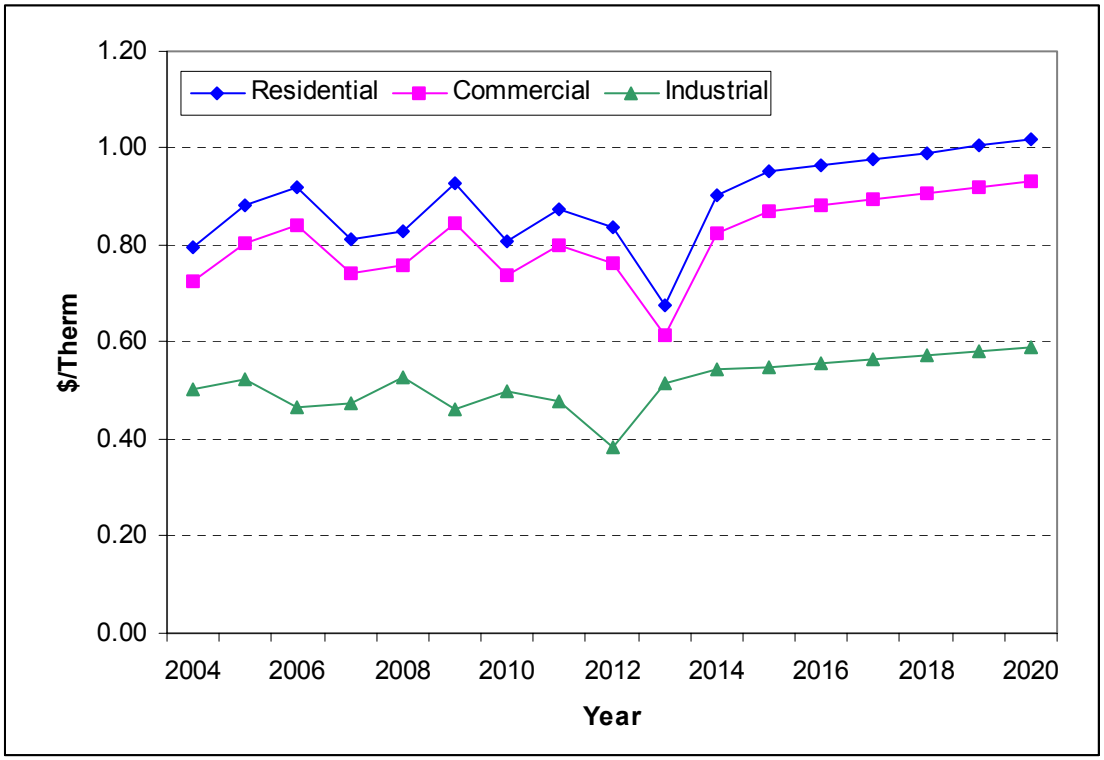


Figure E-3
Projected Avoided Energy Costs by Time Period – Electricity

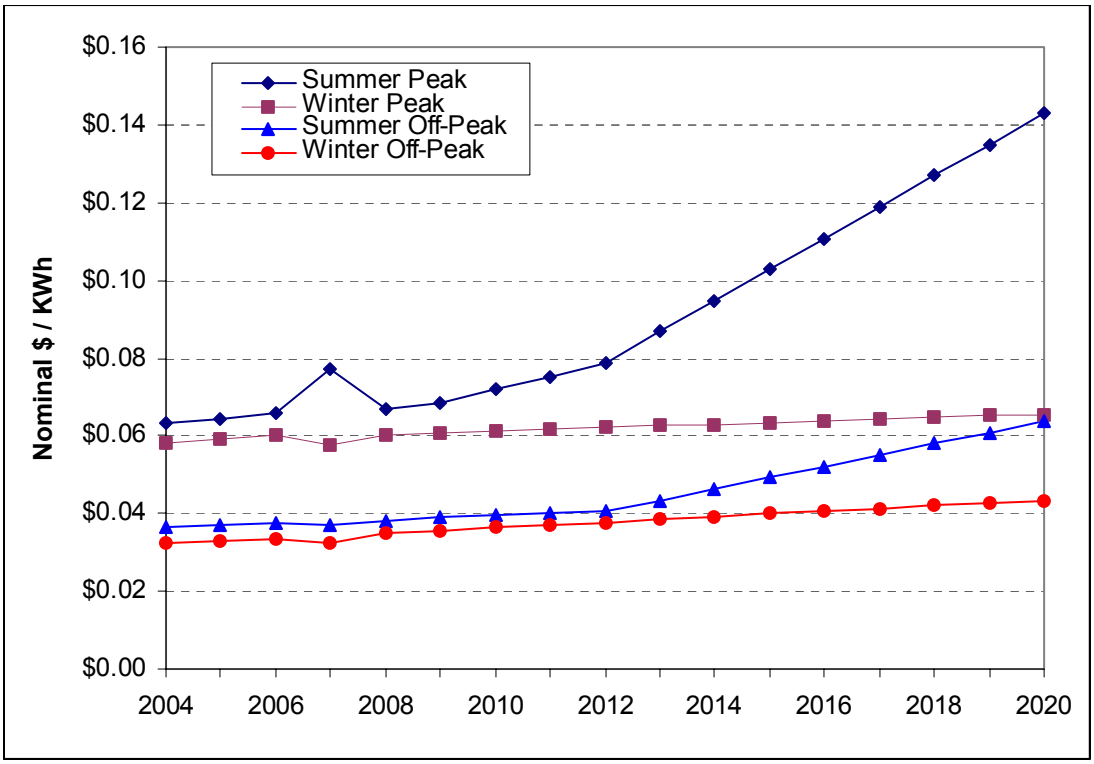
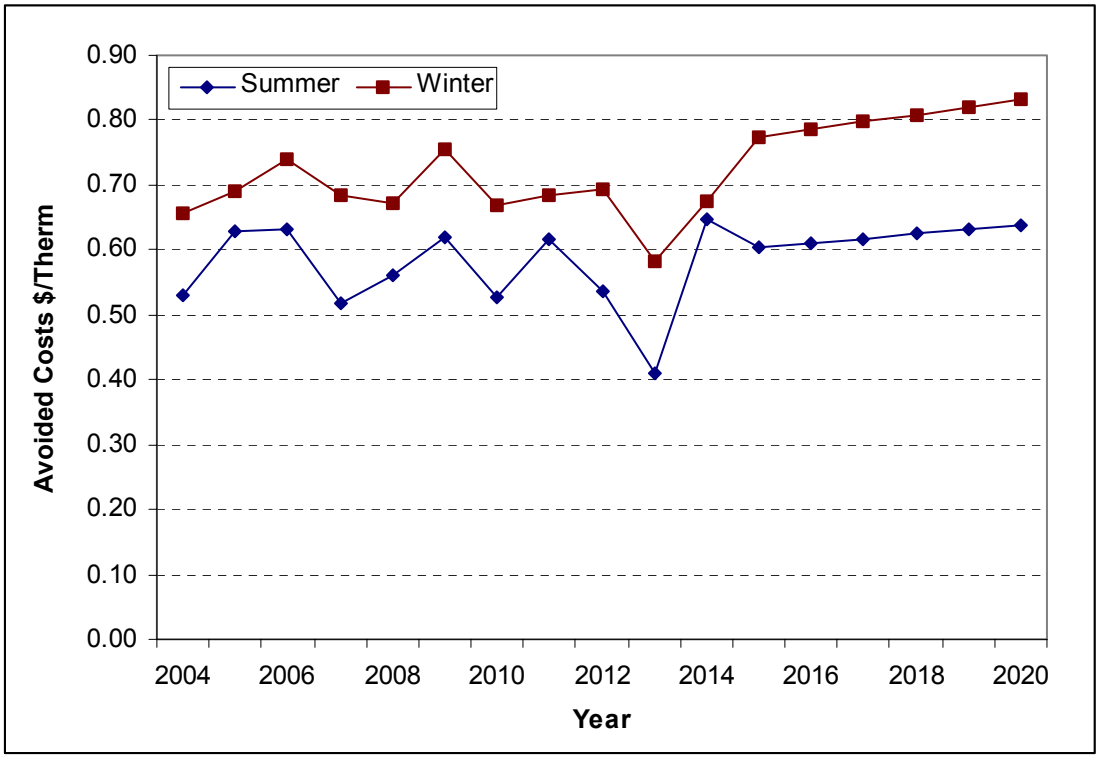


Figure E-4
Projected Avoided Energy Costs by Time Period – Gas



Discount Rates

For the cost effectiveness calculations an average discount rate of 8.4 percent was used.

Number of Participants in Current Programs

Data from the BPU on program participation was compiled for the past three years. The participation and budget amounts data were used to inform the penetration rates for predicting market potential.

E.4 DEVELOP STATEWIDE BASELINE ENERGY USE

The objective of this task is to estimate the current energy and demand contributions by end use for each customer segment. These baselines establish the maximum amount of usage that can be affected by an energy efficiency measure or program.

E.4.1 Developing End Use and Building Level Consumption Estimates

End-use energy can be calculated using either a top-down or a bottom-up approach. The top-down approach starts with total sector or class energy and disaggregates it into building type or SIC code level usage. The bottom-up approach begins with end-use market shares and energy use intensities (EUIs) for C&I end uses, and appliance saturations and corresponding or unit energy consumption (UECs) for residential end uses. For the estimation of technical and market potential, most of the baseline energy consumption estimates were developed using a bottom-up approach. Starting at the end use level, consumption is aggregated to the building type or housing type level and then aggregated to the entire customer class. These class-level estimates of energy consumption are then reconciled with known 2003 class-level sales for both electricity and gas.

The bottom up approach starts at the end-use level using the EUI (or UEC for residential) and market share (saturation for residential) for each end-use and then aggregates the end-uses into total building or housing type energy. *End Use Energy* is calculated as:

$$End\ Use\ Energy = EUI_{end-use} * MarketShare_{end-use} * Square\ Footage$$

where *Number of Dwelling Units* replaces *Square Footage* and *Saturation* replaces *Market Share* in the residential analysis.

The *Total Energy* and *End Use Percent of Total* can then be calculated directly from the *End Use Energy* as follows:

$$Total\ Energy = \sum_{all\ end-use} End\ Use\ Energy$$

$$End\ Use\ Percent\ of\ Total = \frac{End\ Use\ Energy}{Total\ Energy}$$

To use this method, the EUI and the saturation are typically set at known levels for initial iterations. The amounts of end-use and total energy are calculated values. However, current and consistent EUIs, UECs, and saturations were not available across all utilities and all customer classes and segments in this study. As a result, the class level reconciliation process required adjustments to some of the EUI, UEC, saturation, and square footage inputs.

For this analysis customers with similar patterns of energy consumption were grouped into appropriate market segments for which end-use baseline usage estimates were developed. The first level of segmentation is by customer class: residential, commercial and industrial. For each of the classes, customers were further segmented by vintage or activity (retrofit, renovation, or new construction), and/or by building type and SIC grouping. Table E-4 shows the electric commercial class building type segmentation used and each building type's share of total class usage. Table E-54 shows similar data for the five electric industrial SIC groupings developed for this analysis.

Table E-4
Commercial Class Segmentation and Energy Use

Building Type	Percentage of Annual Commercial Energy Consumption
Office	34.3%
Retail	15.7%
Health Care	6.9%
Education	10.9%
Warehouse	5.4%
Grocery	12.2%
Lodging	3.2%
Miscellaneous Commercial	11.6%
TOTAL	100.0%

Table E-5
Industrial Class Segmentation and Energy

SIC	Description	Percentage of Annual Industrial Energy Consumption
28	Chemicals And Allied Products	21.3%
33	Primary Metal Industries	11.3%
30	Rubber And Misc. Plastics Products	10.7%
20	Food And Kindred Products	9.4%
32	Stone, Clay, and Glass Products	6.9%
	Miscellaneous Manufacturing Industries	40.5%
	TOTAL	100.0%

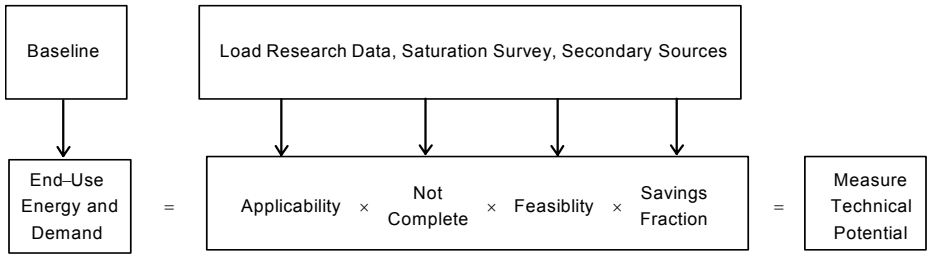
E.5 DEVELOP TECHNICAL POTENTIAL AND COST OF SAVED ENERGY ESTIMATES

Because of the dynamic and complex nature of the data required to perform energy efficiency screening and potential studies, it is important to use analytical systems that can be easily updated and that will prove to be useful on an on-going basis to our clients. The model used for this study, DSM ASSYST™ uses a series of macro-linked spreadsheets to estimate energy efficiency potential.

Annual energy was calculated using the central equation shown below to determine measure technical potential. A set of measure factors was applied to the end-use energy and demand to obtain the measure impacts. For each measure, the *applicability*, *not complete*, *feasibility* and

savings fractions are developed for each customer segment. These measure factors are defined below:

Figure E-5
Equation for Measure Technical Potential



- **Applicability Factors.** The applicability factor for an energy efficiency measure represents the proportion of end-use energy and demand used by the technology to which that energy efficiency measure applies. The applicability of a particular measure depends upon the type of equipment currently in place. For example, the high efficiency fluorescent lighting energy efficiency measure applies to fluorescent lighting. Fluorescent applicability, therefore, represents the proportion of the lighting end-use attributable to fluorescents for which there are high efficiency replacements.
- **Not Complete Factors.** Not complete factors represent the proportion of equipment that is not yet energy efficient, and is therefore the eligible market for the DSM measure. KEMA estimated these for existing customers based on PSE&G program data.
- **Feasibility Factors.** The feasibility factors are used to adjust for the amount of load and energy of a technology for which a DSM measure would be impractical or otherwise not feasible. The feasibility of a measure accounts for physical or technical barriers to implementation of the technology. KEMA developed these based on energy audit experience and knowledge of the energy technology marketplace.
- **Savings Fractions.** The savings fractions represent the change in consumption of energy and demand from implementation of an energy efficiency measure. These fractions are developed by comparing the baseline efficiency and consumption with data on efficiency and consumption for the high efficiency DSM technologies. Where appropriate these standards are based on the most recent appliance standards and ASHRAE standards.
- Trade associations such as the Gas Appliance Manufacturers Association (GAMA), Association of Home Appliance Manufacturers (AHAM) and the Air-Conditioning and Refrigeration Institute (ARI) were also sources for baseline efficiencies, UECs and sales date on high efficiency equipment.

In order to obtain information regarding energy savings potential, costs, equipment life and energy service comparability, each energy-efficient technology had been researched extensively. Some, but not all, of these data were updated for this study. Information on items such as

residential appliances, HVAC equipment and installation practices, shower heads, commercial lighting and other measures is readily obtainable from secondary sources such as previous work done by Lawrence Berkeley Laboratories (LBL), the American Council for an Energy Efficient Economy (ACEEE), Platts publication and KEMA's Measure Cost Study for a group of California utilities and non-utility parties. Much, although by no means all, of this data is fairly consistent from source to source in terms of the technologies' savings characteristics.

These data were supplemented with energy-efficiency technology information from KEMA's in-house technology studies. These studies are the result of work conducted by KEMA's staff of HVAC, refrigeration and lighting engineers and energy efficiency analysts.

E.6 DATA LIMITATIONS AND RECOMMENDATIONS

One of the challenges for this study was to develop the baseline end use energy estimates while working with limited new data. The baseline energy consumption forms the basis for estimating and projecting energy efficiency measure savings. As described above, the baseline of energy consumption by market segment and end use was pieced together using known totals of consumption and data from the previous study supplemented by bits of information from the baseline studies. The baseline studies, while useful, are relatively narrow in their focus and do not give the overall picture of energy consumption. As mentioned before, the utilities no longer produce end use load forecasts so there is little interest on their part to follow where changes in energy consumption are coming from. Comprehensive new data with the level of detail desired for this study simply does not exist. The national data produced by the Energy Information Administration are useful in this regard up to a point, but can only produce results at a regional level and cannot provide the type of resolution necessary to characterize the New Jersey market in which there has been years of intervention which differs from that of neighboring states.

As an example in the residential sector over the past 5 years in New Jersey the number of customers increased by an average of 0.7% per year while electricity consumption increased at an average rate of 3% per year.[1] This occurs at a time when the efficiency of refrigerators, air conditioners and other appliances has increased, while the number of electrically heated homes has likely decreased. What is the cause of this seeming disparity? What is responsible for the increased consumption? It is likely due to a combination of factors such as the increased size of new homes, the increased saturation of central air conditioning and other loads. There is some concern that in the residential sector plug loads are responsible for much of that growth but there is little hard evidence as to the magnitude of this load. Similarly, the commercial and industrial sector analysis was also was also performed with limited new end use consumption data. While we believe the estimates of technical and economic potential are reasonable projections of what is available, the reader should be mindful of the limitations of the source data.

[1] EIA data and KEMA estimates.

E.7 RECOMMENDATIONS

Further research is needed to improve both the data and methods required for accurate estimation of electric energy-efficiency potential in New Jersey. This research will not only improve the estimation of potential, but will also provide information on patterns and trends in energy consumption that can help guide the development and implementation of programs. The primary areas of research needed to reduce uncertainty in key inputs to efficiency potential estimates include the following:

- ***Improve estimates of current equipment saturation.*** Initial estimates of equipment saturation data used for this study relied on the previous Comprehensive Resource Assessment that in turn used sources for which data collection occurred in the mid-1990s. These estimates of saturation were updated to the base year 2003 by estimating trends in the new adoption of appliances and equipment. While the saturations have been combined with energy estimates and reconciled to know total consumption, there is a degree of uncertainty surrounding these estimates.
- ***Improve estimates of end use energy consumption.*** The amount of energy that an efficient measure can save is based on the current consumption of the end use. Accurate data on end use consumption are necessary for reliable estimates of the magnitude of energy savings. The unit energy consumption for residential and the energy use indices for commercial and industrial are also based on the prior assessment, data which was collected in the mid 1990s. An appliance saturation study combined with conditional demand analysis or other methods for estimating end use consumption would provide both the saturation data described above and the end use energy consumption necessary for a more rigorous analysis of the energy efficiency potential in the residential sector. Ideally, in order to detect and track trends in saturations and consumption the study should be repeated periodically (for example every 3 years). A similar survey can also be done to collect these data for the commercial and industrial sectors.
- ***Improve estimates of current efficient measure saturation.*** The estimates of efficient measure saturation used for this study were based on updating the data for the previous study. These estimates of saturation were updated by estimating efficiency upgrades accomplished through the New Jersey utilities' programs from 1999 to 2003. The data on participation in programs used for this study was at an aggregate level so estimates at the end use level are uncertain. Our understanding is that the utilities maintain the data at a measure or end use level but there were not sufficient resources in this study to compile these data. Compiling these data would provide information useful for updating estimates of remaining potential in the state.
- ***Improve forecasts and tracking of customer adoption of efficiency measures.*** Forecasting customer adoption of energy-efficient technologies and practices requires a strong empirical foundation. The key need in this area is further collection and development of historic and current measure penetration data to use as the basis for calibrating forecasting models like those used in this study. A concurrent need is to develop a statewide database of measures adopted with programmatic support.

Currently, there is no measure-level database of all statewide program accomplishments available in a single, consistent format. There is also a need to improve tracking of measure adoption outside of programs (naturally occurring penetration as defined in this study).

F

TRCS BY MEASURE

The following tables present the technical and economic energy savings and the Total Resource Cost (TRC) score by measures, building type, and end use. First, a summary of the top ten measures by economic energy savings and TRC follows. An overall top-ten list presents measures only once, and notes only the highest economic energy savings or TRC for that measure. Another top-ten list includes repeated measures, as used in various building types and end uses. These lists are broken down by sector and fuel.

F.1 TOP TEN ENERGY SAVING MEASURES, OVERALL

Table 1
Residential, Commercial, and Industrial Electric Measures

Rank	Measures	Energy Savings (GWh)
1	Super T8s	329
2	High Performance Windows	308
3	High Efficiency Refrigerators	301
4	Second Refrigerator Removal	292
5	CFL, 2.5 hr/day (screw-in lamp)	285
6	Compact Fluorescent Lamp	243
7	Vendor Miser	226
8	Tank/Pipe Wrap	215
9	Occupancy Sensors	176
10	CFL, 6 hr/day (screw-in lamp)	174

Table 2
Residential, Commercial, and Industrial Gas Measures

Rank	Measures	Energy Savings (Therms)
1	High Performance Windows	140,112,958
2	Basic HVAC Diagnostic Testing And Repair	131,479,732
3	Floor/Basement Insulation	97,051,596
4	Tank/Pipe Wrap	78,728,835
5	Blower Door Air Sealing	78,585,585
6	Programmable Thermostats	78,351,514
7	Wall Insulation R0 - R11	74,118,038
8	Duct Diagnostics and Repair	49,466,261
9	Ceiling Insulation R0 - R38	38,627,756
10	High Efficiency Conventional Heater	27,887,662

Table 3
Residential Electric Measures

Rank	Measures	Energy Savings (GWh)
1	High Performance Windows	308
2	High Efficiency Refrigerators	301
3	Second Refrigerator Removal	292
4	CFL, 2.5 hr/day (screw-in lamp)	285
5	Tank/Pipe Wrap	215
6	CFL, 6 hr/day (screw-in lamp)	174
7	Fluorescent Torchierre	118
8	High Efficiency RAC Energy Star	80
9	Horizontal Axis Clothes Washer	79
10	Air Source Heat Pump 16 SEER	77

Table 4
Residential Gas Measures

Rank	Measures	Energy Savings (Therms)
1	High Performance Windows	140,112,958
2	Basic HVAC Diagnostic Testing And Repair	131,479,733
3	Floor/Basement Insulation	97,051,596
4	Tank/Pipe Wrap	78,728,835
5	Blower Door Air Sealing	78,585,585
6	Programmable Thermostats	78,351,514
7	Wall Insulation R0 - R11	741,18,038
8	Duct Diagnostics and Repair	49,466,261
9	Ceiling Insulation R0 - R38	38,627,756
10	High Efficiency Water Heater	24,794,078

Table 5
Commercial Electric Measures

Rank	Measure	Energy Savings (GWh)
1	Super T8s	329
2	Compact Fluorescent Lamp	243
3	Vendor Miser	226
4	Occupancy Sensors	176
5	Reflectors/Design	157
6	Compact Fluorescent Fixture	131
7	Demand Defrost Electric	126
8	HID	118
9	T8/Electronic Ballasts	115
10	Proper Installation	86

Table 6
Industrial Electric Measures

Rank	Measure	Energy Savings (GWh)
1	Process Support (Low)	61
2	Process Support (Med)	59.2
3	HID	59.0
4	Motor Practices Level 1	42
5	High Efficiency Motors	24
6	Proper Installation	19
7	Motor Practices Level 2	12
8	Reflectors/Design	11.7
9	Super T8s	10
10	Process Compressed Air (Med)	9.5

Table 7
Commercial and Industrial Gas Measures

Rank	Measure	Energy Savings (Therms)
1	High Efficiency Conventional Heater	27,887,662
2	Vent Damper	26,557,734
3	High Efficiency Water Heater	19,352,061
4	High Efficiency Condensing Heater	17,460,102
5	Roof Insulation	15,258,745
6	Low Flow Fixtures	6,618,405

F.2 TOP TEN ENERGY SAVINGS MEASURES, BY END USE AND BUILDING TYPE

Table 8
Residential, Commercial, and Industrial Electric Measures

Rank	Measure	Building Type	End Use	Energy Savings (GWh)	Sector
1	Super T8s	Office Existing	Lighting	329	Com
2	High Performance Windows	Single Existing	HVAC	308	Res
3	High Efficiency Refrigerators	Single Existing	Appliances	301	Res
4	Second Refrigerator Removal	Single Existing	Appliances	292	Res
5	CFL, 2.5 hr/day (screw-in lamp)	Single Existing	Lighting	285	Res
6	High Performance Windows	Single Existing	HVAC	260	Res
7	Compact Fluorescent Lamp	Retail Existing	Lighting	243	Com
8	Vendor Miser	Misc.Comm. Existing	Other	226	Com
9	Tank/Pipe Wrap	Single Existing	Water Heating	215	Res
10	Vendor Miser	Retail Existing	Other	212	Com

Table 9
Residential, Commercial, and Industrial Gas Measures

Rank	Measure	Building Type	End Use	Energy Savings (Therms)	Sector
1	High Performance Windows	Existing	HVAC	140,112,958	Res
2	Basic HVAC Diagnostic Testing And Repair	Existing	HVAC	131,479,732	Res
3	Floor/Basement Insulation	Existing	HVAC	97,051,596	Res
4	Tank/Pipe Wrap	Existing	Water Heating	78,728,835	Res
5	Blower Door Air Sealing	Existing	HVAC	78,585,585	Res
6	Programmable Thermostats	Existing	HVAC	78,351,514	Res
7	Wall Insulation R0 - R11	Existing	HVAC	74,118,038	Res
8	Duct Diagnostics and Repair	Existing	HVAC	49,466,261	Res
9	Ceiling Insulation R0 - R38	Existing	HVAC	38,627,756	Res
10	High Performance Windows	Low Income	HVAC	29,015,876	Res

Table 10
Residential Electric Measures

Rank	Measure	Building Type	End Use	Energy Savings (GWh)
1	High Performance Windows	Single Existing	HVAC	308
2	High Efficiency Refrigerators	Single Existing	Appliances	301
3	Second Refrigerator Removal	Single Existing	Appliances	292
4	CFL, 2.5 hr/day (screw-in lamp)	Single Existing	Lighting	285
5	High Performance Windows	Single Existing	HVAC	260
6	Tank/Pipe Wrap	Single Existing	Water Heating	215
7	CFL, 6 hr/day (screw-in lamp)	Single Existing	Lighting	174
8	High Performance Windows	Single Existing	HVAC	162
9	High Efficiency Refrigerators	Multi Existing	Appliances	151
10	Tank/Pipe Wrap	Multi Existing	Water Heating	132

Table 11
Residential Gas Measures

Rank	Measure	Building Type	End Use	Energy Savings (Therms)
1	High Performance Windows	Existing	HVAC	140,112,958
2	Basic HVAC Diagnostic Testing And Repair	Existing	HVAC	131,479,732
3	Floor/Basement Insulation	Existing	HVAC	97,051,596
4	Tank/Pipe Wrap	Existing	Water Heating	78,728,835
5	Blower Door Air Sealing	Existing	HVAC	78,585,585
6	Programmable Thermostats	Existing	HVAC	78,351,514
7	Wall Insulation R0 - R11	Existing	HVAC	74,118,038
8	Duct Diagnostics and Repair	Existing	HVAC	49,466,261
9	Ceiling Insulation R0 - R38	Existing	HVAC	38,627,756
10	High Performance Windows	Low Income	HVAC	29,015,876

Table 12
Commercial Electric Measures

Rank	Measure	Building Type	End Use	Energy Savings (GWh)
1	Super T8s	Office Existing	Lighting	329
2	Compact Fluorescent Lamp	Retail Existing	Lighting	243
3	Vendor Miser	Misc.Comm. Existing	Other	226
4	Vendor Miser	Retail Existing	Other	212
5	Occupancy Sensors	Office Existing	Lighting	176
6	Reflectors/Design	Office Existing	Lighting	157
7	Compact Fluorescent Fixture	Retail Existing	Lighting	131
8	Demand Defrost Electric	Grocery Existing	Other	126
9	HID	Grocery Existing	Lighting	118
10	T8/Electronic Ballasts	Office Existing	Lighting	115

Table 13
Industrial Electric Measures

Rank	Measure	Building Type	End Use	Energy Savings (GWh)
1	Process Support (Low)	Misc.Indust	Process	61
2	Process Support (Med)	Misc.Indust	Process	59.2
3	HID	Misc.Indust	Lighting	59.0
4	Process Support (Low)	SIC 28	Process	44
5	Motor Practices Level 1	Misc.Indust	Motor	42
6	Process Support (Med)	SIC 28	Process	41
7	Motor Practices Level 1	SIC 28	Motor	26.8
8	Process Support (Low)	SIC 33	Process	26.7
9	Process Support (Med)	SIC 33	Process	26
10	High Efficiency Motors	Misc.Indust	Motor	24

Table 14
Commercial and Industrial Gas Measures

Rank	Measure	Building Type	End Use	Energy Savings (Therms)
1	High Efficiency Conventional Heater	Misc.Comm.	HVAC	27,887,662
2	Vent Damper	Misc.Comm.	HVAC	26,557,733
3	High Efficiency Water Heater	Misc.Comm.	Water Heating	19,352,061
4	High Efficiency Condensing Heater	Misc.Comm.	HVAC	17,460,102
5	High Efficiency Conventional Heater	Office	HVAC	17,024,556
6	Roof Insulation	Misc.Comm.	HVAC	15,258,745
7	Vent Damper	Office	HVAC	12,878,975
8	High Efficiency Water Heater	Office	Water Heating	12,645,937
9	Roof Insulation	Office	HVAC	10,259,760
10	High Efficiency Conventional Heater	Retail	HVAC	9,930,532

F.3 TRC MEASURES, OVERALL

Table 15
Residential, Commercial, and Industrial Electric & Gas Measures

Rank	Measure	TRC	Sector
1	Demand Defrost Electric	887	C&I
2	Night Covers for Display Cases	665	C&I
3	Demand Hot Gas Defrost	263	C&I
4	Vendor Miser	147	C&I
5	T8 / Electronic Ballasts (ROB)	134	C&I
6	Proper HVAC Sizing	130	Res
7	T8/Electronic Ballasts	113	C&I
8	Low Flow Fixtures	56	C&I
9	Roof Insulation	48	C&I
10	Refrigeration Commissioning	41	C&I

Table 16
Residential Gas & Electric Measures

Rank	Measure	TRC
1	Proper HVAC Sizing	130
2	High Performance Windows	19
3	Tank/Pipe Wrap	14
4	Proper HVAC Air Flow / Charge	9
5	Low Flow Fixtures	7.9
6	Programmable Thermostats	7.8
7	Ceiling Insulation R0 – R38	6
8	Duct Diagnostics and Repair	4.7
9	Blower Door Air Sealing	4.5
10	Fluorescent Torchierre	4

Table 17
Residential Electric Measures

Rank	Measure	TRC
1	Proper HVAC Sizing	130
2	High Performance Windows	19
3	Tank/Pipe Wrap	14
4	Proper HVAC Air Flow / Charge	9
5	Low Flow Fixtures	8
6	Programmable Thermostats	7.5
7	Duct Diagnostics and Repair	5
8	Fluorescent Torchierre	3.6
9	Ceiling Insulation R0 – R38	3.5
10	ROB 2L4'T8, 1EB	3.4
10	RET 2L4'T8, 1EB	3.4

Table 18
Residential Gas Measures

Rank	Measure	TRC
1	High Performance Windows	18
2	Tank/Pipe Wrap	10
3	Programmable Thermostats	8
4	Ceiling Insulation R0 – R38	6
5	Low Flow Fixtures	5
6	Blower Door Air Sealing	4.5
7	Wall Insulation R0 – R11	3.5
8	Basic HVAC Diagnostics Testing and Repair	3
9	Duct Diagnostics and Repair	2
10	Wall Insulation R11 – R19	1.9

Table 19
Commercial and Industrial Electric & Gas Measures

Rank	Measure	TRC
1	Demand Defrost Electric	887
2	Night Covers for Display Cases	665
3	Demand Hot Gas Defrost	263
4	Vendor Miser	147
5	T8/Electronic Ballasts (ROB)	134
6	T8/Electronic Ballasts	113
7	Low Flow Fixtures	56
8	Roof Insulation	48
9	Refrigeration Commissioning	41
10	High Efficacy Source	27

Table 20
Commercial Electric Measures

Rank	Measure	TRC
1	Demand Defrost Electric	887
2	Night Covers for Display Cases	665
3	Demand Hot Gas Defrost	263
4	Vendor Miser	147
5	T8/Electronic Ballasts (ROB)	134
6	T8/Electronic Ballasts	113
7	Low Flow Fixtures	56
8	Refrigeration Commissioning	41
9	High Efficacy Source	27
10	Reflectors/Design (ROB)	18

Table 21
Industrial Electric Measures

Rank	Measure	TRC
1	T8/Electronic Ballasts (ROB)	125
2	T8/Electronic Ballasts	106
3	Reflectors/Design (ROB)	17
4	Reflectors/Design	16
5	High Efficiency Motors	14
6	Super T8s (ROB)	13
7	High Efficiency Chillers	10
8	Proper Installation	9
9	Compact Fluorescent Fixture (ROB)	6.9
10	Compact Fluorescent Fixture	6.8

Table 22
Commercial and Industrial Gas Measures

Rank	Measure	TRC
1	Roof Insulation	48
2	Vent Damper	13
3	Low Flow Fixtures	7
4	High Efficiency Conventional Heater	6
5	High Efficiency Water Heater	5
6	High Efficiency Condensing Heater	2

F.4 TOP TEN TRC MEASURES, BY END USE AND BUILDING TYPE

Table 23
Residential, Commercial, and Industrial Electric & Gas Measures

Rank	Measure	Building Type	End Use	TRC	Fuel	Sector
1	Demand Defrost Electric	Grocery Existing	HVAC	887	Electric	C&I
2	Night Covers for Display Cases	Grocery Existing	HVAC	665	Electric	C&I
3	Demand Hot Gas Defrost	Grocery Existing	HVAC	263	Electric	C&I
4	Vendor Miser	Grocery Existing	HVAC	147	Electric	C&I
5	T8/Electronic Ballasts (ROB)	Warehouse Existing	HVAC	134	Electric	C&I
6	T8/Electronic Ballasts (ROB)	Grocery Existing	HVAC	132	Electric	C&I
7	T8/Electronic Ballasts (ROB)	Retail Existing	HVAC	131	Electric	C&I
8	Proper HVAC Sizing	Single LI	HVAC	159	Electric	Res
9	Proper HVAC Sizing	Single Existing	HVAC	129	Electric	Res
10	Proper HVAC Sizing	Single NC	HVAC	129	Electric	Res

Table 24
Residential Electric Measures*

Rank	Measure	Building Type	End Use	TRC
1	Proper HVAC Sizing	Single LI	HVAC	129
2	Proper HVAC Sizing	Single Existing	HVAC	129
3	Proper HVAC Sizing	Single NC	HVAC	129
4	Proper HVAC Sizing	Single NC	HVAC	115
5	Proper HVAC Sizing	Single Existing	HVAC	115
6	Proper HVAC Sizing	Single LI	HVAC	115
7	Proper HVAC Sizing	Single Existing	HVAC	109
8	Proper HVAC Sizing	Single LI	HVAC	109
9	Proper HVAC Sizing	Single NC	HVAC	109
10	Proper HVAC Sizing	Single Existing	HVAC	102

*The top Electric & Gas Measures are all Electric Measures.

Table 25
Residential Gas Measures

Rank	Measure	Building Type	End Use	TRC
1	High Performance Windows	Existing	HVAC	18
2	High Performance Windows	Low Income	HVAC	18
3	High Performance Windows	New Construction	HVAC	18
4	Tank/Pipe Wrap	Existing	Water Heating	10
5	Tank/Pipe Wrap	Low Income	Water Heating	10
6	Tank/Pipe Wrap	New Construction	Water Heating	10
7	Programmable Thermostats	New Construction	HVAC	7.8
8	Programmable Thermostats	Low Income	HVAC	7.6
9	Programmable Thermostats	Existing	HVAC	7.6
10	Ceiling Insulation R0-R38	Low Income	HVAC	6

Table 26
Commercial and Industrial Electric Measures*

Rank	Measure	Building Type	End Use	TRC
1	Demand Defrost Electric	Grocery Existing	Other	887
2	Night Covers for Display Cases	Grocery Existing	Other	665
3	Demand Hot Gas Defrost	Grocery Existing	Other	263
4	Vendor Miser	Grocery Existing	Other	147
5	T8/Electronic Ballasts (ROB)	Warehouse Existing	Lighting	134
6	T8/Electronic Ballasts (ROB)	Grocery Existing	Lighting	132
7	T8/Electronic Ballasts (ROB)	Retail Existing	Lighting	131
8	T8/Electronic Ballasts (ROB)	Office Existing	Lighting	129
9	T8/Electronic Ballasts (ROB)	Health Care Existing	Lighting	127
10	T8/Electronic Ballasts (ROB)	SIC 32	Lighting	125

*The top Electric & Gas Measures are all Electric Measures.

Table 27
Commercial Electric Measures

Rank	Measure	Building Type	End Use	TRC
1	Demand Defrost Eletcric	Grocery Existing	Other	887
2	Night Covers for Display Cases	Grocery Existing	Other	665
3	Demand Hot Gas Defrost	Grocery Existing	Other	263
4	Vendor Miser	Grocery Existing	Other	147
5	T8/Electronic Ballasts (ROB)	Warehouse Existing	Lighting	134
6	T8/Electronic Ballasts (ROB)	Grocery Existing	Lighting	132
7	T8/Electronic Ballasts (ROB)	Retail Existing	Lighting	131
8	T8/Electronic Ballasts (ROB)	Office Existing	Lighting	129
9	T8/Electronic Ballasts (ROB)	Health Care Existing	Lighting	127
10	T8/Electronic Ballasts (ROB)	Lodging Existing	Lighting	115

Table 28
Industrial Electric Measures

Rank	Measure	Building Type	End Use	TRC
1	T8/Electronic Ballasts (ROB)	SIC 32	Lighting	124.84
2	T8/Electronic Ballasts (ROB)	SIC 28	Lighting	124.84
3	T8/Electronic Ballasts (ROB)	Misc.Indust	Lighting	124.84
4	T8/Electronic Ballasts (ROB)	SIC 33	Lighting	124.84
5	T8/Electronic Ballasts (ROB)	SIC 30	Lighting	124.84
6	T8/Electronic Ballasts (ROB)	SIC 20	Lighting	124.84
7	T8/Electronic Ballasts	SIC 32	Lighting	105.79
8	T8/Electronic Ballasts	SIC 28	Lighting	105.79
9	T8/Electronic Ballasts	Misc.Indust	Lighting	105.79
10	T8/Electronic Ballasts	SIC 33	Lighting	105.79

Table 29
Commercial and Industrial Gas Measures

Rank	Measure	Building Type	End Use	TRC
1	Roof Insulation	Warehouse	HVAC	48
2	Roof Insulation	Retail	HVAC	45
3	Roof Insulation	Lodging	HVAC	44.2
4	Roof Insulation	Grocery	HVAC	44.0
5	Roof Insulation	Office	HVAC	43.5
6	Roof Insulation	Education	HVAC	42.9
7	Roof Insulation	Large Industrial	HVAC	42.33
8	Roof Insulation	Small Industrial	HVAC	42.33
9	Roof Insulation	Health Care	HVAC	42.30
10	Roof Insulation	Misc. Comm.	HVAC	42.30

Table 30
Technical and Economic Results

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
RESIDENTIAL													
ELECTRIC													
CFL, 0.5 hr/day (screw-in lamp)	Single	Lighting	0.60	60.74	31%	0.00	1.82	31%	0.00	0.09	0.09	3,080.86	3,080.86
CFL, 0.5 hr/day (Hard-Wired Fixture)	Single	Lighting	0.11	18.19	40%	0.00	0.55	40%	0.00	0.62	0.23	20,673.66	7,685.66
CFL, 2.5 hr/day (screw-in lamp)	Single	Lighting	2.11	285.03	30%	285.03	8.55	30%	8.55	0.03	0.03	1,071.69	1,071.69
CFL, 2.5 hr/day (Hard-Wired Fixture)	Single	Lighting	0.56	87.30	39%	0.00	2.62	39%	0.00	0.12	0.05	4,065.38	1,773.63
CFL, 6 hr/day (screw-in lamp)	Single	Lighting	2.45	173.66	30%	173.66	5.21	30%	5.21	0.03	0.03	925.80	925.80
CFL, 6 hr/day (Hard-Wired Fixture)	Single	Lighting	1.38	53.03	39%	53.03	1.59	39%	1.59	0.05	0.03	1,637.20	1,092.21
ROB 2L4'T8, 1EB	Single	Lighting	2.78	59.86	27%	59.86	1.80	27%	1.80	0.02	0.02	666.33	666.33
Fluorescent Torchierre	Single	Lighting	3.63	117.82	72%	117.82	3.53	72%	3.53	0.02	0.02	622.87	622.87
High Efficiency Refrigerators	Single	Appliances	3.28	301.12	13%	301.12	27.29	13%	27.29	0.02	0.02	203.34	203.34
Second Refrigerator Removal	Single	Appliances	2.33	291.90	100%	291.90	0.00	0%	0.00	0.03	0.03	N/A	N/A
Tank/Pipe Wrap	Single	Water Heating	13.89	214.77	18%	214.77	14.97	18%	14.97	0.00	0.00	61.67	61.67
Low Flow Fixtures	Single	Water Heating	7.86	50.85	23%	50.85	3.55	23%	3.55	0.01	0.00	108.98	70.72
High Efficiency Water Heater	Single	Water Heating	1.81	48.85	27%	48.85	3.41	27%	3.41	0.03	0.01	472.33	133.11
Horizontal Axis Clothes Washer	Single	Water Heating	1.13	79.46	34%	79.46	2.96	31%	2.96	0.05	0.02	1,389.61	282.50
Solar DHW	Single	Water Heating	0.19	4.12	34%	0.00	0.29	31%	0.00	0.32	0.02	4,563.60	331.40
High Efficiency Dishwasher	Single	Appliances	0.25	23.77	19%	0.00	2.72	19%	0.00	0.24	0.24	2,121.70	2,121.70
Induction Cooktop	Single	Appliances	0.47	181.90	28%	0.00	7.57	28%	0.00	0.13	0.13	3,030.64	3,030.64
Convection Oven	Single	Appliances	0.06	35.97	33%	0.00	1.50	33%	0.00	0.94	0.26	22,606.71	6,262.36
High Performance Windows	Single	HVAC	18.28	51.89	7%	51.89	3.14	3%	3.14	0.00	0.00	42.13	42.13
Programmable Thermostats	Single	HVAC	7.46	34.11	12%	34.11	5.42	7%	5.42	0.01	0.00	49.63	48.99
Proper HVAC Air Flow / Charge	Single	HVAC	6.32	23.04	15%	23.04	3.66	11%	3.66	0.01	0.01	58.57	51.86
Ceiling Insulation R0 - R38	Single	HVAC	3.50	13.81	17%	13.81	1.28	12%	1.28	0.01	0.01	149.03	55.40

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Blower Door Air Sealing	Single	HVAC	2.78	27.55	21%	27.55	-0.17	12%	-0.17	0.02	0.01	-2,777.91	100.25
Duct Diagnostics and Repair	Single	HVAC	2.28	44.68	27%	44.68	7.99	19%	7.99	0.03	0.01	147.32	117.91
Wall Insulation R0 - R11	Single	HVAC	1.11	24.02	30%	24.02	1.72	20%	1.72	0.04	0.01	589.48	140.06
AC Cycling	Single	HVAC	1.16	0.04	30%	0.04	35.69	51%	35.69	27.86	0.02	29.61	80.45
Air Source Heat Pump 16 SEER	Single	HVAC	1.35	76.86	41%	76.86	13.82	63%	13.82	0.04	0.03	247.47	112.28
Floor/Basement Insulation	Single	HVAC	0.89	32.34	45%	0.00	1.21	64%	0.00	0.05	0.03	1,371.83	119.58
Ceiling Insulation R11 - R38	Single	HVAC	0.60	7.05	46%	0.00	0.40	64%	0.00	0.08	0.03	1,365.65	126.24
Ceiling Insulation R19 - R38	Single	HVAC	0.37	2.17	47%	0.00	0.09	64%	0.00	0.12	0.03	3,010.03	129.71
Geothermal Heat Pump, Closed Loop 3.3 COP	Single	HVAC	0.33	4.10	47%	0.00	0.75	65%	0.00	0.18	0.03	1,003.58	156.06
Wall Insulation R11 - R19	Single	HVAC	0.12	17.01	49%	0.00	0.90	66%	0.00	0.39	0.05	7,297.69	222.29
Ceiling Insulation R30 - R38	Single	HVAC	0.11	0.24	49%	0.00	-0.02	66%	0.00	0.37	0.05	-4,812.38	223.51
High Performance Windows	Single	HVAC	10.30	19.01	7%	19.01	1.79	3%	1.79	0.00	0.00	49.36	49.36
Ceiling Insulation R0 - R38	Single	HVAC	2.18	5.53	9%	5.53	0.77	4%	0.77	0.02	0.01	164.24	84.03
Programmable Thermostats	Single	HVAC	2.88	10.20	13%	10.20	0.26	5%	0.26	0.02	0.01	690.20	150.33
High Efficiency RAC Energy Star	Single	HVAC	1.95	2.89	14%	2.89	3.65	10%	3.65	0.06	0.02	47.78	92.50
Blower Door Air Sealing	Single	HVAC	1.58	10.40	18%	10.40	0.00	10%	0.00	0.03	0.02	N/A	142.56
Wall Insulation R0 - R11	Single	HVAC	0.71	9.85	22%	0.00	1.09	12%	0.00	0.07	0.03	620.76	196.97
Floor/Basement Insulation	Single	HVAC	0.66	15.69	28%	0.00	0.98	14%	0.00	0.07	0.04	1,133.52	303.88
Ceiling Insulation R11 - R38	Single	HVAC	0.45	3.43	29%	0.00	0.30	14%	0.00	0.11	0.04	1,189.72	334.33
Ceiling Insulation R19 - R38	Single	HVAC	0.27	1.04	29%	0.00	0.07	14%	0.00	0.17	0.04	2,612.00	351.90
Wall Insulation R11 - R19	Single	HVAC	0.09	8.34	32%	0.00	0.69	15%	0.00	0.53	0.09	6,371.37	784.01
Ceiling Insulation R30 - R38	Single	HVAC	0.08	0.12	32%	0.00	-0.01	15%	0.00	0.49	0.09	-4,923.06	791.14
Proper HVAC Sizing	Single	HVAC	109.25	1.03	1%	1.03	1.21	5%	1.21	0.00	0.00	0.88	0.88
High Performance Windows	Single	HVAC	10.85	7.50	8%	7.50	0.66	7%	0.66	0.00	0.00	50.03	18.14
Programmable Thermostats	Single	HVAC	4.68	5.06	13%	5.06	1.18	12%	1.18	0.01	0.01	56.92	34.65
Ceiling Insulation R0 - R38	Single	HVAC	2.20	2.09	14%	2.09	0.28	13%	0.28	0.02	0.01	166.67	42.11

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Blower Door Air Sealing	Single	HVAC	1.64	4.07	18%	4.07	-0.05	13%	-0.05	0.03	0.01	-2,259.44	85.56
Duct Diagnostics and Repair	Single	HVAC	1.50	6.93	25%	6.93	1.81	20%	1.81	0.04	0.02	161.96	112.77
Proper HVAC Air Flow / Charge	Single	HVAC	1.20	0.57	25%	0.57	0.66	23%	0.66	0.09	0.02	80.23	109.00
Wall Insulation R0 - R11	Single	HVAC	0.69	3.60	28%	0.00	0.38	24%	0.00	0.07	0.03	665.31	131.20
AC Cycling	Single	HVAC	0.86	0.01	28%	0.00	6.63	51%	0.00	41.70	0.04	39.68	92.27
Floor/Basement Insulation	Single	HVAC	0.63	5.65	34%	0.00	0.30	52%	0.00	0.07	0.04	1,364.28	110.83
Ceiling Insulation R11 - R38	Single	HVAC	0.44	1.24	35%	0.00	0.10	52%	0.00	0.11	0.04	1,323.46	120.21
High Efficiency CAC 16 SEER	Single	HVAC	0.25	1.99	37%	0.00	2.33	62%	0.00	0.45	0.07	382.76	173.71
Ceiling Insulation R19 - R38	Single	HVAC	0.26	0.37	37%	0.00	0.02	62%	0.00	0.18	0.06	3,120.85	156.90
Wall Insulation R11 - R19	Single	HVAC	0.08	2.95	40%	0.00	0.22	63%	0.00	0.56	0.09	7,359.15	258.71
Ceiling Insulation R30 - R38	Single	HVAC	0.07	0.04	40%	0.00	-0.01	62%	0.00	0.55	0.09	-4,373.80	260.19
High Performance Windows	Single	HVAC	7.02	259.68	26%	259.68	118.82	28%	118.82	0.01	0.01	24.69	24.69
High Efficiency RAC Energy Star	Single	HVAC	1.27	79.77	34%	79.77	34.31	36%	34.31	0.07	0.03	160.40	57.72
Ceiling Insulation R0 - R38	Single	HVAC	0.15	8.01	35%	0.00	3.44	37%	0.00	0.50	0.03	1,163.99	75.25
Wall Insulation R0 - R11	Single	HVAC	0.04	12.00	36%	0.00	5.16	38%	0.00	1.78	0.09	4,148.63	205.24
Ceiling Insulation R11 - R38	Single	HVAC	0.02	3.48	36%	0.00	1.49	38%	0.00	3.28	0.12	7,635.21	273.28
Floor/Basement Insulation	Single	HVAC	0.02	8.18	37%	0.00	3.52	39%	0.00	4.26	0.21	9,912.70	476.65
Ceiling Insulation R19 - R38	Single	HVAC	0.01	0.64	37%	0.00	0.28	39%	0.00	8.85	0.23	20,583.95	509.80
Wall Insulation R11 - R19	Single	HVAC	0.00	7.62	38%	0.00	3.28	40%	0.00	18.20	0.59	42,313.88	1,313.80
Proper HVAC Sizing	Single	HVAC	102.24	29.35	5%	29.35	36.64	5%	36.64	0.00	0.00	0.92	0.92
High Performance Windows	Single	HVAC	15.30	162.11	29%	162.11	202.37	31%	202.37	0.01	0.01	5.40	4.69
Programmable Thermostats	Single	HVAC	1.25	23.26	33%	23.26	27.30	35%	27.30	0.09	0.02	77.28	12.71
Duct Diagnostics and Repair	Single	HVAC	0.47	38.77	39%	0.00	45.50	41%	0.00	0.24	0.05	203.17	40.50
Ceiling Insulation R0 - R38	Single	HVAC	0.32	4.85	40%	0.00	5.69	42%	0.00	0.31	0.05	262.38	39.69
Proper HVAC Air Flow / Charge	Single	HVAC	0.92	13.26	42%	0.00	16.55	44%	0.00	0.13	0.06	101.60	47.92
AC Cycling	Single	HVAC	0.66	0.16	42%	0.00	159.20	65%	0.00	52.09	0.09	52.09	49.27

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Wall Insulation R0 - R11	Single	HVAC	0.09	7.02	43%	0.00	8.24	66%	0.00	1.14	0.11	968.31	58.53
High Efficiency CAC 16 SEER	Single	HVAC	0.24	59.74	52%	0.00	70.11	75%	0.00	0.47	0.18	401.43	107.61
Ceiling Insulation R11 - R38	Single	HVAC	0.04	1.71	52%	0.00	2.00	75%	0.00	2.49	0.17	2,123.43	101.74
Floor/Basement Insulation	Single	HVAC	0.03	4.01	53%	0.00	4.71	76%	0.00	3.24	0.21	2,756.83	123.37
Ceiling Insulation R19 - R38	Single	HVAC	0.01	0.31	53%	0.00	0.37	76%	0.00	6.72	0.21	5,724.62	126.94
Wall Insulation R11 - R19	Single	HVAC	0.01	3.74	54%	0.00	4.39	76%	0.00	13.81	0.36	11,767.95	214.51
Proper HVAC Sizing	Single	HVAC	114.79	1.62	1%	1.62	1.90	5%	1.90	0.00	0.00	0.84	0.84
High Performance Windows	Single	HVAC	11.32	11.75	8%	11.75	1.02	7%	1.02	0.00	0.00	48.60	17.39
Programmable Thermostats	Single	HVAC	4.42	7.51	12%	7.51	1.34	11%	1.34	0.01	0.01	74.72	37.08
Ceiling Insulation R0 - R38	Single	HVAC	2.31	3.29	14%	3.29	0.45	12%	0.45	0.02	0.01	159.32	44.61
Blower Door Air Sealing	Single	HVAC	1.70	6.37	18%	6.37	-0.10	12%	-0.10	0.03	0.01	-1,760.86	91.17
Proper HVAC Air Flow / Charge	Single	HVAC	1.38	0.97	18%	0.97	1.14	14%	1.14	0.08	0.02	70.09	86.98
Duct Diagnostics and Repair	Single	HVAC	1.36	10.04	24%	10.04	1.91	19%	1.91	0.04	0.02	229.83	122.66
Wall Insulation R0 - R11	Single	HVAC	0.73	5.70	28%	0.00	0.60	21%	0.00	0.07	0.03	636.83	146.05
AC Cycling	Single	HVAC	0.75	0.01	28%	0.00	8.60	42%	0.00	48.19	0.04	45.86	104.72
Floor/Basement Insulation	Single	HVAC	0.67	8.96	33%	0.00	0.46	44%	0.00	0.07	0.04	1,334.01	125.31
Ceiling Insulation R11 - R38	Single	HVAC	0.46	1.98	34%	0.00	0.16	44%	0.00	0.10	0.04	1,267.31	135.73
High Efficiency CAC & High Efficiency RAC	Single	HVAC	0.29	3.74	36%	0.00	4.28	55%	0.00	0.39	0.07	335.93	190.06
Ceiling Insulation R19 - R38	Single	HVAC	0.27	0.59	37%	0.00	0.03	55%	0.00	0.17	0.06	3,027.21	171.53
Wall Insulation R11 - R19	Single	HVAC	0.09	4.64	39%	0.00	0.34	56%	0.00	0.53	0.09	7,148.62	279.75
Ceiling Insulation R30 - R38	Single	HVAC	0.07	0.06	39%	0.00	-0.01	56%	0.00	0.54	0.09	-4,136.41	281.34
Proper HVAC Sizing	Single	HVAC	129.46	55.74	5%	55.74	69.58	5%	69.58	0.00	0.00	0.73	0.73
High Performance Windows	Single	HVAC	19.37	307.90	29%	307.90	384.37	31%	384.37	0.01	0.00	4.26	3.71
Programmable Thermostats	Single	HVAC	1.26	35.15	32%	35.15	41.24	34%	41.24	0.09	0.01	76.73	10.25
Ceiling Insulation R0 - R38	Single	HVAC	0.45	10.22	33%	0.00	11.99	35%	0.00	0.22	0.02	186.74	13.22
Duct Diagnostics and Repair	Single	HVAC	0.47	58.14	38%	0.00	68.22	40%	0.00	0.24	0.05	203.24	37.35

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Proper HVAC Air Flow / Charge	Single	HVAC	1.21	25.98	40%	25.98	32.43	42%	32.43	0.10	0.05	77.79	39.50
AC Cycling	Single	HVAC	0.68	0.25	40%	0.00	246.33	59%	0.00	50.50	0.07	50.50	42.68
Wall Insulation R0 - R11	Single	HVAC	0.11	13.75	41%	0.00	16.14	60%	0.00	0.87	0.09	741.24	50.59
Ceiling Insulation R11 - R38	Single	HVAC	0.06	3.98	41%	0.00	4.67	60%	0.00	1.60	0.10	1,364.20	57.60
High Efficiency CAC & High Efficiency RAC	Single	HVAC	0.27	107.55	50%	0.00	126.20	69%	0.00	0.42	0.17	359.61	102.56
Floor/Basement Insulation	Single	HVAC	0.04	7.98	51%	0.00	9.37	70%	0.00	2.44	0.18	2,079.97	108.65
Ceiling Insulation R19 - R38	Single	HVAC	0.02	0.62	51%	0.00	0.73	70%	0.00	5.07	0.18	4,319.11	111.71
Wall Insulation R11 - R19	Single	HVAC	0.01	7.15	51%	0.00	8.38	70%	0.00	10.84	0.30	9,233.84	186.72
CFL, 0.5 hr/day (screw-in lamp)	Multi	Lighting	0.61	22.23	31%	0.00	2.00	31%	0.00	0.09	0.09	1,026.95	1,026.95
CFL, 0.5 hr/day (Hard-Wired Fixture)	Multi	Lighting	0.11	6.66	40%	0.00	0.60	40%	0.00	0.62	0.23	6,891.22	2,561.89
CFL, 2.5 hr/day (screw-in lamp)	Multi	Lighting	2.18	104.33	30%	104.33	9.39	30%	9.39	0.03	0.03	357.23	357.23
CFL, 2.5 hr/day (Hard-Wired Fixture)	Multi	Lighting	0.57	31.96	39%	0.00	2.88	39%	0.00	0.12	0.05	1,355.13	591.21
CFL, 6 hr/day (screw-in lamp)	Multi	Lighting	2.52	63.57	30%	63.57	5.72	30%	5.72	0.03	0.03	308.60	308.60
CFL, 6 hr/day (Hard-Wired Fixture)	Multi	Lighting	1.42	19.41	39%	19.41	1.75	39%	1.75	0.05	0.03	545.73	364.07
ROB 2L4'T8, 1EB	Multi	Lighting	3.44	21.91	27%	21.91	1.97	27%	1.97	0.02	0.02	185.09	185.09
Fluorescent Torchierre	Multi	Lighting	2.50	43.13	72%	43.13	3.88	72%	3.88	0.03	0.03	311.44	311.44
High Efficiency Refrigerators	Multi	Appliances	3.00	151.01	13%	151.01	13.68	13%	13.68	0.02	0.02	222.63	222.63
Second Refrigerator Removal	Multi	Appliances	2.33	70.71	100%	70.71	0.00	0%	0.00	0.03	0.03	N/A	N/A
Tank/Pipe Wrap	Multi	Water Heating	13.81	132.00	18%	132.00	7.82	18%	7.82	0.00	0.00	72.55	72.55
Low Flow Fixtures	Multi	Water Heating	7.81	31.25	23%	31.25	1.85	23%	1.85	0.01	0.00	128.22	83.20
High Efficiency Water Heater	Multi	Water Heating	1.80	30.02	27%	30.02	1.78	27%	1.78	0.03	0.01	555.69	156.60
Horizontal Axis Clothes Washer	Multi	Water Heating	1.16	6.19	28%	6.19	0.46	28%	0.46	0.05	0.01	694.81	177.41
Solar DHW	Multi	Water Heating	0.20	2.76	28%	0.00	0.16	29%	0.00	0.29	0.01	4,924.55	241.77
High Efficiency Dishwasher	Multi	Appliances	0.25	6.31	19%	0.00	0.72	19%	0.00	0.24	0.24	2,121.70	2,121.70
Induction Cooktop	Multi	Appliances	0.48	105.93	28%	0.00	8.38	28%	0.00	0.13	0.13	1,595.07	1,595.07
Convection Oven	Multi	Appliances	0.06	20.94	33%	0.00	1.66	33%	0.00	0.94	0.26	11,898.27	3,295.98

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Performance Windows	Multi	HVAC	7.96	8.11	7%	8.11	0.74	3%	0.74	0.01	0.01	65.78	65.78
Ceiling Insulation R0 - R38	Multi	HVAC	1.68	2.36	9%	2.36	0.33	4%	0.33	0.03	0.01	212.90	111.04
Programmable Thermostats	Multi	HVAC	2.17	5.21	14%	5.21	1.24	9%	1.24	0.03	0.02	118.87	122.27
Proper HVAC Air Flow / Charge	Multi	HVAC	1.84	3.52	17%	3.52	0.84	12%	0.84	0.03	0.02	140.30	127.08
Wall Insulation R0 - R11	Multi	HVAC	0.55	4.27	21%	0.00	0.46	13%	0.00	0.09	0.03	809.88	200.78
Blower Door Air Sealing	Multi	HVAC	0.75	4.11	24%	0.00	-0.04	13%	0.00	0.06	0.04	-6,813.77	305.53
Duct Diagnostics and Repair	Multi	HVAC	0.65	6.67	30%	0.00	1.79	20%	0.00	0.10	0.05	361.34	324.19
AC Cycling	Multi	HVAC	0.55	0.01	30%	0.00	9.34	54%	0.00	97.85	0.07	62.08	157.53
Floor/Basement Insulation	Multi	HVAC	0.45	5.96	35%	0.00	0.33	56%	0.00	0.10	0.07	1,816.26	175.78
Air Source Heat Pump 16 SEER	Multi	HVAC	0.37	11.11	45%	0.00	3.00	67%	0.00	0.17	0.10	626.74	270.82
Ceiling Insulation R11 - R38	Multi	HVAC	0.26	1.10	46%	0.00	0.09	67%	0.00	0.18	0.09	2,131.95	247.92
Ceiling Insulation R19 - R38	Multi	HVAC	0.16	0.34	47%	0.00	0.02	67%	0.00	0.29	0.09	4,699.04	253.06
Geothermal Heat Pump, Closed Loop 3.3 COP	Multi	HVAC	0.10	0.64	47%	0.00	0.18	68%	0.00	0.65	0.11	2,350.09	307.56
Wall Insulation R11 - R19	Multi	HVAC	0.05	2.66	49%	0.00	0.21	69%	0.00	0.91	0.13	11,392.62	397.35
Ceiling Insulation R30 - R38	Multi	HVAC	0.04	0.04	49%	0.00	0.00	69%	0.00	0.86	0.13	-7,512.74	399.18
High Performance Windows	Multi	HVAC	10.09	76.76	7%	76.76	10.22	3%	10.22	0.00	0.00	36.54	36.54
Ceiling Insulation R0 - R38	Multi	HVAC	2.15	22.34	9%	22.34	4.42	4%	4.42	0.02	0.01	121.59	62.21
High Efficiency RAC Energy Star	Multi	HVAC	1.99	8.12	10%	8.12	14.50	8%	14.50	0.07	0.01	38.14	54.51
Programmable Thermostats	Multi	HVAC	1.83	40.84	14%	40.84	1.47	9%	1.47	0.03	0.02	772.86	89.08
Wall Insulation R0 - R11	Multi	HVAC	0.73	41.84	18%	0.00	6.57	10%	0.00	0.07	0.03	436.87	141.69
Blower Door Air Sealing	Multi	HVAC	0.97	40.27	21%	0.00	0.00	10%	0.00	0.05	0.03	N/A	216.36
Floor/Basement Insulation	Multi	HVAC	0.64	63.64	27%	0.00	5.59	12%	0.00	0.07	0.04	835.64	274.68
Ceiling Insulation R11 - R38	Multi	HVAC	0.44	13.90	29%	0.00	1.74	13%	0.00	0.11	0.04	877.08	298.28
Ceiling Insulation R19 - R38	Multi	HVAC	0.26	4.20	29%	0.00	0.39	13%	0.00	0.18	0.05	1,925.60	312.58
Wall Insulation R11 - R19	Multi	HVAC	0.09	33.81	32%	0.00	3.95	14%	0.00	0.55	0.09	4,697.04	667.36
Ceiling Insulation R30 - R38	Multi	HVAC	0.07	0.48	32%	0.00	-0.07	14%	0.00	0.51	0.09	-3,629.33	673.41

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Proper HVAC Sizing	Multi	HVAC	83.52	3.41	1%	3.41	5.65	5%	5.65	0.00	0.00	0.94	0.94
High Performance Windows	Multi	HVAC	11.10	24.84	8%	24.84	3.08	7%	3.08	0.00	0.00	35.38	13.01
Ceiling Insulation R0 - R38	Multi	HVAC	2.40	7.27	10%	7.27	1.40	9%	1.40	0.02	0.01	111.91	26.67
Programmable Thermostats	Multi	HVAC	3.21	16.36	14%	16.36	5.38	13%	5.38	0.02	0.01	61.76	41.22
Wall Insulation R0 - R11	Multi	HVAC	0.81	13.61	18%	0.00	2.03	15%	0.00	0.06	0.02	411.81	79.77
Duct Diagnostics and Repair	Multi	HVAC	1.06	22.93	25%	22.93	8.47	22%	8.47	0.06	0.03	171.92	117.13
Blower Door Air Sealing	Multi	HVAC	0.96	11.85	28%	0.00	-0.22	22%	0.00	0.05	0.04	-2,721.71	141.38
Proper HVAC Air Flow / Charge	Multi	HVAC	0.88	1.79	28%	0.00	2.97	24%	0.00	0.15	0.04	89.08	135.97
AC Cycling	Multi	HVAC	0.86	0.02	28%	0.00	32.91	52%	0.00	62.55	0.05	39.68	84.59
Floor/Basement Insulation	Multi	HVAC	0.64	18.70	34%	0.00	1.41	54%	0.00	0.07	0.05	964.98	94.34
Ceiling Insulation R11 - R38	Multi	HVAC	0.45	4.12	35%	0.00	0.48	54%	0.00	0.11	0.05	936.11	100.66
Ceiling Insulation R19 - R38	Multi	HVAC	0.27	1.26	35%	0.00	0.10	54%	0.00	0.18	0.05	2,145.24	103.97
High Efficiency CAC 16 SEER	Multi	HVAC	0.19	3.27	36%	0.00	5.43	59%	0.00	0.68	0.08	408.31	140.99
Wall Insulation R11 - R19	Multi	HVAC	0.09	9.90	39%	0.00	1.06	60%	0.00	0.55	0.10	5,130.88	199.38
Ceiling Insulation R30 - R38	Multi	HVAC	0.07	0.14	39%	0.00	-0.02	60%	0.00	0.54	0.10	-3,049.46	200.49
High Performance Windows	Multi	HVAC	4.37	118.23	26%	118.23	54.10	28%	54.10	0.02	0.02	39.62	39.62
High Efficiency RAC Energy Star	Multi	HVAC	1.06	36.32	34%	36.32	15.62	36%	15.62	0.08	0.04	193.08	78.21
Ceiling Insulation R0 - R38	Multi	HVAC	0.10	3.64	35%	0.00	1.57	37%	0.00	0.80	0.05	1,868.20	108.37
Wall Insulation R0 - R11	Multi	HVAC	0.03	5.46	36%	0.00	2.35	38%	0.00	2.86	0.14	6,658.55	317.40
Ceiling Insulation R11 - R38	Multi	HVAC	0.01	1.58	36%	0.00	0.68	38%	0.00	5.27	0.19	12,254.51	426.72
Floor/Basement Insulation	Multi	HVAC	0.01	3.72	37%	0.00	1.60	39%	0.00	6.84	0.34	15,909.89	753.37
Ceiling Insulation R19 - R38	Multi	HVAC	0.01	0.29	37%	0.00	0.13	39%	0.00	14.21	0.36	33,037.25	806.60
Wall Insulation R11 - R19	Multi	HVAC	0.00	3.47	38%	0.00	1.49	40%	0.00	29.21	0.94	67,913.78	2,097.24
Proper HVAC Sizing	Multi	HVAC	78.44	16.79	5%	16.79	29.64	5%	29.64	0.00	0.00	0.97	0.97
High Performance Windows	Multi	HVAC	17.60	92.77	29%	92.77	163.73	31%	163.73	0.01	0.01	3.82	3.36
Programmable Thermostats	Multi	HVAC	0.95	13.31	33%	0.00	22.09	35%	0.00	0.14	0.02	82.00	11.84

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Ceiling Insulation R0 - R38	Multi	HVAC	0.41	3.05	34%	0.00	5.05	36%	0.00	0.28	0.02	169.07	14.05
Duct Diagnostics and Repair	Multi	HVAC	0.36	21.92	40%	0.00	36.36	42%	0.00	0.36	0.08	218.23	44.60
Proper HVAC Air Flow / Charge	Multi	HVAC	0.71	7.59	42%	0.00	13.39	44%	0.00	0.19	0.08	107.80	47.73
Wall Insulation R0 - R11	Multi	HVAC	0.10	4.02	43%	0.00	6.67	45%	0.00	1.14	0.10	684.61	57.45
AC Cycling	Multi	HVAC	0.43	0.09	43%	0.00	89.37	59%	0.00	79.66	0.16	79.66	68.82
Ceiling Insulation R11 - R38	Multi	HVAC	0.05	1.16	43%	0.00	1.93	60%	0.00	2.09	0.15	1,260.51	66.82
Floor/Basement Insulation	Multi	HVAC	0.04	2.74	44%	0.00	4.54	60%	0.00	2.71	0.20	1,636.50	85.94
High Efficiency CAC 16 SEER	Multi	HVAC	0.18	33.56	53%	0.00	55.68	69%	0.00	0.72	0.31	433.86	141.40
Ceiling Insulation R19 - R38	Multi	HVAC	0.02	0.18	53%	0.00	0.30	69%	0.00	6.72	0.28	4,049.12	127.10
Wall Insulation R11 - R19	Multi	HVAC	0.01	2.14	54%	0.00	3.55	70%	0.00	13.81	0.42	8,323.67	194.39
CFL, 0.5 hr/day (screw-in lamp)	Single LI	Lighting	0.60	12.26	31%	0.00	0.37	31%	0.00	0.09	0.09	3,080.86	3,080.86
CFL, 0.5 hr/day (Hard-Wired Fixture)	Single LI	Lighting	0.11	3.67	40%	0.00	0.11	40%	0.00	0.62	0.23	20,673.66	7,685.66
CFL, 2.5 hr/day (screw-in lamp)	Single LI	Lighting	2.11	57.54	30%	57.54	1.73	30%	1.73	0.03	0.03	1,071.69	1,071.69
CFL, 2.5 hr/day (Hard-Wired Fixture)	Single LI	Lighting	0.56	17.63	39%	0.00	0.53	39%	0.00	0.12	0.05	4,065.38	1,773.63
CFL, 6 hr/day (screw-in lamp)	Single LI	Lighting	2.45	35.06	30%	35.06	1.05	30%	1.05	0.03	0.03	925.80	925.80
CFL, 6 hr/day (Hard-Wired Fixture)	Single LI	Lighting	1.38	10.71	39%	10.71	0.32	39%	0.32	0.05	0.03	1,637.20	1,092.21
ROB 2L4'T8, 1EB	Single LI	Lighting	2.78	12.09	27%	12.09	0.36	27%	0.36	0.02	0.02	666.33	666.33
Fluorescent Torchierre	Single LI	Lighting	3.63	23.79	72%	23.79	0.71	72%	0.71	0.02	0.02	622.87	622.87
High Efficiency Refrigerators	Single LI	Appliances	3.28	60.79	13%	60.79	5.51	13%	5.51	0.02	0.02	203.34	203.34
Second Refrigerator Removal	Single LI	Appliances	2.33	58.93	100%	58.93	0.00	0%	0.00	0.03	0.03	N/A	N/A
Tank/Pipe Wrap	Single LI	Water Heating	13.81	43.36	18%	43.36	2.57	18%	2.57	0.00	0.00	72.55	72.55
Low Flow Fixtures	Single LI	Water Heating	7.81	10.27	23%	10.27	0.61	23%	0.61	0.01	0.00	128.22	83.20
High Efficiency Water Heater	Single LI	Water Heating	1.80	9.86	27%	9.86	0.58	27%	0.58	0.03	0.01	555.69	156.60
Horizontal Axis Clothes Washer	Single LI	Water Heating	1.13	16.04	34%	16.04	0.60	31%	0.60	0.05	0.02	1,389.61	325.52
Solar DHW	Single LI	Water Heating	0.19	0.83	34%	0.00	0.05	32%	0.00	0.32	0.02	5,368.94	381.96
High Efficiency Dishwasher	Single LI	Appliances	0.25	4.80	19%	0.00	0.55	19%	0.00	0.24	0.24	2,121.70	2,121.70

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Induction Cooktop	Single LI	Appliances	0.47	36.72	28%	0.00	1.53	28%	0.00	0.13	0.13	3,030.64	3,030.64
Convection Oven	Single LI	Appliances	0.06	7.26	33%	0.00	0.30	33%	0.00	0.94	0.26	22,606.71	6,262.36
High Performance Windows	Single LI	HVAC	18.28	10.48	7%	10.48	0.63	3%	0.63	0.00	0.00	42.13	42.13
Programmable Thermostats	Single LI	HVAC	7.46	6.89	12%	6.89	1.09	7%	1.09	0.01	0.00	49.63	48.99
Proper HVAC Air Flow / Charge	Single LI	HVAC	6.32	4.65	15%	4.65	0.74	11%	0.74	0.01	0.01	58.57	51.86
Ceiling Insulation R0 - R38	Single LI	HVAC	3.50	2.79	17%	2.79	0.26	12%	0.26	0.01	0.01	149.03	55.40
Blower Door Air Sealing	Single LI	HVAC	2.78	5.56	21%	5.56	-0.04	12%	-0.04	0.02	0.01	-2,777.91	100.25
Duct Diagnostics and Repair	Single LI	HVAC	2.28	9.02	27%	9.02	1.61	19%	1.61	0.03	0.01	147.32	117.91
Wall Insulation R0 - R11	Single LI	HVAC	1.11	4.85	30%	4.85	0.35	20%	0.35	0.04	0.01	589.48	140.06
AC Cycling	Single LI	HVAC	1.16	0.01	30%	0.01	7.20	51%	7.20	27.86	0.02	29.61	80.45
Air Source Heat Pump 16 SEER	Single LI	HVAC	1.35	15.52	41%	15.52	2.79	63%	2.79	0.04	0.03	247.47	112.28
Floor/Basement Insulation	Single LI	HVAC	0.89	6.53	45%	0.00	0.24	64%	0.00	0.05	0.03	1,371.83	119.58
Ceiling Insulation R11 - R38	Single LI	HVAC	0.60	1.42	46%	0.00	0.08	64%	0.00	0.08	0.03	1,365.65	126.24
Ceiling Insulation R19 - R38	Single LI	HVAC	0.37	0.44	47%	0.00	0.02	64%	0.00	0.12	0.03	3,010.03	129.71
Geothermal Heat Pump, Closed Loop 3.3 COP	Single LI	HVAC	0.33	0.83	47%	0.00	0.15	65%	0.00	0.18	0.03	1,003.58	156.06
Wall Insulation R11 - R19	Single LI	HVAC	0.12	3.43	49%	0.00	0.18	66%	0.00	0.39	0.05	7,297.69	222.29
Ceiling Insulation R30 - R38	Single LI	HVAC	0.11	0.05	49%	0.00	0.00	66%	0.00	0.37	0.05	-4,812.38	223.51
High Performance Windows	Single LI	HVAC	10.30	3.84	7%	3.84	0.36	3%	0.36	0.00	0.00	49.36	49.36
Ceiling Insulation R0 - R38	Single LI	HVAC	2.18	1.12	9%	1.12	0.16	4%	0.16	0.02	0.01	164.24	84.03
Programmable Thermostats	Single LI	HVAC	2.88	2.06	13%	2.06	0.05	5%	0.05	0.02	0.01	690.20	150.33
High Efficiency RAC Energy Star	Single LI	HVAC	1.95	0.58	14%	0.58	0.74	10%	0.74	0.06	0.02	47.78	92.50
Blower Door Air Sealing	Single LI	HVAC	1.58	2.10	18%	2.10	0.00	10%	0.00	0.03	0.02	N/A	142.56
Wall Insulation R0 - R11	Single LI	HVAC	0.71	1.99	22%	0.00	0.22	12%	0.00	0.07	0.03	620.76	196.97
Floor/Basement Insulation	Single LI	HVAC	0.66	3.17	28%	0.00	0.20	14%	0.00	0.07	0.04	1,133.52	303.88
Ceiling Insulation R11 - R38	Single LI	HVAC	0.45	0.69	29%	0.00	0.06	14%	0.00	0.11	0.04	1,189.72	334.33
Ceiling Insulation R19 - R38	Single LI	HVAC	0.27	0.21	29%	0.00	0.01	14%	0.00	0.17	0.04	2,612.00	351.90

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Wall Insulation R11 - R19	Single LI	HVAC	0.09	1.68	32%	0.00	0.14	15%	0.00	0.53	0.09	6,371.37	784.01
Ceiling Insulation R30 - R38	Single LI	HVAC	0.08	0.02	32%	0.00	0.00	15%	0.00	0.49	0.09	-4,923.06	791.14
Proper HVAC Sizing	Single LI	HVAC	109.25	0.21	1%	0.21	0.24	5%	0.24	0.00	0.00	0.88	0.88
High Performance Windows	Single LI	HVAC	10.85	1.51	8%	1.51	0.13	7%	0.13	0.00	0.00	50.03	18.14
Programmable Thermostats	Single LI	HVAC	4.68	1.02	13%	1.02	0.24	12%	0.24	0.01	0.01	56.92	34.65
Ceiling Insulation R0 - R38	Single LI	HVAC	2.20	0.42	14%	0.42	0.06	13%	0.06	0.02	0.01	166.67	42.11
Blower Door Air Sealing	Single LI	HVAC	1.64	0.82	18%	0.82	-0.01	13%	-0.01	0.03	0.01	-2,259.44	85.56
Duct Diagnostics and Repair	Single LI	HVAC	1.50	1.40	25%	1.40	0.37	20%	0.37	0.04	0.02	161.96	112.77
Proper HVAC Air Flow / Charge	Single LI	HVAC	1.20	0.11	25%	0.11	0.13	23%	0.13	0.09	0.02	80.23	109.00
Wall Insulation R0 - R11	Single LI	HVAC	0.69	0.73	28%	0.00	0.08	24%	0.00	0.07	0.03	665.31	131.20
AC Cycling	Single LI	HVAC	0.86	0.00	28%	0.00	1.34	51%	0.00	41.70	0.04	39.68	92.27
Floor/Basement Insulation	Single LI	HVAC	0.63	1.14	34%	0.00	0.06	52%	0.00	0.07	0.04	1,364.28	110.83
Ceiling Insulation R11 - R38	Single LI	HVAC	0.44	0.25	35%	0.00	0.02	52%	0.00	0.11	0.04	1,323.46	120.21
High Efficiency CAC 16 SEER	Single LI	HVAC	0.25	0.40	37%	0.00	0.47	62%	0.00	0.45	0.07	382.76	173.71
Ceiling Insulation R19 - R38	Single LI	HVAC	0.26	0.07	37%	0.00	0.00	62%	0.00	0.18	0.06	3,120.85	156.90
Wall Insulation R11 - R19	Single LI	HVAC	0.08	0.60	40%	0.00	0.04	63%	0.00	0.56	0.09	7,359.15	258.71
Ceiling Insulation R30 - R38	Single LI	HVAC	0.07	0.01	40%	0.00	0.00	62%	0.00	0.55	0.09	-4,373.80	260.19
High Performance Windows	Single LI	HVAC	7.02	52.43	26%	52.43	23.99	28%	23.99	0.01	0.01	24.69	24.69
High Efficiency RAC Energy Star	Single LI	HVAC	1.27	16.11	34%	16.11	6.93	36%	6.93	0.07	0.03	160.40	57.72
Ceiling Insulation R0 - R38	Single LI	HVAC	0.15	1.62	35%	0.00	0.70	37%	0.00	0.50	0.03	1,163.99	75.25
Wall Insulation R0 - R11	Single LI	HVAC	0.04	2.42	36%	0.00	1.04	38%	0.00	1.78	0.09	4,148.63	205.24
Ceiling Insulation R11 - R38	Single LI	HVAC	0.02	0.70	36%	0.00	0.30	38%	0.00	3.28	0.12	7,635.21	273.28
Floor/Basement Insulation	Single LI	HVAC	0.02	1.65	37%	0.00	0.71	39%	0.00	4.26	0.21	9,912.70	476.65
Ceiling Insulation R19 - R38	Single LI	HVAC	0.01	0.13	37%	0.00	0.06	39%	0.00	8.85	0.23	20,583.95	509.80
Wall Insulation R11 - R19	Single LI	HVAC	0.00	1.54	38%	0.00	0.66	40%	0.00	18.20	0.59	42,313.88	1,313.80
Proper HVAC Sizing	Single LI	HVAC	102.24	5.93	5%	5.93	7.40	5%	7.40	0.00	0.00	0.92	0.92

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Performance Windows	Single LI	HVAC	15.30	32.73	29%	32.73	40.86	31%	40.86	0.01	0.01	5.40	4.69
Programmable Thermostats	Single LI	HVAC	1.25	4.70	33%	4.70	5.51	35%	5.51	0.09	0.02	77.28	12.71
Duct Diagnostics and Repair	Single LI	HVAC	0.47	7.83	39%	0.00	9.19	41%	0.00	0.24	0.05	203.17	40.50
Ceiling Insulation R0 - R38	Single LI	HVAC	0.32	0.98	40%	0.00	1.15	42%	0.00	0.31	0.05	262.38	39.69
Proper HVAC Air Flow / Charge	Single LI	HVAC	0.92	2.68	42%	0.00	3.34	44%	0.00	0.13	0.06	101.60	47.92
AC Cycling	Single LI	HVAC	0.66	0.03	42%	0.00	32.14	65%	0.00	52.09	0.09	52.09	49.27
Wall Insulation R0 - R11	Single LI	HVAC	0.09	1.42	43%	0.00	1.66	66%	0.00	1.14	0.11	968.31	58.53
High Efficiency CAC 16 SEER	Single LI	HVAC	0.24	12.06	52%	0.00	14.15	75%	0.00	0.47	0.18	401.43	107.61
Ceiling Insulation R11 - R38	Single LI	HVAC	0.04	0.34	52%	0.00	0.40	75%	0.00	2.49	0.17	2,123.43	101.74
Floor/Basement Insulation	Single LI	HVAC	0.03	0.81	53%	0.00	0.95	76%	0.00	3.24	0.21	2,756.83	123.37
Ceiling Insulation R19 - R38	Single LI	HVAC	0.01	0.06	53%	0.00	0.07	76%	0.00	6.72	0.21	5,724.62	126.94
Wall Insulation R11 - R19	Single LI	HVAC	0.01	0.75	54%	0.00	0.89	76%	0.00	13.81	0.36	11,767.95	214.51
Proper HVAC Sizing	Single LI	HVAC	114.79	0.33	1%	0.33	0.38	5%	0.38	0.00	0.00	0.84	0.84
High Performance Windows	Single LI	HVAC	11.32	2.37	8%	2.37	0.21	7%	0.21	0.00	0.00	48.60	17.39
Programmable Thermostats	Single LI	HVAC	4.42	1.52	12%	1.52	0.27	11%	0.27	0.01	0.01	74.72	37.08
Ceiling Insulation R0 - R38	Single LI	HVAC	2.31	0.66	14%	0.66	0.09	12%	0.09	0.02	0.01	159.32	44.61
Blower Door Air Sealing	Single LI	HVAC	1.70	1.29	18%	1.29	-0.02	12%	-0.02	0.03	0.01	-1,760.86	91.17
Proper HVAC Air Flow / Charge	Single LI	HVAC	1.38	0.20	18%	0.20	0.23	14%	0.23	0.08	0.02	70.09	86.98
Duct Diagnostics and Repair	Single LI	HVAC	1.36	2.03	24%	2.03	0.39	19%	0.39	0.04	0.02	229.83	122.66
Wall Insulation R0 - R11	Single LI	HVAC	0.73	1.15	28%	0.00	0.12	21%	0.00	0.07	0.03	636.83	146.05
AC Cycling	Single LI	HVAC	0.75	0.00	28%	0.00	1.74	42%	0.00	48.19	0.04	45.86	104.72
Floor/Basement Insulation	Single LI	HVAC	0.67	1.81	33%	0.00	0.09	44%	0.00	0.07	0.04	1,334.01	125.31
Ceiling Insulation R11 - R38	Single LI	HVAC	0.46	0.40	34%	0.00	0.03	44%	0.00	0.10	0.04	1,267.31	135.73
High Efficiency CAC & High Efficiency RAC	Single LI	HVAC	0.29	0.75	36%	0.00	0.87	55%	0.00	0.39	0.07	335.93	190.06
Ceiling Insulation R19 - R38	Single LI	HVAC	0.27	0.12	37%	0.00	0.01	55%	0.00	0.17	0.06	3,027.21	171.53
Wall Insulation R11 - R19	Single LI	HVAC	0.09	0.94	39%	0.00	0.07	56%	0.00	0.53	0.09	7,148.62	279.75

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Ceiling Insulation R30 - R38	Single LI	HVAC	0.07	0.01	39%	0.00	0.00	56%	0.00	0.54	0.09	-4,136.41	281.34
Proper HVAC Sizing	Single LI	HVAC	129.46	11.25	5%	11.25	14.05	5%	14.05	0.00	0.00	0.73	0.73
High Performance Windows	Single LI	HVAC	19.37	62.16	29%	62.16	77.60	31%	77.60	0.01	0.00	4.26	3.71
Programmable Thermostats	Single LI	HVAC	1.26	7.10	32%	7.10	8.33	34%	8.33	0.09	0.01	76.73	10.25
Ceiling Insulation R0 - R38	Single LI	HVAC	0.45	2.06	33%	0.00	2.42	35%	0.00	0.22	0.02	186.74	13.22
Duct Diagnostics and Repair	Single LI	HVAC	0.47	11.74	38%	0.00	13.77	40%	0.00	0.24	0.05	203.24	37.35
Proper HVAC Air Flow / Charge	Single LI	HVAC	1.21	5.25	40%	5.25	6.55	42%	6.55	0.10	0.05	77.79	39.50
AC Cycling	Single LI	HVAC	0.68	0.05	40%	0.00	49.73	59%	0.00	50.50	0.07	50.50	42.68
Wall Insulation R0 - R11	Single LI	HVAC	0.11	2.78	41%	0.00	3.26	60%	0.00	0.87	0.09	741.24	50.59
Ceiling Insulation R11 - R38	Single LI	HVAC	0.06	0.80	41%	0.00	0.94	60%	0.00	1.60	0.10	1,364.20	57.60
High Efficiency CAC & High Efficiency RAC	Single LI	HVAC	0.27	21.71	50%	0.00	25.48	69%	0.00	0.42	0.17	359.61	102.56
Floor/Basement Insulation	Single LI	HVAC	0.04	1.61	51%	0.00	1.89	70%	0.00	2.44	0.18	2,079.97	108.65
Ceiling Insulation R19 - R38	Single LI	HVAC	0.02	0.13	51%	0.00	0.15	70%	0.00	5.07	0.18	4,319.11	111.71
Wall Insulation R11 - R19	Single LI	HVAC	0.01	1.44	51%	0.00	1.69	70%	0.00	10.84	0.30	9,233.84	186.72
CFL, 0.5 hr/day (screw-in lamp)	Multi LI	Lighting	0.61	4.82	31%	0.00	0.43	31%	0.00	0.09	0.09	1,026.95	1,026.95
CFL, 0.5 hr/day (Hard-Wired Fixture)	Multi LI	Lighting	0.11	1.44	40%	0.00	0.13	40%	0.00	0.62	0.23	6,891.22	2,561.89
CFL, 2.5 hr/day (screw-in lamp)	Multi LI	Lighting	2.18	22.59	30%	22.59	2.03	30%	2.03	0.03	0.03	357.23	357.23
CFL, 2.5 hr/day (Hard-Wired Fixture)	Multi LI	Lighting	0.57	6.92	39%	0.00	0.62	39%	0.00	0.12	0.05	1,355.13	591.21
CFL, 6 hr/day (screw-in lamp)	Multi LI	Lighting	2.52	13.77	30%	13.77	1.24	30%	1.24	0.03	0.03	308.60	308.60
CFL, 6 hr/day (Hard-Wired Fixture)	Multi LI	Lighting	1.42	4.20	39%	4.20	0.38	39%	0.38	0.05	0.03	545.73	364.07
ROB 2L4'T8, 1EB	Multi LI	Lighting	3.44	4.75	27%	4.75	0.43	27%	0.43	0.02	0.02	185.09	185.09
Fluorescent Torchierre	Multi LI	Lighting	2.50	9.34	72%	9.34	0.84	72%	0.84	0.03	0.03	311.44	311.44
High Efficiency Refrigerators	Multi LI	Appliances	3.00	32.70	13%	32.70	2.96	13%	2.96	0.02	0.02	222.63	222.63
Second Refrigerator Removal	Multi LI	Appliances	2.33	15.31	100%	15.31	0.00	0%	0.00	0.03	0.03	N/A	N/A
Tank/Pipe Wrap	Multi LI	Water Heating	13.81	28.59	18%	28.59	1.69	18%	1.69	0.00	0.00	72.55	72.55
Low Flow Fixtures	Multi LI	Water Heating	7.81	6.77	23%	6.77	0.40	23%	0.40	0.01	0.00	128.22	83.20

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Efficiency Water Heater	Multi LI	Water Heating	1.80	6.50	27%	6.50	0.39	27%	0.39	0.03	0.01	555.69	156.60
Horizontal Axis Clothes Washer	Multi LI	Water Heating	1.16	1.34	28%	1.34	0.10	28%	0.10	0.05	0.01	694.81	177.41
Solar DHW	Multi LI	Water Heating	0.20	0.60	28%	0.00	0.04	29%	0.00	0.29	0.01	4,924.55	241.77
High Efficiency Dishwasher	Multi LI	Appliances	0.25	1.37	19%	0.00	0.16	19%	0.00	0.24	0.24	2,121.70	2,121.70
Induction Cooktop	Multi LI	Appliances	0.48	22.94	28%	0.00	1.81	28%	0.00	0.13	0.13	1,595.07	1,595.07
Convection Oven	Multi LI	Appliances	0.06	4.54	33%	0.00	0.36	33%	0.00	0.94	0.26	11,898.27	3,295.98
High Performance Windows	Multi LI	HVAC	7.96	1.76	7%	1.76	0.16	3%	0.16	0.01	0.01	65.78	65.78
Ceiling Insulation R0 - R38	Multi LI	HVAC	1.68	0.51	9%	0.51	0.07	4%	0.07	0.03	0.01	212.90	111.04
Programmable Thermostats	Multi LI	HVAC	2.17	1.13	14%	1.13	0.27	9%	0.27	0.03	0.02	118.87	122.27
Proper HVAC Air Flow / Charge	Multi LI	HVAC	1.84	0.76	17%	0.76	0.18	12%	0.18	0.03	0.02	140.30	127.08
Wall Insulation R0 - R11	Multi LI	HVAC	0.55	0.92	21%	0.00	0.10	13%	0.00	0.09	0.03	809.88	200.78
Blower Door Air Sealing	Multi LI	HVAC	0.75	0.89	24%	0.00	-0.01	13%	0.00	0.06	0.04	-6,813.77	305.53
Duct Diagnostics and Repair	Multi LI	HVAC	0.65	1.44	30%	0.00	0.39	20%	0.00	0.10	0.05	361.34	324.19
AC Cycling	Multi LI	HVAC	0.55	0.00	30%	0.00	2.02	54%	0.00	97.85	0.07	62.08	157.53
Floor/Basement Insulation	Multi LI	HVAC	0.45	1.29	35%	0.00	0.07	56%	0.00	0.10	0.07	1,816.26	175.78
Air Source Heat Pump 16 SEER	Multi LI	HVAC	0.37	2.41	45%	0.00	0.65	67%	0.00	0.17	0.10	626.74	270.82
Ceiling Insulation R11 - R38	Multi LI	HVAC	0.26	0.24	46%	0.00	0.02	67%	0.00	0.18	0.09	2,131.95	247.92
Ceiling Insulation R19 - R38	Multi LI	HVAC	0.16	0.07	47%	0.00	0.00	67%	0.00	0.29	0.09	4,699.04	253.06
Geothermal Heat Pump, Closed Loop 3.3 COP	Multi LI	HVAC	0.10	0.14	47%	0.00	0.04	68%	0.00	0.65	0.11	2,350.09	307.56
Wall Insulation R11 - R19	Multi LI	HVAC	0.05	0.58	49%	0.00	0.05	69%	0.00	0.91	0.13	11,392.62	397.35
Ceiling Insulation R30 - R38	Multi LI	HVAC	0.04	0.01	49%	0.00	0.00	69%	0.00	0.86	0.13	-7,512.74	399.18
High Performance Windows	Multi LI	HVAC	10.09	16.62	7%	16.62	2.21	3%	2.21	0.00	0.00	36.54	36.54
Ceiling Insulation R0 - R38	Multi LI	HVAC	2.15	4.84	9%	4.84	0.96	4%	0.96	0.02	0.01	121.59	62.21
High Efficiency RAC Energy Star	Multi LI	HVAC	1.99	1.76	10%	1.76	3.14	8%	3.14	0.07	0.01	38.14	54.51
Programmable Thermostats	Multi LI	HVAC	1.83	8.84	14%	8.84	0.32	9%	0.32	0.03	0.02	772.86	89.08
Wall Insulation R0 - R11	Multi LI	HVAC	0.73	9.06	18%	0.00	1.42	10%	0.00	0.07	0.03	436.87	141.69

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Blower Door Air Sealing	Multi LI	HVAC	0.97	8.72	21%	0.00	0.00	10%	0.00	0.05	0.03	N/A	216.36
Floor/Basement Insulation	Multi LI	HVAC	0.64	13.78	27%	0.00	1.21	12%	0.00	0.07	0.04	835.64	274.68
Ceiling Insulation R11 - R38	Multi LI	HVAC	0.44	3.01	29%	0.00	0.38	13%	0.00	0.11	0.04	877.08	298.28
Ceiling Insulation R19 - R38	Multi LI	HVAC	0.26	0.91	29%	0.00	0.09	13%	0.00	0.18	0.05	1,925.60	312.58
Wall Insulation R11 - R19	Multi LI	HVAC	0.09	7.32	32%	0.00	0.86	14%	0.00	0.55	0.09	4,697.04	667.36
Ceiling Insulation R30 - R38	Multi LI	HVAC	0.07	0.10	32%	0.00	-0.01	14%	0.00	0.51	0.09	-3,629.33	673.41
Proper HVAC Sizing	Multi LI	HVAC	83.52	0.74	1%	0.74	1.22	5%	1.22	0.00	0.00	0.94	0.94
High Performance Windows	Multi LI	HVAC	11.10	5.38	8%	5.38	0.67	7%	0.67	0.00	0.00	35.38	13.01
Ceiling Insulation R0 - R38	Multi LI	HVAC	2.40	1.58	10%	1.58	0.30	9%	0.30	0.02	0.01	111.91	26.67
Programmable Thermostats	Multi LI	HVAC	3.21	3.54	14%	3.54	1.16	13%	1.16	0.02	0.01	61.76	41.22
Wall Insulation R0 - R11	Multi LI	HVAC	0.81	2.95	18%	0.00	0.44	15%	0.00	0.06	0.02	411.81	79.77
Duct Diagnostics and Repair	Multi LI	HVAC	1.06	4.96	25%	4.96	1.83	22%	1.83	0.06	0.03	171.92	117.13
Blower Door Air Sealing	Multi LI	HVAC	0.96	2.57	28%	0.00	-0.05	22%	0.00	0.05	0.04	-2,721.71	141.38
Proper HVAC Air Flow / Charge	Multi LI	HVAC	0.88	0.39	28%	0.00	0.64	24%	0.00	0.15	0.04	89.08	135.97
AC Cycling	Multi LI	HVAC	0.86	0.00	28%	0.00	7.13	52%	0.00	62.55	0.05	39.68	84.59
Floor/Basement Insulation	Multi LI	HVAC	0.64	4.05	34%	0.00	0.31	54%	0.00	0.07	0.05	964.98	94.34
Ceiling Insulation R11 - R38	Multi LI	HVAC	0.45	0.89	35%	0.00	0.10	54%	0.00	0.11	0.05	936.11	100.66
Ceiling Insulation R19 - R38	Multi LI	HVAC	0.27	0.27	35%	0.00	0.02	54%	0.00	0.18	0.05	2,145.24	103.97
High Efficiency CAC 16 SEER	Multi LI	HVAC	0.19	0.71	36%	0.00	1.18	59%	0.00	0.68	0.08	408.31	140.99
Wall Insulation R11 - R19	Multi LI	HVAC	0.09	2.14	39%	0.00	0.23	60%	0.00	0.55	0.10	5,130.88	199.38
Ceiling Insulation R30 - R38	Multi LI	HVAC	0.07	0.03	39%	0.00	-0.01	60%	0.00	0.54	0.10	-3,049.46	200.49
High Performance Windows	Multi LI	HVAC	4.37	25.60	26%	25.60	11.72	28%	11.72	0.02	0.02	39.62	39.62
High Efficiency RAC Energy Star	Multi LI	HVAC	1.06	7.87	34%	7.87	3.38	36%	3.38	0.08	0.04	193.08	78.21
Ceiling Insulation R0 - R38	Multi LI	HVAC	0.10	0.79	35%	0.00	0.34	37%	0.00	0.80	0.05	1,868.20	108.37
Wall Insulation R0 - R11	Multi LI	HVAC	0.03	1.18	36%	0.00	0.51	38%	0.00	2.86	0.14	6,658.55	317.40
Ceiling Insulation R11 - R38	Multi LI	HVAC	0.01	0.34	36%	0.00	0.15	38%	0.00	5.27	0.19	12,254.51	426.72

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Floor/Basement Insulation	Multi LI	HVAC	0.01	0.81	37%	0.00	0.35	39%	0.00	6.84	0.34	15,909.89	753.37
Ceiling Insulation R19 - R38	Multi LI	HVAC	0.01	0.06	37%	0.00	0.03	39%	0.00	14.21	0.36	33,037.25	806.60
Wall Insulation R11 - R19	Multi LI	HVAC	0.00	0.75	38%	0.00	0.32	40%	0.00	29.21	0.94	67,913.78	2,097.24
Proper HVAC Sizing	Multi LI	HVAC	78.44	3.64	5%	3.64	6.42	5%	6.42	0.00	0.00	0.97	0.97
High Performance Windows	Multi LI	HVAC	17.60	20.09	29%	20.09	35.46	31%	35.46	0.01	0.01	3.82	3.36
Programmable Thermostats	Multi LI	HVAC	0.95	2.88	33%	0.00	4.78	35%	0.00	0.14	0.02	82.00	11.84
Ceiling Insulation R0 - R38	Multi LI	HVAC	0.41	0.66	34%	0.00	1.09	36%	0.00	0.28	0.02	169.07	14.05
Duct Diagnostics and Repair	Multi LI	HVAC	0.36	4.75	40%	0.00	7.87	42%	0.00	0.36	0.08	218.23	44.60
Proper HVAC Air Flow / Charge	Multi LI	HVAC	0.71	1.64	42%	0.00	2.90	44%	0.00	0.19	0.08	107.80	47.73
Wall Insulation R0 - R11	Multi LI	HVAC	0.10	0.87	43%	0.00	1.44	45%	0.00	1.14	0.10	684.61	57.45
AC Cycling	Multi LI	HVAC	0.43	0.02	43%	0.00	19.35	59%	0.00	79.66	0.16	79.66	68.82
Ceiling Insulation R11 - R38	Multi LI	HVAC	0.05	0.25	43%	0.00	0.42	60%	0.00	2.09	0.15	1,260.51	66.82
Floor/Basement Insulation	Multi LI	HVAC	0.04	0.59	44%	0.00	0.98	60%	0.00	2.71	0.20	1,636.50	85.94
High Efficiency CAC 16 SEER	Multi LI	HVAC	0.18	7.27	53%	0.00	12.06	69%	0.00	0.72	0.31	433.86	141.40
Ceiling Insulation R19 - R38	Multi LI	HVAC	0.02	0.04	53%	0.00	0.06	69%	0.00	6.72	0.28	4,049.12	127.10
Wall Insulation R11 - R19	Multi LI	HVAC	0.01	0.46	54%	0.00	0.77	70%	0.00	13.81	0.42	8,323.67	194.39
CFL, 0.5 hr/day (screw-in lamp)	Single NC	Lighting	0.60	0.79	31%	0.00	0.02	31%	0.00	0.09	0.09	3,080.86	3,080.86
CFL, 0.5 hr/day (Hard-Wired Fixture)	Single NC	Lighting	0.11	0.24	40%	0.00	0.01	40%	0.00	0.62	0.23	20,673.66	7,685.66
CFL, 2.5 hr/day (screw-in lamp)	Single NC	Lighting	2.11	3.71	30%	3.71	0.11	30%	0.11	0.03	0.03	1,071.69	1,071.69
CFL, 2.5 hr/day (Hard-Wired Fixture)	Single NC	Lighting	0.56	1.14	39%	0.00	0.03	39%	0.00	0.12	0.05	4,065.38	1,773.63
CFL, 6 hr/day (screw-in lamp)	Single NC	Lighting	2.45	2.26	30%	2.26	0.07	30%	0.07	0.03	0.03	925.80	925.80
CFL, 6 hr/day (Hard-Wired Fixture)	Single NC	Lighting	1.38	0.69	39%	0.69	0.02	39%	0.02	0.05	0.03	1,637.20	1,092.21
RET 2L4'T8, 1EB	Single NC	Lighting	2.78	0.78	27%	0.78	0.02	27%	0.02	0.02	0.02	666.33	666.33
Fluorescent Torchierre	Single NC	Lighting	3.63	1.53	72%	1.53	0.05	72%	0.05	0.02	0.02	622.87	622.87
High Efficiency Refrigerators	Single NC	Appliances	3.28	3.92	13%	3.92	0.36	13%	0.36	0.02	0.02	203.34	203.34
Second Refrigerator Removal	Single NC	Appliances	2.33	3.80	100%	3.80	0.00	0%	0.00	0.03	0.03	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Tank/Pipe Wrap	Single NC	Water Heating	13.89	2.80	18%	2.80	0.19	18%	0.19	0.00	0.00	61.67	61.67
Low Flow Fixtures	Single NC	Water Heating	7.86	0.66	23%	0.66	0.05	23%	0.05	0.01	0.00	108.98	70.72
High Efficiency Water Heater	Single NC	Water Heating	1.81	0.64	27%	0.64	0.04	27%	0.04	0.03	0.01	472.33	133.11
Horizontal Axis Clothes Washer	Single NC	Water Heating	1.13	1.03	34%	1.03	0.04	31%	0.04	0.05	0.02	1,389.61	282.50
Solar DHW	Single NC	Water Heating	0.19	0.05	34%	0.00	0.00	31%	0.00	0.32	0.02	4,563.60	331.40
High Efficiency Dishwasher	Single NC	Appliances	0.25	0.31	19%	0.00	0.04	19%	0.00	0.24	0.24	2,121.70	2,121.70
Induction Cooktop	Single NC	Appliances	0.19	2.37	28%	0.00	0.10	28%	0.00	0.31	0.31	7,500.60	7,500.60
Convection Oven	Single NC	Appliances	0.06	0.47	33%	0.00	0.02	33%	0.00	0.94	0.42	22,606.71	9,994.40
High Performance Windows	Single NC	HVAC	18.28	0.68	7%	0.68	0.04	3%	0.04	0.00	0.00	42.13	42.13
Proper HVAC Air Flow / Charge	Single NC	HVAC	8.88	0.32	11%	0.32	0.05	6%	0.05	0.01	0.00	41.70	44.49
Programmable Thermostats	Single NC	HVAC	7.19	0.43	15%	0.43	0.07	11%	0.07	0.01	0.01	51.48	47.48
Duct Diagnostics and Repair	Single NC	HVAC	4.65	0.32	18%	0.32	0.06	14%	0.06	0.01	0.01	72.10	54.06
Blower Door Air Sealing	Single NC	HVAC	2.79	0.18	20%	0.18	0.00	14%	0.00	0.02	0.01	-2,765.37	68.97
Wall Insulation R11 - R19	Single NC	HVAC	1.57	0.33	24%	0.33	0.02	16%	0.02	0.03	0.01	556.59	98.17
Air Source Heat Pump 16 SEER	Single NC	HVAC	1.47	1.09	35%	1.09	0.20	29%	0.20	0.04	0.02	226.95	164.28
AC Cycling	Single NC	HVAC	1.12	0.00	35%	0.00	0.43	57%	0.43	28.86	0.03	30.67	97.49
Ceiling Insulation R38-R49	Single NC	HVAC	0.62	0.00	36%	0.00	0.00	57%	0.00	0.06	0.02	-837.58	86.08
Geothermal Heat Pump, Closed Loop 3.3 COP	Single NC	HVAC	0.39	0.06	36%	0.00	0.01	58%	0.00	0.15	0.03	831.85	107.82
High Performance Windows	Single NC	HVAC	10.30	0.25	7%	0.25	0.02	3%	0.02	0.00	0.00	49.36	49.36
Programmable Thermostats	Single NC	HVAC	2.95	0.14	11%	0.14	0.00	3%	0.00	0.02	0.01	674.80	136.20
High Efficiency RAC Energy Star	Single NC	HVAC	1.83	0.04	12%	0.04	0.04	9%	0.04	0.06	0.01	50.97	82.95
Blower Door Air Sealing	Single NC	HVAC	1.66	0.07	14%	0.07	0.00	9%	0.00	0.03	0.02	N/A	112.53
Wall Insulation R11 - R19	Single NC	HVAC	0.95	0.13	18%	0.00	0.01	10%	0.00	0.05	0.02	602.60	165.74
Ceiling Insulation R38-R49	Single NC	HVAC	0.43	0.00	18%	0.00	0.00	10%	0.00	0.09	0.02	-901.06	168.20
Proper HVAC Sizing	Single NC	HVAC	109.25	0.01	1%	0.01	0.02	5%	0.02	0.00	0.00	0.88	0.88
High Performance Windows	Single NC	HVAC	10.85	0.10	8%	0.10	0.01	7%	0.01	0.00	0.00	50.03	18.14

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Programmable Thermostats	Single NC	HVAC	4.68	0.07	13%	0.07	0.02	12%	0.02	0.01	0.01	56.92	34.65
Duct Diagnostics and Repair	Single NC	HVAC	3.06	0.05	16%	0.05	0.01	16%	0.01	0.02	0.01	79.42	45.79
Proper HVAC Air Flow / Charge	Single NC	HVAC	1.78	0.01	17%	0.01	0.01	19%	0.01	0.06	0.01	54.06	47.07
Blower Door Air Sealing	Single NC	HVAC	1.63	0.03	19%	0.03	0.00	19%	0.00	0.03	0.01	-2,268.67	60.01
AC Cycling	Single NC	HVAC	1.03	0.00	19%	0.00	0.10	49%	0.10	35.08	0.03	33.38	43.68
Wall Insulation R11 - R19	Single NC	HVAC	0.95	0.05	22%	0.00	0.00	50%	0.00	0.05	0.03	653.48	52.46
Ceiling Insulation R38-R49	Single NC	HVAC	0.40	0.00	22%	0.00	0.00	50%	0.00	0.09	0.03	-751.60	52.88
High Efficiency CAC 16 SEER	Single NC	HVAC	0.30	0.03	24%	0.00	0.04	61%	0.00	0.38	0.06	320.26	107.26
High Performance Windows	Single NC	HVAC	7.02	3.38	26%	3.38	1.55	28%	1.55	0.01	0.01	24.69	24.69
High Efficiency RAC Energy Star	Single NC	HVAC	1.27	1.04	34%	1.04	0.45	36%	0.45	0.07	0.03	160.40	57.72
Wall Insulation R11 - R19	Single NC	HVAC	0.04	0.10	35%	0.00	0.04	37%	0.00	1.99	0.07	4,619.56	151.29
Proper HVAC Sizing	Single NC	HVAC	102.24	0.38	5%	0.38	0.48	5%	0.48	0.00	0.00	0.92	0.92
High Performance Windows	Single NC	HVAC	15.30	2.11	29%	2.11	2.63	31%	2.63	0.01	0.01	5.40	4.69
Programmable Thermostats	Single NC	HVAC	1.25	0.30	33%	0.30	0.36	35%	0.36	0.09	0.02	77.28	12.71
Duct Diagnostics and Repair	Single NC	HVAC	0.91	0.26	36%	0.00	0.31	38%	0.00	0.12	0.03	105.97	20.37
Proper HVAC Air Flow / Charge	Single NC	HVAC	1.31	0.18	38%	0.18	0.23	40%	0.23	0.09	0.03	71.92	23.30
AC Cycling	Single NC	HVAC	0.73	0.00	38%	0.00	2.20	62%	0.00	47.10	0.06	47.10	31.73
Wall Insulation R11 - R19	Single NC	HVAC	0.08	0.06	39%	0.00	0.07	63%	0.00	1.21	0.08	1,030.26	39.87
High Efficiency CAC 16 SEER	Single NC	HVAC	0.26	0.83	49%	0.00	0.97	73%	0.00	0.44	0.16	376.46	89.78
Proper HVAC Sizing	Single NC	HVAC	114.79	0.02	1%	0.02	0.02	5%	0.02	0.00	0.00	0.84	0.84
High Performance Windows	Single NC	HVAC	11.32	0.15	8%	0.15	0.01	7%	0.01	0.00	0.00	48.60	17.39
Programmable Thermostats	Single NC	HVAC	4.42	0.10	12%	0.10	0.02	11%	0.02	0.01	0.01	74.72	37.08
Duct Diagnostics and Repair	Single NC	HVAC	2.79	0.07	16%	0.07	0.01	13%	0.01	0.02	0.01	112.34	52.16
Proper HVAC Air Flow / Charge	Single NC	HVAC	1.89	0.01	16%	0.01	0.02	16%	0.02	0.06	0.01	51.09	51.97
Blower Door Air Sealing	Single NC	HVAC	1.70	0.04	18%	0.04	0.00	16%	0.00	0.03	0.01	-1,762.50	66.41
Wall Insulation R11 - R19	Single NC	HVAC	1.00	0.08	21%	0.08	0.01	17%	0.01	0.05	0.02	634.05	95.52

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
AC Cycling	Single NC	HVAC	0.81	0.00	22%	0.00	0.12	41%	0.00	44.39	0.03	42.24	70.43
Ceiling Insulation R38-R49	Single NC	HVAC	0.40	0.00	22%	0.00	0.00	41%	0.00	0.09	0.03	-710.03	62.44
High Efficiency CAC & High Efficiency RAC	Single NC	HVAC	0.34	0.06	24%	0.00	0.07	54%	0.00	0.32	0.06	282.14	121.48
Proper HVAC Sizing	Single NC	HVAC	129.46	0.73	5%	0.73	0.91	5%	0.91	0.00	0.00	0.73	0.73
High Performance Windows	Single NC	HVAC	19.37	4.01	29%	4.01	5.00	31%	5.00	0.01	0.00	4.26	3.71
Programmable Thermostats	Single NC	HVAC	1.26	0.46	32%	0.46	0.54	34%	0.54	0.09	0.01	76.73	10.25
Duct Diagnostics and Repair	Single NC	HVAC	0.91	0.40	35%	0.00	0.47	37%	0.00	0.12	0.02	105.73	16.69
Proper HVAC Air Flow / Charge	Single NC	HVAC	1.69	0.35	37%	0.35	0.44	39%	0.44	0.07	0.02	55.60	19.03
AC Cycling	Single NC	HVAC	0.71	0.00	37%	0.00	3.36	57%	0.00	48.13	0.05	48.13	28.17
Wall Insulation R11 - R19	Single NC	HVAC	0.10	0.12	38%	0.00	0.14	58%	0.00	0.97	0.06	828.21	35.11
High Efficiency CAC & High Efficiency RAC	Single NC	HVAC	0.28	1.49	47%	0.00	1.75	67%	0.00	0.40	0.14	338.51	81.26
CFL, 0.5 hr/day (screw-in lamp)	Multi NC	Lighting	0.61	0.19	31%	0.00	0.02	31%	0.00	0.09	0.09	1,026.95	1,026.95
CFL, 0.5 hr/day (Hard-Wired Fixture)	Multi NC	Lighting	0.11	0.06	40%	0.00	0.01	40%	0.00	0.62	0.23	6,891.22	2,561.89
CFL, 2.5 hr/day (screw-in lamp)	Multi NC	Lighting	2.18	0.90	30%	0.90	0.08	30%	0.08	0.03	0.03	357.23	357.23
CFL, 2.5 hr/day (Hard-Wired Fixture)	Multi NC	Lighting	0.57	0.28	39%	0.00	0.02	39%	0.00	0.12	0.05	1,355.13	591.21
CFL, 6 hr/day (screw-in lamp)	Multi NC	Lighting	2.52	0.55	30%	0.55	0.05	30%	0.05	0.03	0.03	308.60	308.60
CFL, 6 hr/day (Hard-Wired Fixture)	Multi NC	Lighting	1.42	0.17	39%	0.17	0.02	39%	0.02	0.05	0.03	545.73	364.07
RET 2L4'T8, 1EB	Multi NC	Lighting	3.44	0.19	27%	0.19	0.02	27%	0.02	0.02	0.02	185.09	185.09
Fluorescent Torchierre	Multi NC	Lighting	2.50	0.37	72%	0.37	0.03	72%	0.03	0.03	0.03	311.44	311.44
High Efficiency Refrigerators	Multi NC	Appliances	3.00	1.30	13%	1.30	0.12	13%	0.12	0.02	0.02	222.63	222.63
Second Refrigerator Removal	Multi NC	Appliances	2.33	0.61	100%	0.61	0.00	0%	0.00	0.03	0.03	N/A	N/A
Tank/Pipe Wrap	Multi NC	Water Heating	13.81	1.14	18%	1.14	0.07	18%	0.07	0.00	0.00	72.55	72.55
Low Flow Fixtures	Multi NC	Water Heating	7.81	0.27	23%	0.27	0.02	23%	0.02	0.01	0.00	128.22	83.20
High Efficiency Water Heater	Multi NC	Water Heating	1.80	0.26	27%	0.26	0.02	27%	0.02	0.03	0.01	555.69	156.60
Horizontal Axis Clothes Washer	Multi NC	Water Heating	1.16	0.05	28%	0.05	0.00	28%	0.00	0.05	0.01	694.81	177.41
Solar DHW	Multi NC	Water Heating	0.20	0.02	28%	0.00	0.00	29%	0.00	0.29	0.01	4,924.55	241.77

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Efficiency Dishwasher	Multi NC	Appliances	0.25	0.05	19%	0.00	0.01	19%	0.00	0.24	0.24	2,121.70	2,121.70
Induction Cooktop	Multi NC	Appliances	0.19	0.91	28%	0.00	0.07	28%	0.00	0.31	0.31	3,947.68	3,947.68
Convection Oven	Multi NC	Appliances	0.06	0.18	33%	0.00	0.01	33%	0.00	0.94	0.42	11,898.27	5,260.21
High Performance Windows	Multi NC	HVAC	7.96	0.07	7%	0.07	0.01	3%	0.01	0.01	0.01	65.78	65.78
Proper HVAC Air Flow / Charge	Multi NC	HVAC	2.64	0.03	11%	0.03	0.01	6%	0.01	0.02	0.01	97.65	87.39
Programmable Thermostats	Multi NC	HVAC	2.14	0.04	15%	0.04	0.01	11%	0.01	0.03	0.02	120.56	101.57
Duct Diagnostics and Repair	Multi NC	HVAC	1.39	0.03	18%	0.03	0.01	14%	0.01	0.05	0.02	168.83	119.55
Blower Door Air Sealing	Multi NC	HVAC	0.79	0.02	20%	0.00	0.00	14%	0.00	0.06	0.03	-6,475.64	154.44
Wall Insulation R11 - R19	Multi NC	HVAC	0.68	0.03	24%	0.00	0.00	16%	0.00	0.07	0.03	868.91	191.28
AC Cycling	Multi NC	HVAC	0.63	0.00	24%	0.00	0.09	53%	0.00	85.97	0.05	54.54	102.15
Air Source Heat Pump 16 SEER	Multi NC	HVAC	0.44	0.11	35%	0.00	0.03	66%	0.00	0.14	0.08	531.49	186.78
Ceiling Insulation R38-R49	Multi NC	HVAC	0.26	0.00	36%	0.00	0.00	66%	0.00	0.15	0.07	-1,307.57	164.74
Geothermal Heat Pump, Closed Loop 3.3 COP	Multi NC	HVAC	0.12	0.01	36%	0.00	0.00	67%	0.00	0.54	0.09	1,947.93	207.94
High Performance Windows	Multi NC	HVAC	10.09	0.66	7%	0.66	0.09	3%	0.09	0.00	0.00	36.54	36.54
High Efficiency RAC Energy Star	Multi NC	HVAC	2.80	0.10	8%	0.10	0.18	9%	0.18	0.05	0.01	27.11	31.93
Programmable Thermostats	Multi NC	HVAC	1.87	0.36	12%	0.36	0.01	9%	0.01	0.03	0.02	757.99	65.88
Blower Door Air Sealing	Multi NC	HVAC	1.06	0.19	14%	0.19	0.00	9%	0.00	0.05	0.02	N/A	97.86
Wall Insulation R11 - R19	Multi NC	HVAC	0.93	0.35	18%	0.00	0.04	10%	0.00	0.05	0.03	446.11	132.72
Ceiling Insulation R38-R49	Multi NC	HVAC	0.40	0.01	18%	0.00	0.00	10%	0.00	0.09	0.03	-667.06	134.52
Proper HVAC Sizing	Multi NC	HVAC	83.52	0.03	1%	0.03	0.05	5%	0.05	0.00	0.00	0.94	0.94
High Performance Windows	Multi NC	HVAC	11.10	0.21	8%	0.21	0.03	7%	0.03	0.00	0.00	35.38	13.01
Programmable Thermostats	Multi NC	HVAC	3.29	0.14	13%	0.14	0.05	12%	0.05	0.02	0.01	60.39	32.41
Duct Diagnostics and Repair	Multi NC	HVAC	2.16	0.11	16%	0.11	0.04	16%	0.04	0.03	0.01	84.27	45.31
Proper HVAC Air Flow / Charge	Multi NC	HVAC	1.36	0.02	17%	0.02	0.03	19%	0.03	0.10	0.02	57.35	47.17
Blower Door Air Sealing	Multi NC	HVAC	1.08	0.06	19%	0.06	0.00	19%	0.00	0.04	0.02	-2,407.00	60.89
AC Cycling	Multi NC	HVAC	1.03	0.00	19%	0.00	0.32	51%	0.32	52.62	0.04	33.38	43.64

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Wall Insulation R11 - R19	Multi NC	HVAC	0.97	0.11	22%	0.00	0.01	52%	0.00	0.05	0.04	462.22	47.72
Ceiling Insulation R38-R49	Multi NC	HVAC	0.38	0.00	22%	0.00	0.00	52%	0.00	0.09	0.04	-531.62	48.01
High Efficiency CAC 16 SEER	Multi NC	HVAC	0.23	0.03	23%	0.00	0.06	57%	0.00	0.56	0.07	339.79	82.09
High Performance Windows	Multi NC	HVAC	4.37	1.02	26%	1.02	0.47	28%	0.47	0.02	0.02	39.62	39.62
High Efficiency RAC Energy Star	Multi NC	HVAC	1.06	0.31	34%	0.31	0.13	36%	0.13	0.08	0.04	193.08	78.21
Wall Insulation R11 - R19	Multi NC	HVAC	0.02	0.03	35%	0.00	0.01	37%	0.00	3.19	0.10	7,414.40	230.42
Proper HVAC Sizing	Multi NC	HVAC	78.44	0.14	5%	0.14	0.26	5%	0.26	0.00	0.00	0.97	0.97
High Performance Windows	Multi NC	HVAC	17.60	0.80	29%	0.80	1.41	31%	1.41	0.01	0.01	3.82	3.36
Programmable Thermostats	Multi NC	HVAC	0.95	0.11	33%	0.00	0.19	35%	0.00	0.14	0.02	82.00	11.84
Duct Diagnostics and Repair	Multi NC	HVAC	0.70	0.10	36%	0.00	0.17	38%	0.00	0.19	0.04	112.43	20.09
Proper HVAC Air Flow / Charge	Multi NC	HVAC	1.00	0.07	38%	0.07	0.12	40%	0.12	0.13	0.04	76.31	23.30
AC Cycling	Multi NC	HVAC	0.49	0.00	38%	0.00	0.83	56%	0.00	70.68	0.09	70.68	36.53
Wall Insulation R11 - R19	Multi NC	HVAC	0.09	0.02	39%	0.00	0.04	57%	0.00	1.21	0.10	728.72	41.40
High Efficiency CAC 16 SEER	Multi NC	HVAC	0.20	0.31	49%	0.00	0.52	66%	0.00	0.66	0.22	399.41	98.98
RESIDENTIAL													
GAS													
Tank/Pipe Wrap	Existing	Water Heating	9.63	78,728,835	18%	78,728,835	-	-	-	0.07	0.07	27.28	27.28
Low Flow Fixtures	Existing	Water Heating	5.45	18,638,728	23%	18,638,728	-	-	-	0.13	0.09	48.22	31.29
High Efficiency Water Heater	Existing	Water Heating	1.18	24,794,078	29%	24,794,078	-	-	-	0.61	0.19	223.36	70.27
Horizontal Axis Clothes Washer	Existing	Water Heating	0.78	28,294,954	35%	0	-	-	-	0.92	0.33	335.76	120.20
Solar DHW	Existing	Water Heating	0.17	2,086,794	36%	0	-	-	-	4.35	0.38	1,587.16	140.27
High Performance Windows	Existing	HVAC	18.17	140,112,958	8%	140,112,958	-	-	-	0.04	0.04	N/A	N/A
Ceiling Insulation R0 - R38	Existing	HVAC	6.27	38,627,756	10%	38,627,756	-	-	-	0.11	0.05	N/A	N/A
Programmable Thermostats	Existing	HVAC	7.58	78,351,514	15%	78,351,514	-	-	-	0.10	0.07	N/A	N/A
Wall Insulation R0 - R11	Existing	HVAC	3.51	74,118,038	19%	74,118,038	-	-	-	0.19	0.09	N/A	N/A
Blower Door Air Sealing	Existing	HVAC	4.21	78,585,585	24%	78,585,585	-	-	-	0.18	0.12	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Duct Diagnostics and Repair	Existing	HVAC	2.04	49,466,261	34%	49,466,261	-	-	-	0.38	0.17	N/A	N/A
Ceiling Insulation R11 - R38	Existing	HVAC	1.38	22,898,010	36%	22,898,010	-	-	-	0.49	0.16	N/A	N/A
Floor/Basement Insulation	Existing	HVAC	1.34	97,051,596	41%	97,051,596	-	-	-	0.51	0.21	N/A	N/A
High Efficiency Conventional Heater	Existing	HVAC	1.15	5,732,683	42%	5,732,683	-	-	-	0.63	0.23	N/A	N/A
High Efficiency Condensing Heater	Existing	HVAC	1.01	23,977,446	43%	23,977,446	-	-	-	0.71	0.24	N/A	N/A
Ceiling Insulation R19 - R38	Existing	HVAC	0.83	6,326,946	43%	0	-	-	-	0.82	0.23	N/A	N/A
Ceiling Insulation R30 - R38	Existing	HVAC	0.45	845,956	43%	0	-	-	-	1.50	0.24	N/A	N/A
Wall Insulation R11 - R19	Existing	HVAC	0.17	46,928,624	46%	0	-	-	-	3.97	0.46	N/A	N/A
Tank/Pipe Wrap	Low Income	Water Heating	9.63	16,303,889	18%	16,303,889	-	-	-	0.07	0.07	27.28	27.28
Low Flow Fixtures	Low Income	Water Heating	5.45	3,859,879	23%	3,859,879	-	-	-	0.13	0.09	48.22	31.29
High Efficiency Water Heater	Low Income	Water Heating	1.18	5,134,585	29%	5,134,585	-	-	-	0.61	0.19	223.36	70.27
Horizontal Axis Clothes Washer	Low Income	Water Heating	0.78	5,859,579	35%	0	-	-	-	0.92	0.33	335.76	120.20
Solar DHW	Low Income	Water Heating	0.17	432,152	36%	0	-	-	-	4.35	0.38	1,587.16	140.27
High Performance Windows	Low Income	HVAC	18.17	29,015,876	8%	29,015,876	-	-	-	0.04	0.04	N/A	N/A
Ceiling Insulation R0 - R38	Low Income	HVAC	6.27	7,999,390	10%	7,999,390	-	-	-	0.11	0.05	N/A	N/A
Programmable Thermostats	Low Income	HVAC	7.58	16,225,750	15%	16,225,750	-	-	-	0.10	0.07	N/A	N/A
Wall Insulation R0 - R11	Low Income	HVAC	3.51	15,349,043	19%	15,349,043	-	-	-	0.19	0.09	N/A	N/A
Blower Door Air Sealing	Low Income	HVAC	4.21	16,274,224	24%	16,274,224	-	-	-	0.18	0.12	N/A	N/A
Basic HVAC Diagnostic Testing And Repair	Low Income	HVAC	3.04	27,228,029	31%	27,228,029	-	-	-	0.25	0.15	N/A	N/A
Duct Diagnostics and Repair	Low Income	HVAC	2.04	10,243,927	34%	10,243,927	-	-	-	0.38	0.17	N/A	N/A
Ceiling Insulation R11 - R38	Low Income	HVAC	1.38	4,741,930	36%	4,741,930	-	-	-	0.49	0.16	N/A	N/A
Floor/Basement Insulation	Low Income	HVAC	1.34	20,098,335	41%	20,098,335	-	-	-	0.51	0.21	N/A	N/A
High Efficiency Conventional Heater	Low Income	HVAC	1.15	1,187,177	42%	1,187,177	-	-	-	0.63	0.23	N/A	N/A
High Efficiency Condensing Heater	Low Income	HVAC	1.01	4,965,469	43%	4,965,469	-	-	-	0.71	0.24	N/A	N/A
Ceiling Insulation R19 - R38	Low Income	HVAC	0.83	1,310,242	43%	0	-	-	-	0.82	0.23	N/A	N/A
Ceiling Insulation R30 - R38	Low Income	HVAC	0.45	175,188	43%	0	-	-	-	1.50	0.24	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Wall Insulation R11 - R19	Low Income	HVAC	0.17	9,718,410	46%	0	-	-	-	3.97	0.46	N/A	N/A
Tank/Pipe Wrap	New Construction	Water Heating	9.63	1,155,594	18%	1,155,594	-	-	-	0.07	0.07	27.28	27.28
Low Flow Fixtures	New Construction	Water Heating	5.45	273,582	23%	273,582	-	-	-	0.13	0.09	48.22	31.29
High Efficiency Water Heater	New Construction	Water Heating	1.18	363,931	29%	363,931	-	-	-	0.61	0.19	223.36	70.27
Horizontal Axis Clothes Washer	New Construction	Water Heating	0.78	415,318	35%	0	-	-	-	0.92	0.33	335.76	120.20
Solar DHW	New Construction	Water Heating	0.17	30,630	36%	0	-	-	-	4.35	0.38	1,587.16	140.27
High Performance Windows	New Construction	HVAC	18.17	2,056,599	8%	2,056,599	-	-	-	0.04	0.04	N/A	N/A
Programmable Thermostats	New Construction	HVAC	7.76	1,178,793	13%	1,178,793	-	-	-	0.10	0.06	N/A	N/A
Blower Door Air Sealing	New Construction	HVAC	4.54	1,245,205	18%	1,245,205	-	-	-	0.17	0.09	N/A	N/A
Basic HVAC Diagnostic Testing And Repair	New Construction	HVAC	3.28	2,083,324	26%	2,083,324	-	-	-	0.24	0.14	N/A	N/A
Duct Diagnostics and Repair	New Construction	HVAC	2.21	783,803	29%	783,803	-	-	-	0.35	0.16	N/A	N/A
Wall Insulation R11 - R19	New Construction	HVAC	1.86	903,516	33%	903,516	-	-	-	0.37	0.17	N/A	N/A
High Efficiency Conventional Heater	New Construction	HVAC	1.31	96,473	33%	96,473	-	-	-	0.55	0.18	N/A	N/A
High Efficiency Condensing Heater	New Construction	HVAC	1.15	403,508	35%	403,508	-	-	-	0.62	0.20	N/A	N/A
Ceiling Insulation R38 - R49	New Construction	HVAC	0.52	15,072	35%	0	-	-	-	1.30	0.19	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical GWh Savings	% GWh	Economic GWh Savings	Technical MW Savings	% MW Savings	Economic MW Savings	Marginal Energy Cost ($/kWh)	Average Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Average Capacity Cost ($/kW)
COMMERCIAL													
ELECTRIC													
Pulse Start MH	Office	Lighting	1.38	5.67	5%	5.67	0.00	0%	0.00	0.04	0.04	N/A	N/A
Incandescent to HID	Office	Lighting	1.31	3.33	7%	3.33	0.00	0%	0.00	0.04	0.04	N/A	N/A
MV to HID	Office	Lighting	0.93	18.92	23%	0.00	0.00	0%	0.00	0.06	0.05	N/A	N/A
Photocell Controls	Office	Lighting	0.37	1.91	24%	0.00	0.00	0%	0.00	0.15	0.06	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
T8/Electronic Ballasts (ROB)	Office	Lighting	129.33	16.08	1%	16.08	6.52	1%	6.52	0.00	0.00	1.62	1.62
Reflectors/Design (ROB)	Office	Lighting	17.25	17.77	1%	17.77	7.21	1%	7.21	0.00	0.00	12.16	7.16
Super T8s (ROB)	Office	Lighting	7.97	39.40	3%	39.40	15.98	3%	15.98	0.01	0.01	26.33	17.47
Reflectors/Design	Office	Lighting	16.88	156.51	8%	156.51	63.50	8%	63.50	0.01	0.01	12.43	14.03
Super T8s	Office	Lighting	7.39	328.74	21%	328.74	133.38	21%	133.38	0.01	0.01	28.40	22.49
T8/Electronic Ballasts	Office	Lighting	102.81	115.03	25%	115.03	46.67	25%	46.67	0.00	0.01	2.04	19.00
Occupancy Sensors	Office	Lighting	1.03	175.99	31%	175.99	6.24	25%	6.24	0.07	0.02	1,931.37	61.67
Daylighting Controls	Office	Lighting	0.28	92.13	35%	0.00	4.36	26%	0.00	0.28	0.05	5,913.46	151.59
Super T8s (ROB)	Office	Lighting	13.42	77.40	11%	77.40	31.40	11%	31.40	0.01	0.01	15.64	15.64
Occupancy Sensors	Office	Lighting	5.72	14.48	13%	14.48	5.88	13%	5.88	0.01	0.01	36.68	18.95
Compact Fluorescent Fixture (ROB)	Office	Lighting	7.15	4.78	2%	4.78	1.94	2%	1.94	0.01	0.01	29.34	29.34
Compact Fluorescent Fixture	Office	Lighting	7.02	42.17	19%	42.17	17.11	19%	17.11	0.01	0.01	29.91	29.85
Compact Fluorescent Lamp (ROB)	Office	Lighting	5.67	9.07	22%	9.07	3.68	22%	3.68	0.02	0.01	37.02	31.01
Compact Fluorescent Lamp	Office	Lighting	3.96	78.05	53%	78.05	31.67	53%	31.67	0.02	0.02	52.93	43.77
Occupancy Sensors	Office	Lighting	0.64	10.18	57%	0.00	0.36	53%	0.00	0.11	0.02	3,096.92	63.89
Daylighting Controls	Office	Lighting	0.09	5.33	59%	0.00	0.25	54%	0.00	0.86	0.05	18,205.69	147.13
HID (ROB)	Office	Lighting	2.46	0.14	1%	0.14	0.06	1%	0.06	0.03	0.03	85.13	85.13
HID	Office	Lighting	2.43	2.51	26%	2.51	1.02	26%	1.02	0.04	0.03	86.31	86.25
T5 for High Bay	Office	Lighting	1.17	0.08	27%	0.08	0.03	27%	0.03	0.07	0.04	179.83	88.87
Occupancy Sensors	Office	Lighting	1.00	0.65	33%	0.65	0.02	27%	0.02	0.07	0.04	1,978.53	127.32
Daylighting Controls	Office	Lighting	0.43	0.34	36%	0.00	0.02	27%	0.00	0.18	0.06	3,877.02	179.94
Exit Signs (LED - ROB)	Office	Lighting	1.52	1.01	6%	1.01	0.12	7%	0.12	0.04	0.04	354.32	354.32
Exit Signs (LED)	Office	Lighting	1.42	8.51	61%	8.51	0.97	61%	0.97	0.04	0.04	378.95	376.34
HID (ROB)	Office	Lighting	1.45	1.63	2%	1.63	0.66	2%	0.66	0.06	0.06	145.09	145.09
T5 for High Bay	Office	Lighting	1.29	1.83	4%	1.83	0.74	4%	0.74	0.07	0.06	163.01	154.57
HID	Office	Lighting	0.94	28.19	34%	0.00	11.44	34%	0.00	0.09	0.09	223.71	216.17

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Roof Insulation	Office	HVAC	1.52	8.77	1%	8.77	0.00	0%	0.00	0.03	0.03	N/A	N/A
Proper Installation	Office	HVAC	3.65	24.14	10%	24.14	4.05	10%	4.05	0.02	0.02	114.70	114.70
Tune Up/Advanced Diagnostics	Office	HVAC	1.58	8.97	14%	8.97	1.50	14%	1.50	0.04	0.03	264.40	155.25
High Efficiency Heat Pump	Office	HVAC	1.68	11.47	18%	11.47	1.92	18%	1.92	0.04	0.03	248.90	179.34
Roof Insulation	Office	HVAC	1.05	1.67	19%	1.67	0.28	19%	0.28	0.06	0.03	350.15	164.70
Commissioning	Office	HVAC	0.17	5.00	21%	0.00	0.84	21%	0.00	0.41	0.07	2,427.37	405.98
Energy Management Systems	Office	HVAC	0.15	31.77	34%	0.00	2.93	28%	0.00	0.38	0.19	4,106.04	1,347.67
Window Film	Office	HVAC	0.11	0.96	35%	0.00	0.16	29%	0.00	0.63	0.19	3,767.60	1,380.93
High Efficiency AC	Office	HVAC	0.78	9.08	14%	0.00	4.69	14%	0.00	0.12	0.12	230.69	230.69
Roof Insulation	Office	HVAC	0.52	0.47	15%	0.00	0.24	15%	0.00	0.16	0.11	305.94	208.02
Energy Management Systems	Office	HVAC	0.10	8.45	28%	0.00	2.18	21%	0.00	0.68	0.39	2,646.88	975.52
Window Film	Office	HVAC	0.06	0.28	28%	0.00	0.15	22%	0.00	1.63	0.41	3,153.38	1,019.42
Proper Installation	Office	HVAC	2.71	80.17	10%	80.17	41.43	10%	41.43	0.03	0.03	66.45	66.45
Tune Up/Advanced Diagnostics	Office	HVAC	1.18	29.78	14%	29.78	15.39	14%	15.39	0.08	0.05	153.17	89.94
High Efficiency AC	Office	HVAC	1.25	38.08	18%	38.08	19.68	18%	19.68	0.07	0.05	144.19	103.90
Roof Insulation	Office	HVAC	0.49	5.56	19%	0.00	2.87	19%	0.00	0.17	0.05	322.69	99.75
Commissioning	Office	HVAC	0.13	16.62	21%	0.00	8.59	21%	0.00	0.73	0.12	1,406.23	239.64
Energy Management Systems	Office	HVAC	0.09	96.47	33%	0.00	24.93	27%	0.00	0.74	0.35	2,865.27	819.47
Window Film	Office	HVAC	0.05	3.24	34%	0.00	1.67	28%	0.00	1.76	0.36	3,413.55	857.34
High Efficiency Chillers	Office	HVAC	4.07	55.61	7%	55.61	28.74	7%	28.74	0.02	0.02	44.28	44.28
Tune Up/Advanced Diagnostics	Office	HVAC	1.34	7.75	8%	7.75	4.01	8%	4.01	0.07	0.03	134.76	55.35
VSD Chillers	Office	HVAC	0.78	8.32	9%	0.00	1.26	8%	0.00	0.09	0.04	565.71	74.24
Roof Insulation	Office	HVAC	0.55	6.19	10%	0.00	3.20	9%	0.00	0.15	0.04	289.02	84.53
Energy Management Systems	Office	HVAC	0.13	65.07	18%	0.00	16.82	13%	0.00	0.55	0.27	2,118.49	725.68
Commissioning	Office	HVAC	0.09	16.84	20%	0.00	8.70	15%	0.00	1.07	0.36	2,076.42	913.09
Window Film	Office	HVAC	0.06	3.87	20%	0.00	2.00	16%	0.00	1.47	0.38	2,846.95	972.85

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Efficiency Motors	Office	HVAC	9.81	22.66	2%	22.66	5.20	2%	5.20	0.01	0.01	32.73	32.73
Variable Air Volume Control (VSD)	Office	HVAC	0.70	13.02	3%	0.00	0.94	2%	0.00	0.08	0.03	1,058.09	189.43
Energy Management Systems	Office	HVAC	0.32	114.66	13%	0.00	14.26	8%	0.00	0.19	0.15	1,500.79	1,106.02
Low Flow Fixtures	Office	Other	56.47	14.04	6%	14.04	2.23	6%	2.23	0.00	0.00	7.93	7.93
High Efficiency Water Heater	Office	Other	8.04	11.96	11%	11.96	1.90	11%	1.90	0.01	0.00	55.76	29.93
Heat Pump Water Heater	Office	Other	4.67	0.90	11%	0.90	0.14	11%	0.14	0.02	0.01	95.87	32.15
Vendor Miser	Office	Other	0.68	36.96	12%	0.00	23.46	12%	0.00	0.12	0.12	191.57	191.57
Incandescent to HID	Retail	Lighting	1.88	0.91	1%	0.91	0.00	0%	0.00	0.03	0.03	N/A	N/A
Pulse Start MH	Retail	Lighting	1.42	8.03	5%	8.03	0.00	0%	0.00	0.04	0.04	N/A	N/A
MV to HID	Retail	Lighting	1.30	27.50	22%	27.50	0.00	0%	0.00	0.04	0.04	N/A	N/A
Photocell Controls	Retail	Lighting	0.51	2.63	23%	0.00	0.00	0%	0.00	0.11	0.04	N/A	N/A
T8/Electronic Ballasts (ROB)	Retail	Lighting	130.91	4.55	1%	4.55	0.82	1%	0.82	0.00	0.00	3.33	3.33
Reflectors/Design (ROB)	Retail	Lighting	17.36	5.00	2%	5.00	0.90	2%	0.90	0.00	0.00	25.11	14.73
Super T8s (ROB)	Retail	Lighting	7.97	5.50	4%	5.50	0.99	4%	0.99	0.01	0.01	54.71	29.35
Reflectors/Design	Retail	Lighting	16.88	43.72	15%	43.72	7.89	15%	7.89	0.00	0.00	25.82	26.73
Super T8s	Retail	Lighting	6.92	43.03	26%	43.03	7.76	26%	7.76	0.01	0.01	62.96	42.04
T8/Electronic Ballasts	Retail	Lighting	96.31	30.11	34%	30.11	5.43	34%	5.43	0.00	0.01	4.53	33.48
Occupancy Sensors	Retail	Lighting	0.97	21.56	40%	0.00	0.34	35%	0.00	0.07	0.02	4,536.75	97.40
Daylighting Controls	Retail	Lighting	0.27	11.52	43%	0.00	0.24	35%	0.00	0.29	0.03	13,879.80	232.96
Super T8s (ROB)	Retail	Lighting	13.58	10.95	11%	10.95	1.98	11%	1.98	0.01	0.01	32.09	32.09
Occupancy Sensors	Retail	Lighting	5.79	2.05	13%	2.05	0.37	13%	0.37	0.01	0.01	75.26	38.89
Compact Fluorescent Fixture (ROB)	Retail	Lighting	7.24	14.85	2%	14.85	2.68	2%	2.68	0.01	0.01	60.21	60.21
Compact Fluorescent Fixture	Retail	Lighting	7.10	131.11	19%	131.11	23.65	19%	23.65	0.01	0.01	61.37	61.25
Compact Fluorescent Lamp (ROB)	Retail	Lighting	5.35	28.21	22%	28.21	5.09	22%	5.09	0.01	0.01	81.54	64.54
Compact Fluorescent Lamp	Retail	Lighting	3.74	242.68	53%	242.68	43.79	53%	43.79	0.02	0.02	116.56	94.82
Occupancy Sensors	Retail	Lighting	0.69	31.40	57%	0.00	0.50	53%	0.00	0.10	0.02	6,354.86	136.08

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Daylighting Controls	Retail	Lighting	0.10	16.77	59%	0.00	0.35	54%	0.00	0.78	0.05	37,328.96	306.86
HID (ROB)	Retail	Lighting	2.77	0.18	2%	0.18	0.03	2%	0.03	0.03	0.03	157.61	157.61
HID	Retail	Lighting	2.70	3.24	46%	3.24	0.59	46%	0.59	0.03	0.03	161.61	161.39
T5 for High Bay	Retail	Lighting	0.86	0.07	47%	0.00	0.01	47%	0.00	0.09	0.03	506.42	168.55
Occupancy Sensors	Retail	Lighting	0.79	0.34	51%	0.00	0.01	47%	0.00	0.09	0.04	5,617.17	214.44
Daylighting Controls	Retail	Lighting	0.34	0.18	54%	0.00	0.00	48%	0.00	0.23	0.04	10,998.58	277.62
Exit Signs (LED - ROB)	Retail	Lighting	1.52	0.33	7%	0.33	0.04	7%	0.04	0.04	0.04	354.32	354.32
Exit Signs (LED)	Retail	Lighting	1.42	2.74	61%	2.74	0.31	61%	0.31	0.04	0.04	378.95	376.34
HID (ROB)	Retail	Lighting	1.62	6.42	2%	6.42	1.16	2%	1.16	0.05	0.05	268.63	268.63
T5 for High Bay	Retail	Lighting	1.30	7.20	4%	7.20	1.30	4%	1.30	0.06	0.05	334.49	303.46
HID	Retail	Lighting	1.05	111.19	34%	111.19	20.06	34%	20.06	0.07	0.07	414.19	402.11
Roof Insulation	Retail	HVAC	1.22	1.76	1%	1.76	0.00	0%	0.00	0.04	0.04	N/A	N/A
Proper Installation	Retail	HVAC	5.04	19.37	10%	19.37	5.70	10%	5.70	0.02	0.02	59.21	59.21
Tune Up/Advanced Diagnostics	Retail	HVAC	2.19	7.20	14%	7.20	2.12	14%	2.12	0.04	0.02	136.49	80.14
High Efficiency Heat Pump	Retail	HVAC	2.32	9.20	18%	9.20	2.71	18%	2.71	0.04	0.03	128.49	92.58
Roof Insulation	Retail	HVAC	1.45	1.34	19%	1.34	0.39	19%	0.39	0.05	0.03	180.76	85.03
Commissioning	Retail	HVAC	0.24	4.02	21%	0.00	1.18	21%	0.00	0.37	0.06	1,253.08	209.58
Window Film	Retail	HVAC	0.18	0.92	22%	0.00	0.27	22%	0.00	0.48	0.07	1,620.05	240.54
Energy Management Systems	Retail	HVAC	0.17	20.27	32%	0.00	4.11	29%	0.00	0.43	0.19	2,132.56	712.00
High Efficiency AC	Retail	HVAC	1.26	13.41	14%	13.41	6.52	14%	6.52	0.08	0.08	174.48	174.48
Roof Insulation	Retail	HVAC	0.83	0.70	15%	0.00	0.34	15%	0.00	0.11	0.08	231.40	157.34
Energy Management Systems	Retail	HVAC	0.12	7.88	23%	0.00	3.03	21%	0.00	0.77	0.33	2,001.99	737.85
Window Film	Retail	HVAC	0.10	0.45	23%	0.00	0.22	22%	0.00	1.09	0.35	2,236.39	770.01
Proper Installation	Retail	HVAC	4.36	73.30	10%	73.30	35.61	10%	35.61	0.02	0.02	50.26	50.26
Tune Up/Advanced Diagnostics	Retail	HVAC	1.89	27.23	14%	27.23	13.23	14%	13.23	0.06	0.03	115.85	68.03
High Efficiency AC	Retail	HVAC	2.01	34.81	18%	34.81	16.92	18%	16.92	0.05	0.04	109.06	78.58

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Roof Insulation	Retail	HVAC	0.79	5.08	19%	0.00	2.47	19%	0.00	0.12	0.04	244.07	75.45
Commissioning	Retail	HVAC	0.21	15.19	21%	0.00	7.38	21%	0.00	0.52	0.09	1,063.61	181.25
Energy Management Systems	Retail	HVAC	0.11	55.68	29%	0.00	21.43	27%	0.00	0.83	0.28	2,167.18	619.81
Window Film	Retail	HVAC	0.09	3.16	29%	0.00	1.53	28%	0.00	1.18	0.30	2,420.91	647.83
High Efficiency Chillers	Retail	HVAC	6.54	11.34	7%	11.34	5.51	7%	5.51	0.02	0.02	33.49	33.49
Tune Up/Advanced Diagnostics	Retail	HVAC	2.15	1.58	8%	1.58	0.77	8%	0.77	0.05	0.02	101.93	41.86
Roof Insulation	Retail	HVAC	0.89	1.28	9%	0.00	0.62	9%	0.00	0.11	0.03	216.13	52.94
VSD Chillers	Retail	HVAC	0.78	0.96	9%	0.00	0.24	9%	0.00	0.11	0.03	431.55	72.64
Commissioning	Retail	HVAC	0.15	3.79	12%	0.00	1.84	11%	0.00	0.69	0.17	1,421.97	349.52
Energy Management Systems	Retail	HVAC	0.14	7.69	16%	0.00	2.96	15%	0.00	0.67	0.31	1,745.30	695.53
Window Film	Retail	HVAC	0.11	0.83	17%	0.00	0.40	16%	0.00	1.00	0.33	2,059.54	739.84
High Efficiency Motors	Retail	HVAC	10.65	6.77	2%	6.77	1.41	2%	1.41	0.01	0.01	33.31	33.31
Variable Air Volume Control (VSD)	Retail	HVAC	0.75	5.31	4%	0.00	0.35	3%	0.00	0.07	0.04	1,077.38	242.25
Energy Management Systems	Retail	HVAC	0.34	28.52	12%	0.00	3.25	7%	0.00	0.18	0.13	1,533.90	1,079.86
Low Flow Fixtures	Retail	Other	53.38	9.56	6%	9.56	1.66	6%	1.66	0.00	0.00	7.93	7.93
High Efficiency Water Heater	Retail	Other	7.60	8.14	11%	8.14	1.42	11%	1.42	0.01	0.01	55.76	29.93
Heat Pump Water Heater	Retail	Other	4.42	0.62	11%	0.62	0.11	11%	0.11	0.02	0.01	95.87	32.15
Vendor Miser	Retail	Other	1.40	212.45	19%	212.45	38.77	19%	38.77	0.05	0.05	270.92	270.92
Pulse Start MH	Health Care	Lighting	1.38	0.90	4%	0.90	0.00	0%	0.00	0.04	0.04	N/A	N/A
Incandescent to HID	Health Care	Lighting	1.32	3.13	16%	3.13	0.00	0%	0.00	0.04	0.04	N/A	N/A
MV to HID	Health Care	Lighting	0.84	2.71	27%	0.00	0.00	0%	0.00	0.06	0.05	N/A	N/A
Photocell Controls	Health Care	Lighting	0.35	0.36	29%	0.00	0.00	0%	0.00	0.16	0.06	N/A	N/A
T8/Electronic Ballasts (ROB)	Health Care	Lighting	127.37	7.17	1%	7.17	0.83	1%	0.83	0.00	0.00	4.80	4.80
Reflectors/Design (ROB)	Health Care	Lighting	16.89	7.88	2%	7.88	0.91	2%	0.91	0.00	0.00	36.21	21.24
Super T8s (ROB)	Health Care	Lighting	7.75	8.68	4%	8.68	1.01	4%	1.01	0.01	0.00	78.91	42.33
Reflectors/Design	Health Care	Lighting	16.42	68.95	15%	68.95	8.00	15%	8.00	0.00	0.00	37.24	38.55

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
T8/Electronic Ballasts	Health Care	Lighting	107.93	54.71	24%	54.71	6.34	24%	6.34	0.00	0.00	5.67	26.34
Super T8s	Health Care	Lighting	6.02	60.65	34%	60.65	7.03	34%	7.03	0.01	0.01	101.61	48.28
Occupancy Sensors	Health Care	Lighting	1.06	38.74	41%	38.74	0.35	35%	0.35	0.06	0.01	6,543.02	140.47
Daylighting Controls	Health Care	Lighting	0.23	14.70	43%	0.00	0.24	35%	0.00	0.33	0.03	20,280.69	336.03
Super T8s (ROB)	Health Care	Lighting	13.22	17.26	11%	17.26	2.00	11%	2.00	0.01	0.01	46.27	46.27
Occupancy Sensors	Health Care	Lighting	5.63	3.23	13%	3.23	0.37	13%	0.37	0.01	0.01	108.54	56.09
Compact Fluorescent Fixture (ROB)	Health Care	Lighting	7.04	1.31	2%	1.31	0.15	2%	0.15	0.01	0.01	86.83	86.83
Compact Fluorescent Fixture	Health Care	Lighting	6.91	11.53	19%	11.53	1.34	19%	1.34	0.01	0.01	88.51	88.34
Compact Fluorescent Lamp (ROB)	Health Care	Lighting	5.12	2.48	22%	2.48	0.29	22%	0.29	0.01	0.01	119.54	93.39
Compact Fluorescent Lamp	Health Care	Lighting	3.58	21.34	53%	21.34	2.48	53%	2.48	0.02	0.02	170.88	138.50
Occupancy Sensors	Health Care	Lighting	0.76	3.15	58%	0.00	0.03	53%	0.00	0.08	0.02	9,165.15	198.00
Daylighting Controls	Health Care	Lighting	0.09	1.19	59%	0.00	0.02	54%	0.00	0.89	0.05	54,543.79	444.32
HID (ROB)	Health Care	Lighting	2.95	0.09	1%	0.09	0.01	1%	0.01	0.02	0.02	207.12	207.12
HID	Health Care	Lighting	2.91	1.60	26%	1.60	0.19	26%	0.19	0.02	0.02	210.01	209.86
Occupancy Sensors	Health Care	Lighting	1.20	0.47	33%	0.47	0.00	26%	0.00	0.05	0.03	5,796.78	327.91
T5 for High Bay	Health Care	Lighting	1.04	0.04	34%	0.04	0.01	27%	0.01	0.07	0.03	589.37	334.40
Daylighting Controls	Health Care	Lighting	0.41	0.18	36%	0.00	0.00	27%	0.00	0.19	0.04	11,615.45	491.17
Exit Signs (LED - ROB)	Health Care	Lighting	1.52	0.33	7%	0.33	0.04	7%	0.04	0.04	0.04	354.32	354.32
Exit Signs (LED)	Health Care	Lighting	1.42	2.76	61%	2.76	0.31	61%	0.31	0.04	0.04	378.95	376.34
HID (ROB)	Health Care	Lighting	1.73	0.18	2%	0.18	0.02	2%	0.02	0.04	0.04	353.03	353.03
T5 for High Bay	Health Care	Lighting	1.27	0.20	4%	0.20	0.02	4%	0.02	0.06	0.05	482.41	421.46
HID	Health Care	Lighting	1.12	3.06	34%	3.06	0.36	34%	0.36	0.06	0.06	544.33	530.93
Roof Insulation	Health Care	HVAC	1.71	1.10	1%	1.10	0.00	0%	0.00	0.03	0.03	N/A	N/A
Proper Installation	Health Care	HVAC	5.03	2.44	10%	2.44	0.45	10%	0.45	0.01	0.01	81.51	81.51
Tune Up/Advanced Diagnostics	Health Care	HVAC	2.18	0.91	14%	0.91	0.17	14%	0.17	0.03	0.02	187.89	110.32
High Efficiency Heat Pump	Health Care	HVAC	2.32	1.16	18%	1.16	0.21	18%	0.21	0.03	0.02	176.87	127.44

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Roof Insulation	Health Care	HVAC	1.45	0.17	19%	0.17	0.03	19%	0.03	0.05	0.02	248.83	117.04
Commissioning	Health Care	HVAC	0.24	0.51	21%	0.00	0.09	21%	0.00	0.31	0.05	1,724.93	288.49
Energy Management Systems	Health Care	HVAC	0.21	3.25	35%	0.00	0.32	28%	0.00	0.29	0.14	2,917.82	957.68
Window Film	Health Care	HVAC	0.15	0.10	35%	0.00	0.02	29%	0.00	0.49	0.15	2,683.38	981.35
High Efficiency AC	Health Care	HVAC	1.11	18.05	14%	18.05	7.25	14%	7.25	0.08	0.08	209.13	209.13
Roof Insulation	Health Care	HVAC	0.74	0.94	15%	0.00	0.38	15%	0.00	0.11	0.08	277.35	188.58
Energy Management Systems	Health Care	HVAC	0.15	17.42	28%	0.00	3.37	21%	0.00	0.46	0.27	2,399.52	884.36
Window Film	Health Care	HVAC	0.08	0.56	29%	0.00	0.22	22%	0.00	1.16	0.28	2,878.00	924.27
Proper Installation	Health Care	HVAC	3.87	8.88	10%	8.88	3.57	10%	3.57	0.02	0.02	60.24	60.24
Tune Up/Advanced Diagnostics	Health Care	HVAC	1.68	3.30	14%	3.30	1.33	14%	1.33	0.06	0.03	138.86	81.53
High Efficiency AC	Health Care	HVAC	1.78	4.22	18%	4.22	1.69	18%	1.69	0.05	0.04	130.72	94.19
Roof Insulation	Health Care	HVAC	0.70	0.62	19%	0.00	0.25	19%	0.00	0.12	0.04	292.53	90.43
Commissioning	Health Care	HVAC	0.18	1.84	21%	0.00	0.74	21%	0.00	0.51	0.09	1,274.81	217.24
Energy Management Systems	Health Care	HVAC	0.14	11.09	34%	0.00	2.15	27%	0.00	0.50	0.24	2,597.50	742.89
Window Film	Health Care	HVAC	0.07	0.36	34%	0.00	0.14	28%	0.00	1.25	0.25	3,115.46	777.29
High Efficiency Chillers	Health Care	HVAC	5.80	12.82	7%	12.82	5.15	7%	5.15	0.02	0.02	40.14	40.14
Tune Up/Advanced Diagnostics	Health Care	HVAC	1.91	1.79	8%	1.79	0.72	8%	0.72	0.05	0.02	122.17	50.18
VSD Chillers	Health Care	HVAC	0.91	1.58	9%	0.00	0.23	8%	0.00	0.07	0.03	512.84	67.30
Roof Insulation	Health Care	HVAC	0.78	1.43	10%	0.00	0.57	9%	0.00	0.11	0.03	261.48	76.61
Energy Management Systems	Health Care	HVAC	0.19	15.69	18%	0.00	3.04	13%	0.00	0.37	0.19	1,903.79	655.99
Commissioning	Health Care	HVAC	0.12	3.87	20%	0.00	1.55	15%	0.00	0.76	0.25	1,886.87	826.00
Window Film	Health Care	HVAC	0.09	0.89	21%	0.00	0.36	16%	0.00	1.04	0.27	2,587.06	880.19
High Efficiency Motors	Health Care	HVAC	8.86	4.40	2%	4.40	0.85	2%	0.85	0.01	0.01	42.32	42.32
Variable Air Volume Control (VSD)	Health Care	HVAC	0.66	6.57	5%	0.00	0.38	3%	0.00	0.08	0.05	1,365.83	453.13
Energy Management Systems	Health Care	HVAC	0.29	9.10	9%	0.00	0.93	5%	0.00	0.20	0.12	1,978.48	1,107.38
High Efficiency Ice Makers	Health Care	Other	4.40	0.37	0%	0.37	0.03	0%	0.03	0.02	0.02	188.63	188.63

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Low Flow Fixtures	Health Care	Other	49.97	2.80	6%	2.80	1.17	6%	1.17	0.00	0.00	3.99	3.99
High Efficiency Water Heater	Health Care	Other	7.11	2.39	11%	2.39	1.00	11%	1.00	0.01	0.01	28.02	15.04
Heat Pump Water Heater	Health Care	Other	4.14	0.18	11%	0.18	0.08	11%	0.08	0.02	0.01	48.17	16.15
Vendor Miser	Health Care	Other	0.09	4.66	5%	0.00	0.37	5%	0.00	0.77	0.77	9,693.55	9,693.55
Pulse Start MH	Education	Lighting	1.25	3.56	5%	3.56	0.00	0%	0.00	0.04	0.04	N/A	N/A
Incandescent to HID	Education	Lighting	1.01	2.62	8%	2.62	0.00	0%	0.00	0.05	0.05	N/A	N/A
MV to HID	Education	Lighting	0.71	11.80	23%	0.00	0.00	0%	0.00	0.08	0.07	N/A	N/A
Photocell Controls	Education	Lighting	0.28	1.21	24%	0.00	0.00	0%	0.00	0.20	0.07	N/A	N/A
T8/Electronic Ballasts (ROB)	Education	Lighting	98.60	10.06	1%	10.06	2.98	1%	2.98	0.00	0.00	2.64	2.64
Reflectors/Design (ROB)	Education	Lighting	13.07	11.05	2%	11.05	3.27	2%	3.27	0.01	0.00	19.90	11.68
Super T8s (ROB)	Education	Lighting	6.00	12.17	4%	12.17	3.61	4%	3.61	0.01	0.01	43.37	23.27
Reflectors/Design	Education	Lighting	12.71	96.73	15%	96.73	28.65	15%	28.65	0.01	0.01	20.47	21.18
Super T8s	Education	Lighting	5.21	95.21	26%	95.21	28.20	26%	28.20	0.01	0.01	49.91	33.33
T8/Electronic Ballasts	Education	Lighting	72.54	66.63	34%	66.63	19.73	34%	19.73	0.00	0.01	3.59	26.54
Occupancy Sensors	Education	Lighting	0.68	45.25	40%	0.00	1.24	35%	0.00	0.10	0.02	3,596.01	77.20
Daylighting Controls	Education	Lighting	0.21	27.32	43%	0.00	0.88	35%	0.00	0.35	0.04	10,949.00	184.65
Super T8s (ROB)	Education	Lighting	10.23	24.22	11%	24.22	7.17	11%	7.17	0.01	0.01	25.43	25.43
Occupancy Sensors	Education	Lighting	4.36	4.53	13%	4.53	1.34	13%	1.34	0.02	0.01	59.65	30.83
Compact Fluorescent Lamp (ROB)	Education	Lighting	6.50	5.93	4%	5.93	1.76	4%	1.76	0.01	0.01	43.82	43.82
Compact Fluorescent Fixture (ROB)	Education	Lighting	5.21	2.43	6%	2.43	0.72	6%	0.72	0.01	0.01	49.93	42.90
Compact Fluorescent Fixture	Education	Lighting	5.11	21.47	22%	21.47	6.36	22%	6.36	0.02	0.01	50.89	48.65
Compact Fluorescent Lamp	Education	Lighting	3.70	41.57	53%	41.57	12.31	53%	12.31	0.02	0.02	76.93	67.05
Occupancy Sensors	Education	Lighting	0.49	5.10	57%	0.00	0.14	53%	0.00	0.14	0.03	5,037.11	94.03
Daylighting Controls	Education	Lighting	0.08	3.08	59%	0.00	0.10	54%	0.00	0.94	0.06	29,446.74	229.45
HID (ROB)	Education	Lighting	1.89	0.31	2%	0.31	0.09	2%	0.09	0.04	0.04	151.02	151.02
HID	Education	Lighting	1.84	5.44	46%	5.44	1.61	46%	1.61	0.05	0.05	154.85	154.64

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
T5 for High Bay	Education	Lighting	0.65	0.12	47%	0.00	0.04	47%	0.00	0.12	0.04	401.41	146.63
Occupancy Sensors	Education	Lighting	0.55	0.54	51%	0.00	0.01	47%	0.00	0.12	0.05	4,452.39	182.90
Daylighting Controls	Education	Lighting	0.26	0.32	54%	0.00	0.01	48%	0.00	0.28	0.06	8,676.16	232.90
Exit Signs (LED - ROB)	Education	Lighting	1.52	0.49	6%	0.49	0.06	6%	0.06	0.04	0.04	354.32	354.32
Exit Signs (LED)	Education	Lighting	1.42	4.12	61%	4.12	0.47	61%	0.47	0.04	0.04	378.95	376.34
HID (ROB)	Education	Lighting	1.11	1.58	2%	1.58	0.47	2%	0.47	0.08	0.08	257.39	257.39
T5 for High Bay	Education	Lighting	0.98	1.77	4%	0.00	0.53	4%	0.00	0.08	0.07	265.13	250.97
HID	Education	Lighting	0.72	27.38	34%	0.00	8.11	34%	0.00	0.12	0.11	396.88	383.56
Roof Insulation	Education	HVAC	1.16	1.11	1%	1.11	0.00	0%	0.00	0.04	0.04	N/A	N/A
Proper Installation	Education	HVAC	4.15	8.70	10%	8.70	3.01	10%	3.01	0.02	0.02	61.26	61.26
Tune Up/Advanced Diagnostics	Education	HVAC	1.80	3.23	14%	3.23	1.12	14%	1.12	0.05	0.03	141.20	82.91
High Efficiency Heat Pump	Education	HVAC	1.91	4.13	18%	4.13	1.43	18%	1.43	0.05	0.03	132.92	95.77
Roof Insulation	Education	HVAC	1.20	0.60	19%	0.60	0.21	19%	0.21	0.06	0.03	187.00	87.96
Commissioning	Education	HVAC	0.20	1.80	21%	0.00	0.62	21%	0.00	0.45	0.07	1,296.31	216.81
Window Film	Education	HVAC	0.15	0.41	22%	0.00	0.14	22%	0.00	0.58	0.09	1,675.94	248.83
Energy Management Systems	Education	HVAC	0.15	10.03	33%	0.00	2.16	29%	0.00	0.48	0.22	2,206.13	736.56
High Efficiency AC	Education	HVAC	1.00	20.87	14%	20.87	13.15	14%	13.15	0.11	0.11	176.15	176.15
Roof Insulation	Education	HVAC	0.66	1.09	15%	0.00	0.69	15%	0.00	0.15	0.10	233.60	158.84
Energy Management Systems	Education	HVAC	0.11	14.77	25%	0.00	6.12	21%	0.00	0.84	0.40	2,021.05	744.87
Window Film	Education	HVAC	0.08	0.68	25%	0.00	0.43	22%	0.00	1.45	0.42	2,308.18	777.71
Proper Installation	Education	HVAC	3.48	30.70	10%	30.70	19.35	10%	19.35	0.03	0.03	50.74	50.74
Tune Up/Advanced Diagnostics	Education	HVAC	1.51	11.41	14%	11.41	7.19	14%	7.19	0.07	0.04	116.96	68.67
High Efficiency AC	Education	HVAC	1.60	14.58	18%	14.58	9.19	18%	9.19	0.07	0.05	110.10	79.33
Roof Insulation	Education	HVAC	0.63	2.13	19%	0.00	1.34	19%	0.00	0.16	0.05	246.39	76.17
Commissioning	Education	HVAC	0.16	6.36	21%	0.00	4.01	21%	0.00	0.68	0.12	1,073.74	182.98
Energy Management Systems	Education	HVAC	0.10	28.10	30%	0.00	11.64	27%	0.00	0.91	0.35	2,187.81	625.71

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Window Film	Education	HVAC	0.07	1.29	31%	0.00	0.81	28%	0.00	1.57	0.37	2,498.63	654.22
High Efficiency Chillers	Education	HVAC	5.22	1.59	7%	1.59	1.00	7%	1.00	0.02	0.02	33.81	33.81
Tune Up/Advanced Diagnostics	Education	HVAC	1.72	0.22	8%	0.22	0.14	8%	0.14	0.06	0.03	102.90	42.26
Roof Insulation	Education	HVAC	0.71	0.18	9%	0.00	0.11	9%	0.00	0.14	0.03	218.19	53.44
VSD Chillers	Education	HVAC	0.53	0.12	9%	0.00	0.04	9%	0.00	0.16	0.05	435.65	73.33
Energy Management Systems	Education	HVAC	0.13	1.36	15%	0.00	0.56	13%	0.00	0.70	0.30	1,677.77	560.08
Commissioning	Education	HVAC	0.12	0.50	17%	0.00	0.31	15%	0.00	0.97	0.38	1,535.23	700.46
Window Film	Education	HVAC	0.08	0.11	18%	0.00	0.07	16%	0.00	1.33	0.41	2,104.93	745.44
High Efficiency Motors	Education	HVAC	9.16	9.48	2%	9.48	3.35	2%	3.35	0.01	0.01	24.42	24.42
Variable Air Volume Control (VSD)	Education	HVAC	0.55	10.04	4%	0.00	1.31	3%	0.00	0.10	0.06	794.22	240.65
Energy Management Systems	Education	HVAC	0.27	22.65	9%	0.00	4.81	6%	0.00	0.24	0.16	1,131.04	693.14
High Efficiency Ice Makers	Education	Other	4.16	1.30	3%	1.30	0.46	3%	0.46	0.02	0.02	50.64	50.64
Low Flow Fixtures	Education	Other	29.66	6.70	6%	6.70	2.36	6%	2.36	0.00	0.00	7.94	7.94
High Efficiency Water Heater	Education	Other	4.22	5.70	11%	5.70	2.01	11%	2.01	0.02	0.01	55.82	29.96
Heat Pump Water Heater	Education	Other	2.45	0.43	11%	0.43	0.15	11%	0.15	0.03	0.01	95.97	32.18
Vendor Miser	Education	Other	0.08	5.91	9%	0.00	2.09	9%	0.00	0.94	0.94	2,676.72	2,676.72
Pulse Start MH	Warehouse	Lighting	1.38	0.19	5%	0.19	0.00	0%	0.00	0.04	0.04	N/A	N/A
MV to HID	Warehouse	Lighting	0.97	0.64	22%	0.00	0.00	0%	0.00	0.06	0.05	N/A	N/A
Photocell Controls	Warehouse	Lighting	0.38	0.06	23%	0.00	0.00	0%	0.00	0.15	0.06	N/A	N/A
T8/Electronic Ballasts (ROB)	Warehouse	Lighting	133.70	1.20	1%	1.20	0.22	1%	0.22	0.00	0.00	2.97	2.97
Reflectors/Design (ROB)	Warehouse	Lighting	17.73	1.32	2%	1.32	0.24	2%	0.24	0.00	0.00	22.38	13.13
Super T8s (ROB)	Warehouse	Lighting	8.14	1.45	4%	1.45	0.27	4%	0.27	0.01	0.00	48.76	26.16
Reflectors/Design	Warehouse	Lighting	17.24	11.55	15%	11.55	2.12	15%	2.12	0.00	0.00	23.01	23.82
T8/Electronic Ballasts	Warehouse	Lighting	113.30	9.16	24%	9.16	1.69	24%	1.69	0.00	0.00	3.50	16.28
Super T8s	Warehouse	Lighting	6.32	10.16	34%	10.16	1.87	34%	1.87	0.01	0.01	62.79	29.84
Occupancy Sensors	Warehouse	Lighting	1.09	6.49	41%	6.49	0.09	35%	0.09	0.06	0.01	4,043.14	86.80

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Daylighting Controls	Warehouse	Lighting	0.24	2.46	43%	0.00	0.06	35%	0.00	0.32	0.03	12,532.07	207.64
Super T8s (ROB)	Warehouse	Lighting	13.87	2.89	11%	2.89	0.53	11%	0.53	0.01	0.01	28.59	28.59
Occupancy Sensors	Warehouse	Lighting	5.91	0.54	13%	0.54	0.10	13%	0.10	0.01	0.01	67.07	34.66
Compact Fluorescent Fixture (ROB)	Warehouse	Lighting	7.39	0.18	2%	0.18	0.03	2%	0.03	0.01	0.01	53.66	53.66
Compact Fluorescent Fixture	Warehouse	Lighting	7.25	1.60	19%	1.60	0.30	19%	0.30	0.01	0.01	54.69	54.59
Compact Fluorescent Lamp (ROB)	Warehouse	Lighting	5.26	0.35	22%	0.35	0.06	22%	0.06	0.01	0.01	75.35	57.95
Compact Fluorescent Lamp	Warehouse	Lighting	3.68	2.97	53%	2.97	0.55	53%	0.55	0.02	0.02	107.71	86.92
Occupancy Sensors	Warehouse	Lighting	0.78	0.44	58%	0.00	0.01	53%	0.00	0.08	0.02	5,663.43	123.68
Daylighting Controls	Warehouse	Lighting	0.09	0.17	59%	0.00	0.00	54%	0.00	0.87	0.05	33,704.31	275.88
HID	Warehouse	Lighting	N/A	0.00	50%	0.00	0.00	50%	0.00	0.02	0.02	122.90	122.90
HID (ROB)	Warehouse	Lighting	N/A	0.00	74%	0.00	0.00	74%	0.00	0.04	0.03	243.36	163.32
Occupancy Sensors	Warehouse	Lighting	N/A	0.00	77%	0.00	0.00	75%	0.00	0.15	0.03	10,424.08	189.59
Daylighting Controls	Warehouse	Lighting	N/A	0.00	78%	0.00	0.00	75%	0.00	0.54	0.04	20,678.65	225.78
T5 for High Bay	Warehouse	Lighting	N/A	0.00	86%	0.00	0.00	83%	0.00	0.20	0.06	1,104.86	310.23
Exit Signs (LED - ROB)	Warehouse	Lighting	1.52	0.19	7%	0.19	0.02	7%	0.02	0.04	0.04	354.32	354.32
Exit Signs (LED)	Warehouse	Lighting	1.42	1.60	61%	1.60	0.18	61%	0.18	0.04	0.04	378.95	376.34
HID (ROB)	Warehouse	Lighting	1.89	6.25	2%	6.25	1.15	2%	1.15	0.04	0.04	209.47	209.47
T5 for High Bay	Warehouse	Lighting	1.33	7.02	4%	7.02	1.29	4%	1.29	0.05	0.05	298.09	256.35
HID	Warehouse	Lighting	1.23	108.38	34%	108.38	19.94	34%	19.94	0.06	0.06	322.98	315.71
Roof Insulation	Warehouse	HVAC	1.09	0.02	1%	0.02	0.00	0%	0.00	0.05	0.05	N/A	N/A
Proper Installation	Warehouse	HVAC	6.28	0.27	10%	0.27	0.11	10%	0.11	0.01	0.01	38.53	38.53
Tune Up/Advanced Diagnostics	Warehouse	HVAC	2.72	0.10	14%	0.10	0.04	14%	0.04	0.03	0.02	88.81	52.15
High Efficiency Heat Pump	Warehouse	HVAC	2.89	0.13	18%	0.13	0.05	18%	0.05	0.03	0.02	83.61	60.24
Roof Insulation	Warehouse	HVAC	1.81	0.02	19%	0.02	0.01	19%	0.01	0.05	0.02	117.62	55.32
Commissioning	Warehouse	HVAC	0.30	0.06	21%	0.00	0.02	21%	0.00	0.32	0.05	815.35	136.37
Energy Management Systems	Warehouse	HVAC	0.23	0.33	33%	0.00	0.08	28%	0.00	0.32	0.15	1,379.22	452.68

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Window Film	Warehouse	HVAC	0.19	0.01	34%	0.00	0.00	29%	0.00	0.48	0.15	1,244.19	463.75
High Efficiency AC	Warehouse	HVAC	1.42	12.41	14%	12.41	4.82	14%	4.82	0.07	0.07	170.03	170.03
Roof Insulation	Warehouse	HVAC	0.94	0.65	15%	0.00	0.25	15%	0.00	0.09	0.06	225.49	153.32
Energy Management Systems	Warehouse	HVAC	0.18	10.64	27%	0.00	2.24	21%	0.00	0.41	0.22	1,950.87	719.01
Window Film	Warehouse	HVAC	0.11	0.39	27%	0.00	0.15	22%	0.00	0.89	0.23	2,291.94	751.14
Proper Installation	Warehouse	HVAC	4.94	31.16	10%	31.16	12.12	10%	12.12	0.02	0.02	48.98	48.98
Tune Up/Advanced Diagnostics	Warehouse	HVAC	2.14	11.58	14%	11.58	4.50	14%	4.50	0.04	0.03	112.89	66.29
High Efficiency AC	Warehouse	HVAC	2.27	14.80	18%	14.80	5.75	18%	5.75	0.04	0.03	106.28	76.58
Roof Insulation	Warehouse	HVAC	0.89	2.16	19%	0.00	0.84	19%	0.00	0.09	0.03	237.84	73.52
Commissioning	Warehouse	HVAC	0.23	6.46	21%	0.00	2.51	21%	0.00	0.40	0.07	1,036.45	176.62
Energy Management Systems	Warehouse	HVAC	0.16	34.57	32%	0.00	7.29	27%	0.00	0.45	0.20	2,111.83	603.98
Window Film	Warehouse	HVAC	0.10	1.28	33%	0.00	0.50	28%	0.00	0.96	0.21	2,481.05	631.77
High Efficiency Chillers	Warehouse	HVAC	N/A	0.00	8%	0.00	0.00	8%	0.00	0.01	0.01	32.64	32.64
VSD Chillers	Warehouse	HVAC	N/A	0.00	14%	0.00	0.00	10%	0.00	0.06	0.03	418.12	109.10
Energy Management Systems	Warehouse	HVAC	N/A	0.00	21%	0.00	0.00	14%	0.00	0.35	0.14	1,661.83	532.24
Tune Up/Advanced Diagnostics	Warehouse	HVAC	N/A	0.00	22%	0.00	0.00	15%	0.00	0.05	0.13	117.06	509.25
Roof Insulation	Warehouse	HVAC	N/A	0.00	23%	0.00	0.00	16%	0.00	0.10	0.12	248.21	439.38
Window Film	Warehouse	HVAC	N/A	0.00	23%	0.00	0.00	16%	0.00	0.84	0.15	2,167.50	548.42
Commissioning	Warehouse	HVAC	N/A	0.00	25%	0.00	0.00	18%	0.00	0.63	0.19	1,632.34	667.58
High Efficiency Motors	Warehouse	HVAC	13.02	1.62	2%	1.62	0.38	2%	0.38	0.01	0.01	23.17	23.17
Variable Air Volume Control (VSD)	Warehouse	HVAC	1.14	1.60	4%	1.60	0.10	3%	0.10	0.04	0.02	742.17	168.22
Energy Management Systems	Warehouse	HVAC	0.48	7.92	14%	0.00	0.87	7%	0.00	0.12	0.09	1,071.80	752.89
Heat Pump Water Heater	Warehouse	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	Warehouse	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Low Flow Fixtures	Warehouse	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Incandescent to HID	Grocery	Lighting	N/A	0.00	0%	0.00	0.00	0%	0.00	0.02	0.02	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
MV to HID	Grocery	Lighting	1.76	3.79	17%	3.79	0.00	0%	0.00	0.03	0.03	N/A	N/A
Pulse Start MH	Grocery	Lighting	1.27	0.87	21%	0.87	0.00	0%	0.00	0.04	0.03	N/A	N/A
Photocell Controls	Grocery	Lighting	0.66	0.34	23%	0.00	0.00	0%	0.00	0.09	0.04	N/A	N/A
T8/Electronic Ballasts (ROB)	Grocery	Lighting	132.12	3.06	1%	3.06	0.55	1%	0.55	0.00	0.00	3.01	3.01
Reflectors/Design (ROB)	Grocery	Lighting	17.52	3.36	2%	3.36	0.60	2%	0.60	0.00	0.00	22.67	13.30
Super T8s (ROB)	Grocery	Lighting	8.04	3.70	4%	3.70	0.66	4%	0.66	0.01	0.00	49.39	26.49
Reflectors/Design	Grocery	Lighting	17.03	29.41	15%	29.41	5.25	15%	5.25	0.00	0.00	23.31	24.12
T8/Electronic Ballasts	Grocery	Lighting	111.96	23.33	24%	23.33	4.17	24%	4.17	0.00	0.00	3.55	16.49
Super T8s	Grocery	Lighting	6.24	25.87	34%	25.87	4.62	34%	4.62	0.01	0.01	63.59	30.22
Occupancy Sensors	Grocery	Lighting	1.11	17.13	41%	17.13	0.23	35%	0.23	0.05	0.01	4,095.10	87.92
Daylighting Controls	Grocery	Lighting	0.23	5.83	43%	0.00	0.16	35%	0.00	0.34	0.03	12,743.23	210.32
Super T8s (ROB)	Grocery	Lighting	13.71	7.36	11%	7.36	1.32	11%	1.32	0.01	0.01	28.96	28.96
Occupancy Sensors	Grocery	Lighting	5.84	1.38	13%	1.38	0.25	13%	0.25	0.01	0.01	67.93	35.10
Compact Fluorescent Fixture (ROB)	Grocery	Lighting	7.31	0.75	2%	0.75	0.13	2%	0.13	0.01	0.01	54.35	54.35
Compact Fluorescent Fixture	Grocery	Lighting	7.17	6.63	19%	6.63	1.18	19%	1.18	0.01	0.01	55.39	55.29
Compact Fluorescent Lamp (ROB)	Grocery	Lighting	5.20	1.43	22%	1.43	0.25	22%	0.25	0.01	0.01	76.28	58.69
Compact Fluorescent Lamp	Grocery	Lighting	3.64	12.27	53%	12.27	2.19	53%	2.19	0.02	0.02	109.04	88.00
Occupancy Sensors	Grocery	Lighting	0.79	1.87	58%	0.00	0.02	53%	0.00	0.08	0.02	5,736.22	125.23
Daylighting Controls	Grocery	Lighting	0.08	0.64	59%	0.00	0.02	54%	0.00	0.92	0.05	34,272.20	279.39
HID	Grocery	Lighting	N/A	0.00	49%	0.00	0.00	50%	0.00	0.02	0.02	115.97	115.97
HID (ROB)	Grocery	Lighting	N/A	0.00	74%	0.00	0.00	74%	0.00	0.04	0.03	229.64	154.11
Occupancy Sensors	Grocery	Lighting	N/A	0.00	77%	0.00	0.00	75%	0.00	0.14	0.03	10,558.05	180.75
Daylighting Controls	Grocery	Lighting	N/A	0.00	78%	0.00	0.00	75%	0.00	0.57	0.04	21,027.07	217.42
T5 for High Bay	Grocery	Lighting	N/A	0.00	86%	0.00	0.00	83%	0.00	0.20	0.05	1,120.35	304.08
Exit Signs (LED - ROB)	Grocery	Lighting	1.52	0.14	7%	0.14	0.02	7%	0.02	0.04	0.04	354.32	354.32
Exit Signs (LED)	Grocery	Lighting	1.42	1.20	61%	1.20	0.14	61%	0.14	0.04	0.04	378.95	376.34

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
HID (ROB)	Grocery	Lighting	2.01	6.68	2%	6.68	1.19	2%	1.19	0.04	0.04	197.66	197.66
HID	Grocery	Lighting	1.33	118.20	33%	118.20	21.12	33%	21.12	0.05	0.05	298.68	293.27
T5 for High Bay	Grocery	Lighting	0.90	5.14	34%	0.00	0.92	34%	0.00	0.08	0.05	440.77	299.10
Roof Insulation	Grocery	HVAC	3.17	0.02	1%	0.02	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	Grocery	HVAC	7.48	18.00	10%	18.00	2.10	10%	2.10	0.01	0.01	80.15	80.15
Tune Up/Advanced Diagnostics	Grocery	HVAC	3.25	6.69	14%	6.69	0.78	14%	0.78	0.02	0.01	184.76	108.49
High Efficiency Heat Pump	Grocery	HVAC	3.45	8.55	18%	8.55	1.00	18%	1.00	0.02	0.01	173.93	125.32
Roof Insulation	Grocery	HVAC	2.16	1.25	19%	1.25	0.15	19%	0.15	0.03	0.01	244.68	115.09
Commissioning	Grocery	HVAC	0.35	3.73	21%	0.00	0.44	21%	0.00	0.20	0.03	1,696.20	283.69
Energy Management Systems	Grocery	HVAC	0.30	22.97	34%	0.00	1.52	28%	0.00	0.19	0.09	2,869.23	941.73
Window Film	Grocery	HVAC	0.23	0.72	34%	0.00	0.08	29%	0.00	0.31	0.09	2,616.79	964.89
High Efficiency AC	Grocery	HVAC	N/A	0.00	14%	0.00	0.00	14%	0.00	0.08	0.08	153.08	153.08
Energy Management Systems	Grocery	HVAC	N/A	0.00	25%	0.00	0.00	21%	0.00	0.52	0.27	1,741.46	660.37
Roof Insulation	Grocery	HVAC	N/A	0.00	26%	0.00	0.00	21%	0.00	0.12	0.23	232.77	570.39
Window Film	Grocery	HVAC	N/A	0.00	26%	0.00	0.00	22%	0.00	1.01	0.28	2,032.71	677.23
Proper Installation	Grocery	HVAC	4.80	72.01	10%	72.01	35.74	10%	35.74	0.02	0.02	44.09	44.09
Tune Up/Advanced Diagnostics	Grocery	HVAC	2.08	26.75	14%	26.75	13.28	14%	13.28	0.05	0.03	101.64	59.68
High Efficiency AC	Grocery	HVAC	2.21	34.20	18%	34.20	16.97	18%	16.97	0.05	0.03	95.68	68.94
Roof Insulation	Grocery	HVAC	0.87	4.99	19%	0.00	2.48	19%	0.00	0.11	0.03	214.13	66.19
Commissioning	Grocery	HVAC	0.23	14.93	21%	0.00	7.41	21%	0.00	0.46	0.08	933.13	159.02
Energy Management Systems	Grocery	HVAC	0.15	72.52	31%	0.00	21.50	27%	0.00	0.56	0.23	1,901.31	543.77
Window Film	Grocery	HVAC	0.10	2.99	32%	0.00	1.49	28%	0.00	1.09	0.25	2,200.42	568.66
High Efficiency Chillers	Grocery	HVAC	N/A	0.00	8%	0.00	0.00	8%	0.00	0.01	0.01	29.38	29.38
VSD Chillers	Grocery	HVAC	N/A	0.00	12%	0.00	0.00	10%	0.00	0.10	0.04	376.44	98.23
Energy Management Systems	Grocery	HVAC	N/A	0.00	18%	0.00	0.00	14%	0.00	0.44	0.18	1,484.98	478.20
Tune Up/Advanced Diagnostics	Grocery	HVAC	N/A	0.00	19%	0.00	0.00	15%	0.00	0.05	0.17	102.08	456.78

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Roof Insulation	Grocery	HVAC	N/A	0.00	20%	0.00	0.00	16%	0.00	0.11	0.15	216.44	393.62
Window Film	Grocery	HVAC	N/A	0.00	21%	0.00	0.00	16%	0.00	0.94	0.19	1,890.11	490.92
Commissioning	Grocery	HVAC	N/A	0.00	23%	0.00	0.00	18%	0.00	0.71	0.24	1,423.43	595.85
High Efficiency Motors	Grocery	HVAC	13.82	4.78	2%	4.78	0.40	2%	0.40	0.00	0.00	59.20	59.20
Variable Air Volume Control (VSD)	Grocery	HVAC	1.22	4.57	4%	4.57	0.10	3%	0.10	0.04	0.02	1,899.03	429.89
Energy Management Systems	Grocery	HVAC	0.51	22.85	14%	0.00	0.91	7%	0.00	0.11	0.08	2,736.40	1,922.85
Demand Defrost Electric	Grocery	Other	886.96	126.19	7%	126.19	12.84	7%	12.84	0.00	0.00	0.69	0.69
Night Covers for Display Cases	Grocery	Other	665.27	38.74	9%	38.74	0.00	7%	0.00	0.00	0.00	N/A	0.92
Demand Hot Gas Defrost	Grocery	Other	263.40	11.83	10%	11.83	1.20	8%	1.20	0.00	0.00	2.32	1.04
Refrigeration Commissioning	Grocery	Other	41.42	41.03	12%	41.03	4.17	10%	4.17	0.00	0.00	14.75	4.19
High Efficiency Ice Makers	Grocery	Other	5.81	35.20	14%	35.20	3.58	12%	3.58	0.01	0.00	105.25	20.79
High-Efficiency Compressors	Grocery	Other	4.81	85.39	19%	85.39	8.69	17%	8.69	0.01	0.00	127.04	51.07
Floating Condenser Head Pressure Controls Installation	Grocery	Other	3.04	43.83	22%	43.83	0.00	17%	0.00	0.02	0.01	N/A	75.60
Strip Curtains for Walk-Ins	Grocery	Other	2.14	17.32	22%	17.32	1.76	18%	1.76	0.03	0.01	285.08	87.05
Anti-Sweat (Humidistat) Controls	Grocery	Other	1.72	57.51	26%	57.51	3.16	20%	3.16	0.03	0.01	606.31	133.43
Reduced Speed or Cycling of Evaporator Fans	Grocery	Other	1.56	4.95	26%	4.95	0.00	20%	0.00	0.03	0.01	N/A	138.09
High Efficiency Case Fans	Grocery	Other	0.79	150.53	34%	0.00	15.32	28%	0.00	0.08	0.03	776.54	330.85
Compressor VSD retrofit	Grocery	Other	0.61	31.82	36%	0.00	1.75	29%	0.00	0.09	0.03	1,707.07	376.74
Low Flow Fixtures	Grocery	Other	47.58	1.24	6%	1.24	0.10	6%	0.10	0.00	0.00	19.63	19.63
High Efficiency Water Heater	Grocery	Other	6.77	1.05	11%	1.05	0.08	11%	0.08	0.01	0.01	137.99	74.07
Heat Pump Water Heater	Grocery	Other	3.94	0.08	11%	0.08	0.01	11%	0.01	0.02	0.01	237.25	79.55
Vendor Miser	Grocery	Other	147.34	67.69	3%	67.69	6.89	3%	6.89	0.00	0.00	4.15	4.15
Incandescent to HID	Lodging	Lighting	1.48	3.14	14%	3.14	0.00	0%	0.00	0.04	0.04	N/A	N/A
Pulse Start MH	Lodging	Lighting	1.20	0.67	17%	0.67	0.00	0%	0.00	0.04	0.04	N/A	N/A
MV to HID	Lodging	Lighting	0.89	2.33	28%	0.00	0.00	0%	0.00	0.06	0.05	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Photocell Controls	Lodging	Lighting	0.37	0.32	29%	0.00	0.00	0%	0.00	0.15	0.05	N/A	N/A
T8/Electronic Ballasts (ROB)	Lodging	Lighting	115.46	0.69	1%	0.69	0.10	1%	0.10	0.00	0.00	4.40	4.40
Reflectors/Design (ROB)	Lodging	Lighting	15.31	0.75	2%	0.75	0.11	2%	0.11	0.00	0.00	33.20	19.48
Super T8s (ROB)	Lodging	Lighting	7.03	0.83	4%	0.83	0.12	4%	0.12	0.01	0.01	72.34	38.81
Reflectors/Design	Lodging	Lighting	14.89	6.59	15%	6.59	0.93	15%	0.93	0.00	0.00	34.14	35.34
Super T8s	Lodging	Lighting	6.10	6.49	26%	6.49	0.91	26%	0.91	0.01	0.01	83.25	55.59
T8/Electronic Ballasts	Lodging	Lighting	84.94	4.54	34%	4.54	0.64	34%	0.64	0.00	0.01	5.98	44.27
Occupancy Sensors	Lodging	Lighting	0.96	3.73	41%	0.00	0.04	35%	0.00	0.06	0.02	5,998.44	128.78
Daylighting Controls	Lodging	Lighting	0.21	1.39	43%	0.00	0.03	35%	0.00	0.37	0.04	18,607.34	308.06
Super T8s (ROB)	Lodging	Lighting	11.98	1.65	11%	1.65	0.23	11%	0.23	0.01	0.01	42.42	42.42
Occupancy Sensors	Lodging	Lighting	5.11	0.31	13%	0.31	0.04	13%	0.04	0.01	0.01	99.51	51.42
Compact Fluorescent Fixture (ROB)	Lodging	Lighting	6.38	3.51	2%	3.51	0.49	2%	0.49	0.01	0.01	79.61	79.61
Compact Fluorescent Fixture	Lodging	Lighting	6.26	30.95	19%	30.95	4.35	19%	4.35	0.01	0.01	81.14	80.98
Compact Fluorescent Lamp (ROB)	Lodging	Lighting	4.85	6.66	22%	6.66	0.94	22%	0.94	0.01	0.01	104.70	84.83
Compact Fluorescent Lamp	Lodging	Lighting	3.40	57.30	53%	57.30	8.05	53%	8.05	0.02	0.02	149.67	122.58
Occupancy Sensors	Lodging	Lighting	0.68	8.51	58%	0.00	0.09	53%	0.00	0.09	0.02	8,402.33	177.15
Daylighting Controls	Lodging	Lighting	0.08	3.16	59%	0.00	0.06	54%	0.00	1.00	0.05	50,043.41	402.99
HID (ROB)	Lodging	Lighting	2.35	0.62	2%	0.62	0.09	2%	0.09	0.03	0.03	215.87	215.87
HID	Lodging	Lighting	2.30	10.82	46%	10.82	1.52	46%	1.52	0.03	0.03	221.34	221.05
Occupancy Sensors	Lodging	Lighting	0.79	1.32	51%	0.00	0.01	46%	0.00	0.08	0.04	7,293.28	282.96
T5 for High Bay	Lodging	Lighting	0.68	0.22	52%	0.00	0.03	47%	0.00	0.10	0.04	742.11	291.51
Daylighting Controls	Lodging	Lighting	0.26	0.48	54%	0.00	0.01	47%	0.00	0.30	0.05	14,744.75	375.19
Exit Signs (LED - ROB)	Lodging	Lighting	1.52	0.65	7%	0.65	0.07	7%	0.07	0.04	0.04	354.32	354.32
Exit Signs (LED)	Lodging	Lighting	1.42	5.46	61%	5.46	0.62	61%	0.62	0.04	0.04	378.95	376.34
HID (ROB)	Lodging	Lighting	1.38	0.60	2%	0.60	0.08	2%	0.08	0.05	0.05	367.93	367.93
T5 for High Bay	Lodging	Lighting	1.15	0.68	4%	0.68	0.10	4%	0.10	0.06	0.06	442.26	407.24

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
HID	Lodging	Lighting	0.90	10.48	34%	0.00	1.47	34%	0.00	0.08	0.08	567.31	549.84
Roof Insulation	Lodging	HVAC	1.60	0.79	1%	0.79	0.00	0%	0.00	0.03	0.03	N/A	N/A
Proper Installation	Lodging	HVAC	5.09	1.54	10%	1.54	0.39	10%	0.39	0.02	0.02	61.88	61.88
Tune Up/Advanced Diagnostics	Lodging	HVAC	2.21	0.57	14%	0.57	0.15	14%	0.15	0.04	0.02	142.63	83.75
High Efficiency Heat Pump	Lodging	HVAC	2.35	0.73	18%	0.73	0.19	18%	0.19	0.03	0.02	134.27	96.75
Roof Insulation	Lodging	HVAC	1.47	0.11	19%	0.11	0.03	19%	0.03	0.05	0.02	188.90	88.85
Commissioning	Lodging	HVAC	0.24	0.32	21%	0.00	0.08	21%	0.00	0.33	0.06	1,309.48	219.01
Energy Management Systems	Lodging	HVAC	0.20	1.94	34%	0.00	0.28	28%	0.00	0.32	0.16	2,215.06	727.02
Window Film	Lodging	HVAC	0.16	0.06	34%	0.00	0.02	29%	0.00	0.51	0.16	2,015.61	744.88
High Efficiency AC	Lodging	HVAC	1.05	28.24	14%	28.24	10.79	14%	10.79	0.09	0.09	226.07	226.07
Roof Insulation	Lodging	HVAC	0.70	1.47	15%	0.00	0.56	15%	0.00	0.11	0.08	299.81	203.85
Energy Management Systems	Lodging	HVAC	0.13	24.78	27%	0.00	5.02	21%	0.00	0.53	0.29	2,593.83	955.97
Window Film	Lodging	HVAC	0.08	0.89	27%	0.00	0.34	22%	0.00	1.17	0.30	3,058.88	998.78
Proper Installation	Lodging	HVAC	3.65	5.53	10%	5.53	2.11	10%	2.11	0.02	0.02	65.12	65.12
Tune Up/Advanced Diagnostics	Lodging	HVAC	1.58	2.06	14%	2.06	0.79	14%	0.79	0.06	0.03	150.10	88.14
High Efficiency AC	Lodging	HVAC	1.68	2.63	18%	2.63	1.00	18%	1.00	0.05	0.04	141.30	101.81
Roof Insulation	Lodging	HVAC	0.66	0.38	19%	0.00	0.15	19%	0.00	0.12	0.04	316.22	97.75
Commissioning	Lodging	HVAC	0.17	1.15	21%	0.00	0.44	21%	0.00	0.53	0.09	1,378.04	234.84
Energy Management Systems	Lodging	HVAC	0.12	6.28	33%	0.00	1.27	27%	0.00	0.57	0.26	2,807.84	803.04
Window Film	Lodging	HVAC	0.07	0.23	33%	0.00	0.09	28%	0.00	1.27	0.27	3,311.26	840.03
High Efficiency Chillers	Lodging	HVAC	5.47	0.77	7%	0.77	0.30	7%	0.30	0.02	0.02	43.39	43.39
Tune Up/Advanced Diagnostics	Lodging	HVAC	1.80	0.11	8%	0.11	0.04	8%	0.04	0.05	0.02	132.06	54.24
VSD Chillers	Lodging	HVAC	1.04	0.11	9%	0.11	0.01	8%	0.01	0.06	0.03	554.37	72.75
Roof Insulation	Lodging	HVAC	0.74	0.09	10%	0.00	0.03	9%	0.00	0.11	0.03	283.10	82.83
Energy Management Systems	Lodging	HVAC	0.17	0.85	17%	0.00	0.17	13%	0.00	0.42	0.21	2,096.36	713.27
Commissioning	Lodging	HVAC	0.12	0.24	19%	0.00	0.09	15%	0.00	0.77	0.27	2,020.66	896.23

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Window Film	Lodging	HVAC	0.09	0.05	20%	0.00	0.02	16%	0.00	1.06	0.29	2,770.49	954.63
Variable Air Volume Control (VSD)	Lodging	HVAC	N/A	0.00	0%	0.00	0.00	0%	0.00	0.04	0.04	828.15	828.15
High Efficiency Motors	Lodging	HVAC	11.59	2.12	2%	2.12	0.47	2%	0.47	0.01	0.01	26.62	26.62
Energy Management Systems	Lodging	HVAC	0.48	19.57	21%	0.00	1.82	10%	0.00	0.11	0.10	1,206.06	964.37
High Efficiency Ice Makers	Lodging	Other	5.40	62.43	95%	62.43	11.49	95%	11.49	0.01	0.01	67.27	67.27
Low Flow Fixtures	Lodging	Other	51.52	1.25	6%	1.25	0.62	6%	0.62	0.00	0.00	3.19	3.19
High Efficiency Water Heater	Lodging	Other	7.33	1.07	11%	1.07	0.53	11%	0.53	0.01	0.01	22.43	12.04
Heat Pump Water Heater	Lodging	Other	4.26	0.08	11%	0.08	0.04	11%	0.04	0.02	0.01	38.56	12.93
Vendor Miser	Lodging	Other	3.19	52.67	16%	52.67	9.69	16%	9.69	0.02	0.02	113.96	113.96
Incandescent to HID	Misc.Comm.	Lighting	1.53	4.96	3%	4.96	0.00	0%	0.00	0.03	0.03	N/A	N/A
Pulse Start MH	Misc.Comm.	Lighting	1.36	7.18	8%	7.18	0.00	0%	0.00	0.04	0.04	N/A	N/A
MV to HID	Misc.Comm.	Lighting	1.03	24.64	23%	24.64	0.00	0%	0.00	0.05	0.05	N/A	N/A
Photocell Controls	Misc.Comm.	Lighting	0.41	2.49	24%	0.00	0.00	0%	0.00	0.14	0.05	N/A	N/A
T8/Electronic Ballasts (ROB)	Misc.Comm.	Lighting	97.20	3.38	1%	3.38	0.86	1%	0.86	0.00	0.00	2.81	2.81
Reflectors/Design (ROB)	Misc.Comm.	Lighting	12.89	3.72	2%	3.72	0.95	2%	0.95	0.01	0.00	21.21	12.44
Super T8s (ROB)	Misc.Comm.	Lighting	5.91	4.09	4%	4.09	1.05	4%	1.05	0.01	0.01	46.22	24.79
Reflectors/Design	Misc.Comm.	Lighting	12.53	32.53	15%	32.53	8.31	15%	8.31	0.01	0.01	21.81	22.58
Super T8s	Misc.Comm.	Lighting	5.14	32.02	26%	32.02	8.18	26%	8.18	0.01	0.01	53.19	35.52
T8/Electronic Ballasts	Misc.Comm.	Lighting	71.51	22.41	34%	22.41	5.73	34%	5.73	0.00	0.01	3.82	28.28
Occupancy Sensors	Misc.Comm.	Lighting	0.79	18.95	41%	0.00	0.36	35%	0.00	0.07	0.02	3,832.36	82.28
Daylighting Controls	Misc.Comm.	Lighting	0.16	6.45	43%	0.00	0.25	35%	0.00	0.46	0.04	11,925.63	196.83
Super T8s (ROB)	Misc.Comm.	Lighting	10.08	8.14	11%	8.14	2.08	11%	2.08	0.01	0.01	27.10	27.10
Occupancy Sensors	Misc.Comm.	Lighting	4.30	1.52	13%	1.52	0.39	13%	0.39	0.02	0.01	63.58	32.85
Compact Fluorescent Lamp (ROB)	Misc.Comm.	Lighting	5.92	8.98	4%	8.98	2.30	4%	2.30	0.01	0.01	48.65	48.65
Compact Fluorescent Fixture (ROB)	Misc.Comm.	Lighting	5.14	3.68	6%	3.68	0.94	6%	0.94	0.01	0.01	53.21	48.23
Compact Fluorescent Fixture	Misc.Comm.	Lighting	5.04	32.49	22%	32.49	8.30	22%	8.30	0.01	0.01	54.23	52.55

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Compact Fluorescent Lamp	Misc.Comm.	Lighting	3.37	62.92	53%	62.92	16.08	53%	16.08	0.02	0.02	85.42	72.85
Occupancy Sensors	Misc.Comm.	Lighting	0.56	9.61	58%	0.00	0.18	53%	0.00	0.10	0.02	5,368.18	104.10
Daylighting Controls	Misc.Comm.	Lighting	0.06	3.27	59%	0.00	0.13	54%	0.00	1.24	0.06	32,073.32	248.43
HID (ROB)	Misc.Comm.	Lighting	1.91	0.61	2%	0.61	0.16	2%	0.16	0.04	0.04	150.55	150.55
HID	Misc.Comm.	Lighting	1.86	10.76	46%	10.76	2.75	46%	2.75	0.04	0.04	154.37	154.17
Occupancy Sensors	Misc.Comm.	Lighting	0.65	1.35	51%	0.00	0.03	46%	0.00	0.09	0.04	4,659.62	185.89
T5 for High Bay	Misc.Comm.	Lighting	0.57	0.22	52%	0.00	0.06	47%	0.00	0.12	0.04	475.62	191.26
Daylighting Controls	Misc.Comm.	Lighting	0.20	0.45	54%	0.00	0.02	47%	0.00	0.36	0.05	9,450.06	244.71
Exit Signs (LED - ROB)	Misc.Comm.	Lighting	1.52	0.76	7%	0.76	0.09	7%	0.09	0.04	0.04	354.32	354.32
Exit Signs (LED)	Misc.Comm.	Lighting	1.42	6.40	61%	6.40	0.73	61%	0.73	0.04	0.04	378.95	376.34
HID (ROB)	Misc.Comm.	Lighting	1.12	3.59	2%	3.59	0.92	2%	0.92	0.07	0.07	256.61	256.61
T5 for High Bay	Misc.Comm.	Lighting	0.97	4.04	4%	0.00	1.03	4%	0.00	0.07	0.07	282.55	264.22
HID	Misc.Comm.	Lighting	0.73	62.29	34%	0.00	15.92	34%	0.00	0.10	0.10	395.66	382.85
Roof Insulation	Misc.Comm.	HVAC	1.10	0.06	1%	0.06	0.00	0%	0.00	0.05	0.05	N/A	N/A
Proper Installation	Misc.Comm.	HVAC	5.15	3.84	10%	3.84	1.14	10%	1.14	0.02	0.02	55.16	55.16
Tune Up/Advanced Diagnostics	Misc.Comm.	HVAC	2.23	1.42	14%	1.42	0.42	14%	0.42	0.04	0.02	127.14	74.65
High Efficiency Heat Pump	Misc.Comm.	HVAC	2.37	1.82	18%	1.82	0.54	18%	0.54	0.04	0.03	119.69	86.24
Roof Insulation	Misc.Comm.	HVAC	1.48	0.27	19%	0.27	0.08	19%	0.08	0.05	0.02	168.37	79.20
Commissioning	Misc.Comm.	HVAC	0.24	0.80	21%	0.00	0.24	21%	0.00	0.35	0.06	1,167.21	195.22
Energy Management Systems	Misc.Comm.	HVAC	0.22	5.52	36%	0.00	0.83	28%	0.00	0.30	0.15	1,974.41	648.04
Window Film	Misc.Comm.	HVAC	0.15	0.15	36%	0.00	0.04	29%	0.00	0.55	0.16	1,846.09	664.20
High Efficiency AC	Misc.Comm.	HVAC	1.38	68.97	14%	68.97	22.43	14%	22.43	0.06	0.06	193.65	193.65
Roof Insulation	Misc.Comm.	HVAC	0.91	3.60	15%	0.00	1.17	15%	0.00	0.08	0.06	256.82	174.63
Energy Management Systems	Misc.Comm.	HVAC	0.21	73.04	30%	0.00	10.44	21%	0.00	0.32	0.19	2,221.94	818.91
Window Film	Misc.Comm.	HVAC	0.10	2.10	30%	0.00	0.68	22%	0.00	0.88	0.20	2,714.81	856.19
Proper Installation	Misc.Comm.	HVAC	4.79	85.88	10%	85.88	27.93	10%	27.93	0.02	0.02	55.78	55.78

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Tune Up/Advanced Diagnostics	Misc.Comm.	HVAC	2.08	31.90	14%	31.90	10.38	14%	10.38	0.04	0.02	128.58	75.50
High Efficiency AC	Misc.Comm.	HVAC	2.21	40.79	18%	40.79	13.27	18%	13.27	0.04	0.03	121.04	87.22
Roof Insulation	Misc.Comm.	HVAC	0.87	5.95	19%	0.00	1.94	19%	0.00	0.09	0.03	270.88	83.74
Commissioning	Misc.Comm.	HVAC	0.23	17.80	21%	0.00	5.79	21%	0.00	0.38	0.07	1,180.47	201.17
Energy Management Systems	Misc.Comm.	HVAC	0.19	117.63	35%	0.00	16.81	27%	0.00	0.34	0.17	2,405.27	687.91
Window Film	Misc.Comm.	HVAC	0.09	3.38	35%	0.00	1.10	28%	0.00	0.96	0.18	2,938.81	719.96
High Efficiency Chillers	Misc.Comm.	HVAC	7.18	3.40	7%	3.40	1.10	7%	1.10	0.01	0.01	37.17	37.17
Tune Up/Advanced Diagnostics	Misc.Comm.	HVAC	2.36	0.47	8%	0.47	0.15	8%	0.15	0.04	0.02	113.13	46.46
VSD Chillers	Misc.Comm.	HVAC	1.37	0.50	9%	0.50	0.05	8%	0.05	0.05	0.02	474.89	62.32
Roof Insulation	Misc.Comm.	HVAC	0.97	0.38	10%	0.00	0.12	9%	0.00	0.08	0.02	242.55	70.96
Energy Management Systems	Misc.Comm.	HVAC	0.26	4.64	19%	0.00	0.66	13%	0.00	0.25	0.13	1,733.57	604.30
Commissioning	Misc.Comm.	HVAC	0.15	1.01	21%	0.00	0.33	15%	0.00	0.58	0.18	1,771.98	762.93
Window Film	Misc.Comm.	HVAC	0.11	0.23	22%	0.00	0.08	16%	0.00	0.79	0.19	2,429.54	813.39
High Efficiency Motors	Misc.Comm.	HVAC	11.66	6.35	2%	6.35	1.15	2%	1.15	0.01	0.01	33.82	33.82
Variable Air Volume Control (VSD)	Misc.Comm.	HVAC	1.05	1.46	2%	1.46	0.07	2%	0.07	0.05	0.01	1,081.96	90.84
Energy Management Systems	Misc.Comm.	HVAC	0.44	48.18	18%	0.00	4.03	9%	0.00	0.13	0.11	1,539.89	1,204.69
High Efficiency Ice Makers	Misc.Comm.	Other	4.54	5.36	2%	5.36	0.56	2%	0.56	0.01	0.01	140.71	140.71
Low Flow Fixtures	Misc.Comm.	Other	39.74	6.90	6%	6.90	0.84	6%	0.84	0.00	0.00	14.87	14.87
High Efficiency Water Heater	Misc.Comm.	Other	5.65	5.88	11%	5.88	0.72	11%	0.72	0.01	0.01	104.50	56.10
Heat Pump Water Heater	Misc.Comm.	Other	3.29	0.44	11%	0.44	0.05	11%	0.05	0.02	0.01	179.68	60.25
Vendor Miser	Misc.Comm.	Other	1.45	226.04	16%	226.04	23.63	16%	23.63	0.05	0.05	440.45	440.45
High Efficacy Source	Office	Lighting	22.25	11.55	20%	11.55	4.68	20%	4.68	0.00	0.00	9.43	9.43
Daylighting	Office	Lighting	6.60	10.16	37%	10.16	0.47	22%	0.47	0.01	0.01	249.18	31.20
DX Packaged System, EER=9.5, 10 tons	Office	HVAC	N/A	4.25	0%	4.25	2.20	0%	2.20	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Office	HVAC	2.15	0.65	5%	0.65	0.34	5%	0.34	0.04	0.04	83.78	83.78
DX Packaged System, EER=10.9, 10 tons	Office	HVAC	1.51	0.14	7%	0.14	0.07	7%	0.07	0.06	0.05	119.32	90.13

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
DX Tune Up/ Advanced Diagnostics	Office	HVAC	0.80	0.76	13%	0.00	0.16	9%	0.00	0.09	0.07	432.55	185.00
Low-e Windows	Office	HVAC	1.46	0.66	18%	0.66	0.34	14%	0.34	0.06	0.07	123.60	161.92
High Efficiency Chillers	Office	HVAC	4.16	0.68	6%	0.68	0.35	6%	0.35	0.02	0.02	43.37	43.37
Tune Up/Advanced Diagnostics	Office	HVAC	1.36	0.48	10%	0.48	0.25	10%	0.25	0.07	0.04	132.88	80.15
VSD Chillers	Office	HVAC	0.78	0.16	11%	0.00	0.02	10%	0.00	0.09	0.05	571.66	99.00
High Efficacy Source	Retail	Lighting	27.15	8.83	23%	8.83	1.59	23%	1.59	0.00	0.00	16.05	16.05
Daylighting	Retail	Lighting	1.85	1.66	28%	1.66	0.03	24%	0.03	0.04	0.01	1,988.36	57.19
DX Packaged System, EER=9.5, 10 tons	Retail	HVAC	N/A	4.79	0%	4.79	2.33	0%	2.33	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Retail	HVAC	3.46	0.73	5%	0.73	0.36	5%	0.36	0.03	0.03	63.37	63.37
DX Packaged System, EER=10.9, 10 tons	Retail	HVAC	2.43	0.16	7%	0.16	0.08	7%	0.08	0.04	0.03	90.25	68.17
DX Tune Up/ Advanced Diagnostics	Retail	HVAC	0.88	0.53	10%	0.00	0.16	9%	0.00	0.10	0.06	335.21	140.86
Low-e Windows	Retail	HVAC	2.41	0.76	16%	0.76	0.37	15%	0.37	0.04	0.05	90.99	121.72
High Efficiency Chillers	Retail	HVAC	6.68	0.17	6%	0.17	0.08	6%	0.08	0.02	0.02	32.81	32.81
Tune Up/Advanced Diagnostics	Retail	HVAC	2.18	0.12	10%	0.12	0.06	10%	0.06	0.05	0.03	100.51	60.62
VSD Chillers	Retail	HVAC	0.78	0.02	10%	0.00	0.01	10%	0.00	0.11	0.04	433.79	74.89
High Efficacy Source	Health Care	Lighting	19.86	3.83	18%	3.83	0.44	18%	0.44	0.00	0.00	30.79	30.79
Daylighting	Health Care	Lighting	3.61	1.88	28%	1.88	0.03	20%	0.03	0.02	0.01	1,443.39	106.06
DX Packaged System, EER=9.5, 10 tons	Health Care	HVAC	N/A	0.75	0%	0.75	0.30	0%	0.30	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Health Care	HVAC	3.07	0.11	5%	0.11	0.05	5%	0.05	0.03	0.03	75.95	75.95
DX Packaged System, EER=10.9, 10 tons	Health Care	HVAC	2.15	0.02	7%	0.02	0.01	7%	0.01	0.04	0.03	108.17	81.71
DX Tune Up/ Advanced Diagnostics	Health Care	HVAC	0.96	0.11	12%	0.00	0.02	9%	0.00	0.07	0.05	396.08	168.18
Low-e Windows	Health Care	HVAC	2.10	0.12	17%	0.12	0.05	14%	0.05	0.04	0.05	110.78	146.41
High Efficiency Chillers	Health Care	HVAC	5.93	0.25	6%	0.25	0.10	6%	0.10	0.02	0.02	39.32	39.32
Tune Up/Advanced Diagnostics	Health Care	HVAC	1.93	0.17	10%	0.17	0.07	10%	0.07	0.05	0.03	120.46	72.66
VSD Chillers	Health Care	HVAC	0.90	0.05	11%	0.00	0.01	10%	0.00	0.07	0.03	518.93	89.75
High Efficacy Source	Education	Lighting	14.39	4.42	17%	4.42	1.31	17%	1.31	0.01	0.01	19.80	19.80

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Daylighting	Education	Lighting	7.70	6.76	44%	6.76	0.23	20%	0.23	0.01	0.01	302.56	61.44
DX Packaged System, EER=9.5, 10 tons	Education	HVAC	N/A	1.96	0%	1.96	1.23	0%	1.23	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Education	HVAC	2.76	0.30	5%	0.30	0.19	5%	0.19	0.04	0.04	63.97	63.97
DX Packaged System, EER=10.9, 10 tons	Education	HVAC	1.94	0.06	7%	0.06	0.04	7%	0.04	0.06	0.04	91.11	68.82
DX Tune Up/ Advanced Diagnostics	Education	HVAC	0.62	0.20	10%	0.00	0.09	9%	0.00	0.15	0.08	339.80	142.37
Low-e Windows	Education	HVAC	1.93	0.31	16%	0.31	0.20	15%	0.20	0.06	0.07	91.45	122.75
High Efficiency Chillers	Education	HVAC	5.33	0.02	6%	0.02	0.01	6%	0.01	0.02	0.02	33.12	33.12
Tune Up/Advanced Diagnostics	Education	HVAC	1.74	0.02	10%	0.02	0.01	10%	0.01	0.06	0.04	101.46	61.20
VSD Chillers	Education	HVAC	0.53	0.00	10%	0.00	0.00	10%	0.00	0.16	0.05	438.16	75.61
High Efficacy Source	Warehouse	Lighting	5.30	3.35	18%	3.35	0.62	18%	0.62	0.01	0.01	74.87	74.87
Daylighting	Warehouse	Lighting	2.52	4.42	42%	4.42	0.09	21%	0.09	0.03	0.02	1,305.18	236.61
DX Packaged System, EER=9.5, 10 tons	Warehouse	HVAC	N/A	2.37	0%	2.37	0.92	0%	0.92	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Warehouse	HVAC	3.92	0.36	5%	0.36	0.14	5%	0.14	0.02	0.02	61.75	61.75
DX Packaged System, EER=10.9, 10 tons	Warehouse	HVAC	2.75	0.08	7%	0.08	0.03	7%	0.03	0.03	0.03	87.94	66.43
DX Tune Up/ Advanced Diagnostics	Warehouse	HVAC	1.27	0.37	12%	0.37	0.07	9%	0.07	0.06	0.04	321.72	136.70
Low-e Windows	Warehouse	HVAC	2.68	0.37	17%	0.37	0.14	14%	0.14	0.04	0.04	90.17	119.07
High Efficiency Chillers	Warehouse	HVAC	N/A	0.00	6%	0.00	0.00	6%	0.00	0.01	0.01	31.97	31.97
VSD Chillers	Warehouse	HVAC	N/A	0.00	18%	0.00	0.00	10%	0.00	0.06	0.04	406.97	177.03
Tune Up/Advanced Diagnostics	Warehouse	HVAC	N/A	0.00	21%	0.00	0.00	14%	0.00	0.04	0.04	112.19	160.72
High Efficacy Source	Grocery	Lighting	11.10	3.11	15%	3.11	0.56	15%	0.56	0.01	0.01	35.78	35.78
Daylighting	Grocery	Lighting	0.00	0.00	15%	0.00	0.00	15%	0.00	N/A	0.02	N/A	130.19
DX Packaged System, EER=9.5, 10 tons	Grocery	HVAC	N/A	4.71	0%	4.71	2.34	0%	2.34	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Grocery	HVAC	3.81	0.72	5%	0.72	0.36	5%	0.36	0.03	0.03	55.60	55.60
DX Packaged System, EER=10.9, 10 tons	Grocery	HVAC	2.67	0.16	7%	0.16	0.08	7%	0.08	0.04	0.03	79.18	59.81
DX Tune Up/ Advanced Diagnostics	Grocery	HVAC	0.91	0.51	10%	0.00	0.16	9%	0.00	0.09	0.05	294.31	123.61
Low-e Windows	Grocery	HVAC	2.66	0.75	16%	0.75	0.37	15%	0.37	0.04	0.05	79.76	106.77

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Efficiency Chillers	Grocery	HVAC	N/A	0.00	6%	0.00	0.00	6%	0.00	0.01	0.01	28.78	28.78
VSD Chillers	Grocery	HVAC	N/A	0.00	14%	0.00	0.00	10%	0.00	0.10	0.06	367.19	159.52
Tune Up/Advanced Diagnostics	Grocery	HVAC	N/A	0.00	17%	0.00	0.00	14%	0.00	0.05	0.06	96.50	143.11
High Efficacy Source	Lodging	Lighting	7.14	1.38	13%	1.38	0.19	13%	0.19	0.01	0.01	71.18	71.18
Daylighting	Lodging	Lighting	0.37	0.19	15%	0.00	0.00	13%	0.00	0.19	0.03	11,640.47	254.89
DX Packaged System, EER=9.5, 10 tons	Lodging	HVAC	N/A	0.56	0%	0.56	0.21	0%	0.21	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Lodging	HVAC	2.89	0.09	5%	0.09	0.03	5%	0.03	0.03	0.03	82.10	82.10
DX Packaged System, EER=10.9, 10 tons	Lodging	HVAC	2.03	0.02	7%	0.02	0.01	7%	0.01	0.04	0.03	116.93	88.32
DX Tune Up/ Advanced Diagnostics	Lodging	HVAC	1.07	0.10	13%	0.10	0.02	9%	0.02	0.07	0.05	424.80	181.40
Low-e Windows	Lodging	HVAC	1.97	0.09	18%	0.09	0.03	14%	0.03	0.05	0.05	120.83	158.59
High Efficiency Chillers	Lodging	HVAC	5.59	0.02	6%	0.02	0.01	6%	0.01	0.02	0.02	42.50	42.50
Tune Up/Advanced Diagnostics	Lodging	HVAC	1.82	0.01	10%	0.01	0.00	10%	0.00	0.05	0.03	130.22	78.54
VSD Chillers	Lodging	HVAC	1.03	0.00	11%	0.00	0.00	10%	0.00	0.07	0.03	560.37	97.02
High Efficacy Source	Misc.Comm.	Lighting	4.06	2.31	18%	2.31	0.59	18%	0.59	0.02	0.02	70.95	70.95
Daylighting	Misc.Comm.	Lighting	0.94	1.52	30%	0.00	0.04	19%	0.00	0.07	0.04	2,471.16	240.00
DX Packaged System, EER=9.5, 10 tons	Misc.Comm.	HVAC	N/A	3.87	0%	3.87	1.26	0%	1.26	N/A	N/A	N/A	N/A
DX Packaged System, EER=10.3, 10 tons	Misc.Comm.	HVAC	3.80	0.59	5%	0.59	0.19	5%	0.19	0.02	0.02	70.33	70.33
DX Packaged System, EER=10.9, 10 tons	Misc.Comm.	HVAC	2.67	0.13	7%	0.13	0.04	7%	0.04	0.03	0.02	100.16	75.66
DX Tune Up/ Advanced Diagnostics	Misc.Comm.	HVAC	1.40	0.68	13%	0.68	0.09	9%	0.09	0.05	0.04	363.60	155.36
Low-e Windows	Misc.Comm.	HVAC	2.58	0.60	18%	0.60	0.20	14%	0.20	0.03	0.04	103.60	135.88
High Efficiency Chillers	Misc.Comm.	HVAC	7.33	0.04	6%	0.04	0.01	6%	0.01	0.01	0.01	36.41	36.41
Tune Up/Advanced Diagnostics	Misc.Comm.	HVAC	2.39	0.02	10%	0.02	0.01	10%	0.01	0.04	0.02	111.55	67.28
VSD Chillers	Misc.Comm.	HVAC	1.36	0.01	11%	0.01	0.00	10%	0.00	0.05	0.02	479.97	83.11

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
COMMERCIAL & INDUSTRIAL													
GAS													
High Efficiency Conventional Heater	Office	HVAC	6.30	17,024,556	5%	17,024,556	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Office	HVAC	2.10	9,475,693	9%	9,475,693	-	-	-	0.30	0.17	45.51	26.02
Vent Damper	Office	HVAC	12.14	12,878,975	13%	12,878,975	-	-	-	0.05	0.13	7.88	20.09
Roof Insulation	Office	HVAC	43.53	10,259,760	16%	10,259,760	-	-	-	0.01	0.10	1.93	14.42
High Efficiency Water Heater	Office	Water Heating	4.51	12,645,937	14%	12,645,937	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Office	Water Heating	7.33	4,324,910	19%	4,324,910	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Retail	HVAC	6.30	9,930,532	6%	9,930,532	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Retail	HVAC	2.09	6,219,552	10%	6,219,552	-	-	-	0.30	0.18	45.68	26.92
Vent Damper	Retail	HVAC	N/A	0	10%	0	-	-	-	0.05	0.18	7.96	26.92
Roof Insulation	Retail	HVAC	45.12	5,828,275	13%	5,828,275	-	-	-	0.01	0.12	1.87	17.90
High Efficiency Water Heater	Retail	Water Heating	4.51	6,929,892	14%	6,929,892	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Retail	Water Heating	7.33	2,370,023	19%	2,370,023	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Health Care	HVAC	6.30	5,157,990	6%	5,157,990	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Health Care	HVAC	2.09	3,229,350	10%	3,229,350	-	-	-	0.30	0.18	45.69	26.93
Vent Damper	Health Care	HVAC	12.01	4,907,591	15%	4,907,591	-	-	-	0.05	0.13	7.97	19.93
Roof Insulation	Health Care	HVAC	42.30	2,822,364	18%	2,822,364	-	-	-	0.01	0.10	1.99	14.81
High Efficiency Water Heater	Health Care	Water Heating	4.51	3,579,279	14%	3,579,279	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Health Care	Water Heating	7.33	1,224,113	19%	1,224,113	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Education	HVAC	6.30	6,826,499	6%	6,826,499	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Education	HVAC	2.10	3,876,089	9%	3,876,089	-	-	-	0.30	0.17	45.66	26.22
Vent Damper	Education	HVAC	12.07	5,781,231	14%	5,781,231	-	-	-	0.05	0.13	7.93	19.80
Roof Insulation	Education	HVAC	42.86	3,825,144	17%	3,825,144	-	-	-	0.01	0.10	1.96	14.51
High Efficiency Water Heater	Education	Water Heating	4.51	4,788,342	14%	4,788,342	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Education	Water Heating	7.33	1,637,613	19%	1,637,613	-	-	-	0.10	0.14	35.85	52.55

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Efficiency Conventional Heater	Warehouse	HVAC	6.30	3,138,092	2%	3,138,092	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Warehouse	HVAC	2.18	2,045,026	3%	2,045,026	-	-	-	0.29	0.18	43.90	26.51
Vent Damper	Warehouse	HVAC	12.83	1,947,444	5%	1,947,444	-	-	-	0.05	0.14	7.46	21.31
Roof Insulation	Warehouse	HVAC	47.56	5,579,143	8%	5,579,143	-	-	-	0.01	0.07	1.77	11.29
High Efficiency Water Heater	Warehouse	Water Heating	4.51	6,293,680	14%	6,293,680	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Warehouse	Water Heating	7.33	2,152,438	19%	2,152,438	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Grocery	HVAC	6.30	5,938,775	5%	5,938,775	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Grocery	HVAC	2.11	3,390,465	8%	3,390,465	-	-	-	0.30	0.17	45.40	26.16
Vent Damper	Grocery	HVAC	12.18	4,032,374	12%	4,032,374	-	-	-	0.05	0.14	7.86	20.64
Roof Insulation	Grocery	HVAC	43.96	3,773,543	15%	3,773,543	-	-	-	0.01	0.10	1.91	14.58
High Efficiency Water Heater	Grocery	Water Heating	4.51	4,605,378	14%	4,605,378	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Grocery	Water Heating	7.33	1,575,039	19%	1,575,039	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Lodging	HVAC	6.30	1,698,612	6%	1,698,612	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Lodging	HVAC	2.09	649,147	8%	649,147	-	-	-	0.30	0.16	45.69	23.62
Vent Damper	Lodging	HVAC	12.20	958,849	11%	958,849	-	-	-	0.05	0.13	7.84	19.04
Roof Insulation	Lodging	HVAC	44.15	970,109	15%	970,109	-	-	-	0.01	0.09	1.91	13.38
High Efficiency Water Heater	Lodging	Water Heating	4.51	1,178,716	14%	1,178,716	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Lodging	Water Heating	7.33	403,121	19%	403,121	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Misc.Comm.	HVAC	6.30	27,887,662	6%	27,887,662	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Misc.Comm.	HVAC	2.09	17,460,102	10%	17,460,102	-	-	-	0.30	0.18	45.69	26.93
Vent Damper	Misc.Comm.	HVAC	12.01	26,557,734	15%	26,557,734	-	-	-	0.05	0.13	7.97	19.93
Roof Insulation	Misc.Comm.	HVAC	42.30	15,258,745	18%	15,258,745	-	-	-	0.01	0.10	1.99	14.81
High Efficiency Water Heater	Misc.Comm.	Water Heating	4.51	19,352,061	14%	19,352,061	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Misc.Comm.	Water Heating	7.33	6,618,405	19%	6,618,405	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Small Industrial	HVAC	6.30	238,129	6%	238,129	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Small Industrial	HVAC	2.09	148,816	10%	148,816	-	-	-	0.30	0.18	45.69	26.91

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Vent Damper	Small Industrial	HVAC	12.01	226,218	15%	226,218	-	-	-	0.05	0.13	7.96	19.92
Roof Insulation	Small Industrial	HVAC	42.33	130,740	18%	130,740	-	-	-	0.01	0.10	1.99	14.79
High Efficiency Water Heater	Small Industrial	Water Heating	4.51	15,138	14%	15,138	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Small Industrial	Water Heating	7.33	5,177	19%	5,177	-	-	-	0.10	0.14	35.85	52.55
High Efficiency Conventional Heater	Large Industrial	HVAC	6.30	1,362,452	6%	1,362,452	-	-	-	0.10	0.10	15.18	15.18
High Efficiency Condensing Heater	Large Industrial	HVAC	2.09	851,447	10%	851,447	-	-	-	0.30	0.18	45.69	26.91
Vent Damper	Large Industrial	HVAC	12.01	1,294,302	15%	1,294,302	-	-	-	0.05	0.13	7.96	19.92
Roof Insulation	Large Industrial	HVAC	42.33	748,025	18%	748,025	-	-	-	0.01	0.10	1.99	14.79
High Efficiency Water Heater	Large Industrial	Water Heating	4.51	86,611	14%	86,611	-	-	-	0.16	0.16	58.26	58.26
Low Flow Fixtures	Large Industrial	Water Heating	7.33	29,621	19%	29,621	-	-	-	0.10	0.14	35.85	52.55

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical GWh Savings	% GWh	Economic GWh Savings	Technical MW Savings	% MW Savings	Economic MW Savings	Marginal Energy Cost ($/kWh)	Average Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Average Capacity Cost ($/kW)
INDUSTRIAL													
ELECTRIC													
Incandescent to HID	SIC 28	Lighting	3.95	0.05	1%	0.05	0.00	0%	0.00	0.01	0.01	N/A	N/A
MV to HID	SIC 28	Lighting	2.84	0.64	18%	0.64	0.00	0%	0.00	0.02	0.02	N/A	N/A
Photocell Controls	SIC 28	Lighting	1.74	0.06	20%	0.06	0.00	0%	0.00	0.03	0.02	N/A	N/A
Pulse Start MH	SIC 28	Lighting	1.29	0.14	24%	0.14	0.00	0%	0.00	0.04	0.02	N/A	N/A
T8/Electronic Ballasts (ROB)	SIC 28	Lighting	124.84	0.17	1%	0.17	0.03	1%	0.03	0.00	0.00	3.02	3.02
Reflectors/Design (ROB)	SIC 28	Lighting	16.55	0.18	2%	0.18	0.03	2%	0.03	0.00	0.00	22.77	13.36
Super T8s (ROB)	SIC 28	Lighting	7.60	0.20	4%	0.20	0.03	4%	0.03	0.01	0.00	49.62	26.62
Reflectors/Design	SIC 28	Lighting	16.09	1.59	15%	1.59	0.28	15%	0.28	0.00	0.00	23.42	24.24
T8/Electronic Ballasts	SIC 28	Lighting	105.79	1.26	24%	1.26	0.22	24%	0.22	0.00	0.00	3.56	16.57

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Super T8s	SIC 28	Lighting	5.90	1.40	34%	1.40	0.24	34%	0.24	0.01	0.01	63.90	30.36
Occupancy Sensors	SIC 28	Lighting	1.14	1.03	42%	1.03	0.01	35%	0.01	0.05	0.01	4,114.68	88.34
Daylighting Controls	SIC 28	Lighting	0.18	0.25	43%	0.00	0.01	35%	0.00	0.43	0.03	12,957.59	211.35
Super T8s (ROB)	SIC 28	Lighting	12.95	0.40	11%	0.40	0.07	11%	0.07	0.01	0.01	29.10	29.10
Occupancy Sensors	SIC 28	Lighting	5.52	0.07	13%	0.07	0.01	13%	0.01	0.01	0.01	68.26	35.27
Compact Fluorescent Fixture (ROB)	SIC 28	Lighting	6.90	0.02	2%	0.02	0.00	2%	0.00	0.01	0.01	54.61	54.61
Compact Fluorescent Fixture	SIC 28	Lighting	6.77	0.19	19%	0.19	0.03	19%	0.03	0.01	0.01	55.66	55.55
Compact Fluorescent Lamp (ROB)	SIC 28	Lighting	5.03	0.04	22%	0.04	0.01	22%	0.01	0.01	0.01	74.89	58.68
Compact Fluorescent Lamp	SIC 28	Lighting	3.52	0.35	53%	0.35	0.06	53%	0.06	0.02	0.02	107.06	86.85
Occupancy Sensors	SIC 28	Lighting	0.82	0.06	58%	0.00	0.00	53%	0.00	0.07	0.02	5,763.65	124.26
Daylighting Controls	SIC 28	Lighting	0.07	0.01	60%	0.00	0.00	54%	0.00	1.16	0.04	34,848.73	279.19
HID (ROB)	SIC 28	Lighting	4.05	0.03	2%	0.03	0.01	2%	0.01	0.02	0.02	92.98	92.98
HID	SIC 28	Lighting	3.95	0.59	46%	0.59	0.10	46%	0.10	0.02	0.02	95.34	95.21
Occupancy Sensors	SIC 28	Lighting	0.94	0.08	52%	0.00	0.00	46%	0.00	0.06	0.02	5,002.89	138.18
T5 for High Bay	SIC 28	Lighting	0.73	0.01	53%	0.00	0.00	47%	0.00	0.09	0.02	516.78	145.12
Daylighting Controls	SIC 28	Lighting	0.22	0.02	54%	0.00	0.00	47%	0.00	0.34	0.03	10,267.80	202.87
Exit Signs (LED - ROB)	SIC 28	Lighting	1.52	0.01	7%	0.01	0.00	7%	0.00	0.04	0.04	354.32	354.32
Exit Signs (LED)	SIC 28	Lighting	1.42	0.12	61%	0.12	0.01	61%	0.01	0.04	0.04	378.95	376.34
HID (ROB)	SIC 28	Lighting	2.38	0.46	2%	0.46	0.08	2%	0.08	0.03	0.03	158.47	158.47
HID	SIC 28	Lighting	1.57	8.06	33%	8.06	1.40	33%	1.40	0.04	0.04	239.46	235.13
T5 for High Bay	SIC 28	Lighting	0.85	0.35	34%	0.00	0.06	34%	0.00	0.08	0.04	442.88	243.34
Roof Insulation	SIC 28	HVAC	2.57	0.05	1%	0.05	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	SIC 28	HVAC	8.56	0.67	10%	0.67	0.07	10%	0.07	0.01	0.01	81.56	81.56
Tune Up/Advanced Diagnostics	SIC 28	HVAC	3.71	0.25	14%	0.25	0.02	14%	0.02	0.02	0.01	188.00	110.39
High Efficiency Heat Pump	SIC 28	HVAC	3.94	0.32	18%	0.32	0.03	18%	0.03	0.02	0.01	176.98	127.52
Roof Insulation	SIC 28	HVAC	2.47	0.05	19%	0.05	0.00	19%	0.00	0.02	0.01	248.98	117.11

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Commissioning	SIC 28	HVAC	0.40	0.14	21%	0.00	0.01	21%	0.00	0.17	0.03	1,725.97	288.67
Energy Management Systems	SIC 28	HVAC	0.38	0.93	35%	0.00	0.05	28%	0.00	0.15	0.08	2,919.59	958.26
Window Film	SIC 28	HVAC	0.26	0.03	36%	0.00	0.00	29%	0.00	0.27	0.08	2,710.50	982.07
High Efficiency AC	SIC 28	HVAC	1.93	0.80	14%	0.80	0.15	14%	0.15	0.04	0.04	216.36	216.36
Roof Insulation	SIC 28	HVAC	1.28	0.04	15%	0.04	0.01	15%	0.01	0.05	0.04	286.93	195.10
Energy Management Systems	SIC 28	HVAC	0.30	0.85	30%	0.00	0.07	21%	0.00	0.20	0.12	2,482.45	914.92
Window Film	SIC 28	HVAC	0.14	0.02	30%	0.00	0.00	22%	0.00	0.57	0.13	3,032.11	956.56
Proper Installation	SIC 28	HVAC	6.71	2.63	10%	2.63	0.49	10%	0.49	0.01	0.01	62.32	62.32
Tune Up/Advanced Diagnostics	SIC 28	HVAC	2.91	0.98	14%	0.98	0.18	14%	0.18	0.03	0.02	143.66	84.35
High Efficiency AC	SIC 28	HVAC	3.09	1.25	18%	1.25	0.23	18%	0.23	0.03	0.02	135.24	97.44
Roof Insulation	SIC 28	HVAC	1.22	0.18	19%	0.18	0.03	19%	0.03	0.06	0.02	302.64	93.56
Commissioning	SIC 28	HVAC	0.32	0.55	21%	0.00	0.10	21%	0.00	0.25	0.04	1,318.87	224.75
Energy Management Systems	SIC 28	HVAC	0.27	3.60	35%	0.00	0.30	27%	0.00	0.22	0.11	2,687.27	768.56
Window Film	SIC 28	HVAC	0.13	0.10	35%	0.00	0.02	28%	0.00	0.61	0.12	3,282.29	804.37
High Efficiency Chillers	SIC 28	HVAC	10.08	0.14	7%	0.14	0.03	7%	0.03	0.01	0.01	41.53	41.53
Tune Up/Advanced Diagnostics	SIC 28	HVAC	3.31	0.02	8%	0.02	0.00	8%	0.00	0.02	0.01	126.39	51.91
VSD Chillers	SIC 28	HVAC	2.40	0.02	9%	0.02	0.00	8%	0.00	0.03	0.01	530.56	69.62
Roof Insulation	SIC 28	HVAC	1.36	0.02	10%	0.02	0.00	9%	0.00	0.05	0.01	271.50	79.29
Energy Management Systems	SIC 28	HVAC	0.38	0.18	19%	0.00	0.02	13%	0.00	0.16	0.09	1,941.13	675.70
Commissioning	SIC 28	HVAC	0.21	0.04	21%	0.00	0.01	15%	0.00	0.37	0.11	1,983.06	853.17
Window Film	SIC 28	HVAC	0.15	0.01	22%	0.00	0.00	16%	0.00	0.51	0.12	2,718.95	909.62
High Efficiency Motors	SIC 28	HVAC	14.03	0.60	2%	0.60	0.11	2%	0.11	0.00	0.00	25.03	25.03
Variable Air Volume Control (VSD)	SIC 28	HVAC	1.65	0.03	2%	0.03	0.00	2%	0.00	0.03	0.01	790.37	32.59
Energy Management Systems	SIC 28	HVAC	0.64	5.85	22%	0.00	0.42	10%	0.00	0.08	0.07	1,135.26	904.51
Heat Pump Water Heater	SIC 28	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	SIC 28	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Low Flow Fixtures	SIC 28	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Motors	SIC 28	Motor	10.01	15.47	1%	15.47	2.56	1%	2.56	0.01	0.01	39.49	39.49
Motor Practices Level 1	SIC 28	Motor	5.94	26.81	2%	26.81	4.44	2%	4.44	0.01	0.01	66.54	56.65
Process Support (Low)	SIC 28	Process	3.19	43.95	4%	43.95	7.27	4%	7.27	0.02	0.02	124.01	90.98
Process Motor VSD Controls	SIC 28	Motor	2.47	3.57	4%	3.57	0.39	4%	0.39	0.02	0.02	216.03	94.29
Process Compressed Air (Low)	SIC 28	Compressed Air	2.25	8.75	4%	8.75	1.45	4%	1.45	0.03	0.02	175.55	101.59
Process Support (Med)	SIC 28	Process	2.03	40.91	6%	40.91	6.77	6%	6.77	0.03	0.02	194.27	129.02
Motor Practices Level 2	SIC 28	Motor	1.55	7.83	6%	7.83	1.30	6%	1.30	0.04	0.02	255.34	135.79
Process Compressed Air (Med)	SIC 28	Compressed Air	1.14	9.50	7%	9.50	1.57	7%	1.57	0.06	0.02	345.69	148.61
Process Support (High)	SIC 28	Process	0.81	11.42	7%	0.00	1.89	7%	0.00	0.08	0.03	485.73	171.67
Process Compressed Air (High)	SIC 28	Compressed Air	0.48	7.25	7%	0.00	1.20	7%	0.00	0.14	0.03	821.63	198.71
Incandescent to HID	SIC 33	Lighting	3.95	0.03	1%	0.03	0.00	0%	0.00	0.01	0.01	N/A	N/A
MV to HID	SIC 33	Lighting	2.84	0.41	18%	0.41	0.00	0%	0.00	0.02	0.02	N/A	N/A
Photocell Controls	SIC 33	Lighting	1.74	0.04	20%	0.04	0.00	0%	0.00	0.03	0.02	N/A	N/A
Pulse Start MH	SIC 33	Lighting	1.29	0.09	24%	0.09	0.00	0%	0.00	0.04	0.02	N/A	N/A
T8/Electronic Ballasts (ROB)	SIC 33	Lighting	124.84	0.11	1%	0.11	0.02	1%	0.02	0.00	0.00	3.02	3.02
Reflectors/Design (ROB)	SIC 33	Lighting	16.55	0.12	2%	0.12	0.02	2%	0.02	0.00	0.00	22.77	13.36
Super T8s (ROB)	SIC 33	Lighting	7.60	0.13	4%	0.13	0.02	4%	0.02	0.01	0.00	49.62	26.62
Reflectors/Design	SIC 33	Lighting	16.09	1.03	15%	1.03	0.18	15%	0.18	0.00	0.00	23.42	24.24
T8/Electronic Ballasts	SIC 33	Lighting	105.79	0.81	24%	0.81	0.14	24%	0.14	0.00	0.00	3.56	16.57
Super T8s	SIC 33	Lighting	5.90	0.90	34%	0.90	0.16	34%	0.16	0.01	0.01	63.90	30.36
Occupancy Sensors	SIC 33	Lighting	1.14	0.66	42%	0.66	0.01	35%	0.01	0.05	0.01	4,114.68	88.34
Daylighting Controls	SIC 33	Lighting	0.18	0.16	43%	0.00	0.01	35%	0.00	0.43	0.03	12,957.60	211.35
Super T8s (ROB)	SIC 33	Lighting	12.95	0.26	11%	0.26	0.04	11%	0.04	0.01	0.01	29.10	29.10
Occupancy Sensors	SIC 33	Lighting	5.52	0.05	13%	0.05	0.01	13%	0.01	0.01	0.01	68.26	35.27
Compact Fluorescent Fixture (ROB)	SIC 33	Lighting	6.90	0.01	2%	0.01	0.00	2%	0.00	0.01	0.01	54.61	54.61

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Compact Fluorescent Fixture	SIC 33	Lighting	6.77	0.12	19%	0.12	0.02	19%	0.02	0.01	0.01	55.66	55.55
Compact Fluorescent Lamp (ROB)	SIC 33	Lighting	5.03	0.03	22%	0.03	0.00	22%	0.00	0.01	0.01	74.89	58.68
Compact Fluorescent Lamp	SIC 33	Lighting	3.52	0.23	53%	0.23	0.04	53%	0.04	0.02	0.02	107.06	86.85
Occupancy Sensors	SIC 33	Lighting	0.82	0.04	58%	0.00	0.00	53%	0.00	0.07	0.02	5,763.65	124.26
Daylighting Controls	SIC 33	Lighting	0.07	0.01	60%	0.00	0.00	54%	0.00	1.16	0.04	34,848.73	279.19
HID (ROB)	SIC 33	Lighting	4.05	0.02	2%	0.02	0.00	2%	0.00	0.02	0.02	92.98	92.98
HID	SIC 33	Lighting	3.95	0.38	46%	0.38	0.07	46%	0.07	0.02	0.02	95.34	95.21
Occupancy Sensors	SIC 33	Lighting	0.94	0.05	52%	0.00	0.00	46%	0.00	0.06	0.02	5,002.89	138.18
T5 for High Bay	SIC 33	Lighting	0.73	0.01	53%	0.00	0.00	47%	0.00	0.09	0.02	516.78	145.12
Daylighting Controls	SIC 33	Lighting	0.22	0.01	54%	0.00	0.00	47%	0.00	0.34	0.03	10,267.80	202.87
Exit Signs (LED - ROB)	SIC 33	Lighting	1.52	0.01	7%	0.01	0.00	7%	0.00	0.04	0.04	354.32	354.32
Exit Signs (LED)	SIC 33	Lighting	1.42	0.08	61%	0.08	0.01	61%	0.01	0.04	0.04	378.95	376.34
HID (ROB)	SIC 33	Lighting	2.38	0.29	2%	0.29	0.05	2%	0.05	0.03	0.03	158.47	158.47
HID	SIC 33	Lighting	1.57	5.19	33%	5.19	0.90	33%	0.90	0.04	0.04	239.46	235.13
T5 for High Bay	SIC 33	Lighting	0.85	0.23	34%	0.00	0.04	34%	0.00	0.08	0.04	442.88	243.34
Roof Insulation	SIC 33	HVAC	2.57	0.02	1%	0.02	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	SIC 33	HVAC	8.56	0.29	10%	0.29	0.03	10%	0.03	0.01	0.01	81.56	81.56
Tune Up/Advanced Diagnostics	SIC 33	HVAC	3.71	0.11	14%	0.11	0.01	14%	0.01	0.02	0.01	188.00	110.39
High Efficiency Heat Pump	SIC 33	HVAC	3.94	0.14	18%	0.14	0.01	18%	0.01	0.02	0.01	176.98	127.52
Roof Insulation	SIC 33	HVAC	2.47	0.02	19%	0.02	0.00	19%	0.00	0.02	0.01	248.98	117.11
Commissioning	SIC 33	HVAC	0.40	0.06	21%	0.00	0.01	21%	0.00	0.17	0.03	1,725.97	288.67
Energy Management Systems	SIC 33	HVAC	0.38	0.40	35%	0.00	0.02	28%	0.00	0.15	0.08	2,919.59	958.26
Window Film	SIC 33	HVAC	0.26	0.01	36%	0.00	0.00	29%	0.00	0.27	0.08	2,710.50	982.07
High Efficiency AC	SIC 33	HVAC	1.93	0.35	14%	0.35	0.06	14%	0.06	0.04	0.04	216.36	216.36
Roof Insulation	SIC 33	HVAC	1.28	0.02	15%	0.02	0.00	15%	0.00	0.05	0.04	286.93	195.10
Energy Management Systems	SIC 33	HVAC	0.30	0.37	30%	0.00	0.03	21%	0.00	0.20	0.12	2,482.45	914.92

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Window Film	SIC 33	HVAC	0.14	0.01	30%	0.00	0.00	22%	0.00	0.57	0.13	3,032.11	956.56
Proper Installation	SIC 33	HVAC	6.71	1.13	10%	1.13	0.21	10%	0.21	0.01	0.01	62.32	62.32
Tune Up/Advanced Diagnostics	SIC 33	HVAC	2.91	0.42	14%	0.42	0.08	14%	0.08	0.03	0.02	143.66	84.35
High Efficiency AC	SIC 33	HVAC	3.09	0.54	18%	0.54	0.10	18%	0.10	0.03	0.02	135.24	97.44
Roof Insulation	SIC 33	HVAC	1.22	0.08	19%	0.08	0.01	19%	0.01	0.06	0.02	302.64	93.56
Commissioning	SIC 33	HVAC	0.32	0.23	21%	0.00	0.04	21%	0.00	0.25	0.04	1,318.87	224.75
Energy Management Systems	SIC 33	HVAC	0.27	1.55	35%	0.00	0.13	27%	0.00	0.22	0.11	2,687.27	768.56
Window Film	SIC 33	HVAC	0.13	0.04	35%	0.00	0.01	28%	0.00	0.61	0.12	3,282.29	804.37
High Efficiency Chillers	SIC 33	HVAC	10.08	0.06	7%	0.06	0.01	7%	0.01	0.01	0.01	41.53	41.53
Tune Up/Advanced Diagnostics	SIC 33	HVAC	3.31	0.01	8%	0.01	0.00	8%	0.00	0.02	0.01	126.39	51.91
VSD Chillers	SIC 33	HVAC	2.40	0.01	9%	0.01	0.00	8%	0.00	0.03	0.01	530.56	69.62
Roof Insulation	SIC 33	HVAC	1.36	0.01	10%	0.01	0.00	9%	0.00	0.05	0.01	271.50	79.29
Energy Management Systems	SIC 33	HVAC	0.38	0.08	19%	0.00	0.01	13%	0.00	0.16	0.09	1,941.13	675.70
Commissioning	SIC 33	HVAC	0.21	0.02	21%	0.00	0.00	15%	0.00	0.37	0.11	1,983.06	853.17
Window Film	SIC 33	HVAC	0.15	0.00	22%	0.00	0.00	16%	0.00	0.51	0.12	2,718.95	909.62
High Efficiency Motors	SIC 33	HVAC	14.03	0.26	2%	0.26	0.05	2%	0.05	0.00	0.00	25.03	25.03
Variable Air Volume Control (VSD)	SIC 33	HVAC	1.65	0.01	2%	0.01	0.00	2%	0.00	0.03	0.01	790.37	32.59
Energy Management Systems	SIC 33	HVAC	0.64	2.52	22%	0.00	0.18	10%	0.00	0.08	0.07	1,135.26	904.51
Heat Pump Water Heater	SIC 33	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	SIC 33	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Low Flow Fixtures	SIC 33	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Motors	SIC 33	Motor	10.01	3.89	0%	3.89	0.64	0%	0.64	0.01	0.01	39.49	39.49
Motor Practices Level 1	SIC 33	Motor	5.96	6.77	1%	6.77	1.12	1%	1.12	0.01	0.01	66.31	56.52
Process Support (Low)	SIC 33	Process	3.22	26.69	3%	26.69	4.42	3%	4.42	0.02	0.02	122.82	103.89
Process Motor VSD Controls	SIC 33	Motor	2.49	0.90	3%	0.90	0.10	3%	0.10	0.02	0.02	214.48	105.62
Process Compressed Air (Low)	SIC 33	Compressed Air	2.27	1.15	3%	1.15	0.19	3%	0.19	0.03	0.02	174.14	107.64

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Process Support (Med)	SIC 33	Process	2.06	25.71	5%	25.71	4.25	5%	4.25	0.03	0.02	192.15	141.16
Motor Practices Level 2	SIC 33	Motor	1.56	1.99	5%	1.99	0.33	5%	0.33	0.04	0.02	253.30	144.50
Process Compressed Air (Med)	SIC 33	Compressed Air	1.15	1.25	5%	1.25	0.21	5%	0.21	0.06	0.02	342.29	148.13
Process Support (High)	SIC 33	Process	0.82	8.52	6%	0.00	1.41	6%	0.00	0.08	0.03	479.39	184.99
Process Compressed Air (High)	SIC 33	Compressed Air	0.49	0.96	6%	0.00	0.16	6%	0.00	0.13	0.03	812.49	192.73
Incandescent to HID	SIC 30	Lighting	3.95	0.07	1%	0.07	0.00	0%	0.00	0.01	0.01	N/A	N/A
MV to HID	SIC 30	Lighting	2.84	0.85	18%	0.85	0.00	0%	0.00	0.02	0.02	N/A	N/A
Photocell Controls	SIC 30	Lighting	1.74	0.08	20%	0.08	0.00	0%	0.00	0.03	0.02	N/A	N/A
Pulse Start MH	SIC 30	Lighting	1.29	0.19	24%	0.19	0.00	0%	0.00	0.04	0.02	N/A	N/A
T8/Electronic Ballasts (ROB)	SIC 30	Lighting	124.84	0.22	1%	0.22	0.04	1%	0.04	0.00	0.00	3.02	3.02
Reflectors/Design (ROB)	SIC 30	Lighting	16.55	0.24	2%	0.24	0.04	2%	0.04	0.00	0.00	22.77	13.36
Super T8s (ROB)	SIC 30	Lighting	7.60	0.27	4%	0.27	0.05	4%	0.05	0.01	0.00	49.62	26.62
Reflectors/Design	SIC 30	Lighting	16.09	2.12	15%	2.12	0.37	15%	0.37	0.00	0.00	23.42	24.24
T8/Electronic Ballasts	SIC 30	Lighting	105.79	1.68	24%	1.68	0.29	24%	0.29	0.00	0.00	3.56	16.57
Super T8s	SIC 30	Lighting	5.90	1.86	34%	1.86	0.32	34%	0.32	0.01	0.01	63.90	30.36
Occupancy Sensors	SIC 30	Lighting	1.14	1.36	42%	1.36	0.02	35%	0.02	0.05	0.01	4,114.68	88.34
Daylighting Controls	SIC 30	Lighting	0.18	0.33	43%	0.00	0.01	35%	0.00	0.43	0.03	12,957.60	211.35
Super T8s (ROB)	SIC 30	Lighting	12.95	0.53	11%	0.53	0.09	11%	0.09	0.01	0.01	29.10	29.10
Occupancy Sensors	SIC 30	Lighting	5.52	0.10	13%	0.10	0.02	13%	0.02	0.01	0.01	68.26	35.27
Compact Fluorescent Fixture (ROB)	SIC 30	Lighting	6.90	0.03	2%	0.03	0.01	2%	0.01	0.01	0.01	54.61	54.61
Compact Fluorescent Fixture	SIC 30	Lighting	6.77	0.25	19%	0.25	0.04	19%	0.04	0.01	0.01	55.66	55.55
Compact Fluorescent Lamp (ROB)	SIC 30	Lighting	5.03	0.05	22%	0.05	0.01	22%	0.01	0.01	0.01	74.89	58.68
Compact Fluorescent Lamp	SIC 30	Lighting	3.52	0.47	53%	0.47	0.08	53%	0.08	0.02	0.02	107.06	86.85
Occupancy Sensors	SIC 30	Lighting	0.82	0.08	58%	0.00	0.00	53%	0.00	0.07	0.02	5,763.65	124.26
Daylighting Controls	SIC 30	Lighting	0.07	0.02	60%	0.00	0.00	54%	0.00	1.16	0.04	34,848.73	279.19
HID (ROB)	SIC 30	Lighting	4.05	0.04	2%	0.04	0.01	2%	0.01	0.02	0.02	92.98	92.98

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
HID	SIC 30	Lighting	3.95	0.78	46%	0.78	0.14	46%	0.14	0.02	0.02	95.34	95.21
Occupancy Sensors	SIC 30	Lighting	0.94	0.11	52%	0.00	0.00	46%	0.00	0.06	0.02	5,002.89	138.18
T5 for High Bay	SIC 30	Lighting	0.73	0.02	53%	0.00	0.00	47%	0.00	0.09	0.02	516.78	145.12
Daylighting Controls	SIC 30	Lighting	0.22	0.03	54%	0.00	0.00	47%	0.00	0.34	0.03	10,267.80	202.87
Exit Signs (LED - ROB)	SIC 30	Lighting	1.52	0.02	7%	0.02	0.00	7%	0.00	0.04	0.04	354.32	354.32
Exit Signs (LED)	SIC 30	Lighting	1.42	0.16	61%	0.16	0.02	61%	0.02	0.04	0.04	378.95	376.34
HID (ROB)	SIC 30	Lighting	2.38	0.61	2%	0.61	0.11	2%	0.11	0.03	0.03	158.47	158.47
HID	SIC 30	Lighting	1.57	10.71	33%	10.71	1.87	33%	1.87	0.04	0.04	239.46	235.13
T5 for High Bay	SIC 30	Lighting	0.85	0.47	34%	0.00	0.08	34%	0.00	0.08	0.04	442.88	243.34
Roof Insulation	SIC 30	HVAC	2.57	0.06	1%	0.06	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	SIC 30	HVAC	8.56	0.75	10%	0.75	0.07	10%	0.07	0.01	0.01	81.56	81.56
Tune Up/Advanced Diagnostics	SIC 30	HVAC	3.71	0.28	14%	0.28	0.03	14%	0.03	0.02	0.01	188.00	110.39
High Efficiency Heat Pump	SIC 30	HVAC	3.94	0.36	18%	0.36	0.04	18%	0.04	0.02	0.01	176.98	127.52
Roof Insulation	SIC 30	HVAC	2.47	0.05	19%	0.05	0.01	19%	0.01	0.02	0.01	248.98	117.11
Commissioning	SIC 30	HVAC	0.40	0.15	21%	0.00	0.02	21%	0.00	0.17	0.03	1,725.97	288.67
Energy Management Systems	SIC 30	HVAC	0.38	1.04	35%	0.00	0.05	28%	0.00	0.15	0.08	2,919.59	958.26
Window Film	SIC 30	HVAC	0.26	0.03	36%	0.00	0.00	29%	0.00	0.27	0.08	2,710.50	982.06
High Efficiency AC	SIC 30	HVAC	1.93	0.90	14%	0.90	0.17	14%	0.17	0.04	0.04	216.36	216.36
Roof Insulation	SIC 30	HVAC	1.28	0.05	15%	0.05	0.01	15%	0.01	0.05	0.04	286.93	195.10
Energy Management Systems	SIC 30	HVAC	0.30	0.95	30%	0.00	0.08	21%	0.00	0.20	0.12	2,482.45	914.92
Window Film	SIC 30	HVAC	0.14	0.03	30%	0.00	0.01	22%	0.00	0.57	0.13	3,032.11	956.56
Proper Installation	SIC 30	HVAC	6.71	2.95	10%	2.95	0.55	10%	0.55	0.01	0.01	62.32	62.32
Tune Up/Advanced Diagnostics	SIC 30	HVAC	2.91	1.09	14%	1.09	0.20	14%	0.20	0.03	0.02	143.66	84.35
High Efficiency AC	SIC 30	HVAC	3.09	1.40	18%	1.40	0.26	18%	0.26	0.03	0.02	135.24	97.44
Roof Insulation	SIC 30	HVAC	1.22	0.20	19%	0.20	0.04	19%	0.04	0.06	0.02	302.64	93.56
Commissioning	SIC 30	HVAC	0.32	0.61	21%	0.00	0.11	21%	0.00	0.25	0.04	1,318.87	224.75

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Energy Management Systems	SIC 30	HVAC	0.27	4.03	35%	0.00	0.33	27%	0.00	0.22	0.11	2,687.27	768.56
Window Film	SIC 30	HVAC	0.13	0.12	35%	0.00	0.02	28%	0.00	0.61	0.12	3,282.29	804.37
High Efficiency Chillers	SIC 30	HVAC	10.08	0.15	7%	0.15	0.03	7%	0.03	0.01	0.01	41.53	41.53
Tune Up/Advanced Diagnostics	SIC 30	HVAC	3.31	0.02	8%	0.02	0.00	8%	0.00	0.02	0.01	126.39	51.91
VSD Chillers	SIC 30	HVAC	2.40	0.03	9%	0.03	0.00	8%	0.00	0.03	0.01	530.56	69.62
Roof Insulation	SIC 30	HVAC	1.36	0.02	10%	0.02	0.00	9%	0.00	0.05	0.01	271.50	79.29
Energy Management Systems	SIC 30	HVAC	0.38	0.21	19%	0.00	0.02	13%	0.00	0.16	0.09	1,941.13	675.70
Commissioning	SIC 30	HVAC	0.21	0.05	21%	0.00	0.01	15%	0.00	0.37	0.11	1,983.06	853.17
Window Film	SIC 30	HVAC	0.15	0.01	22%	0.00	0.00	16%	0.00	0.51	0.12	2,718.95	909.62
High Efficiency Motors	SIC 30	HVAC	14.03	0.68	2%	0.68	0.12	2%	0.12	0.00	0.00	25.03	25.03
Variable Air Volume Control (VSD)	SIC 30	HVAC	1.65	0.03	2%	0.03	0.00	2%	0.00	0.03	0.01	790.37	32.59
Energy Management Systems	SIC 30	HVAC	0.64	6.55	22%	0.00	0.47	10%	0.00	0.08	0.07	1,135.26	904.51
Heat Pump Water Heater	SIC 30	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	SIC 30	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Low Flow Fixtures	SIC 30	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Motors	SIC 30	Motor	10.01	6.54	1%	6.54	1.08	1%	1.08	0.01	0.01	39.49	39.49
Motor Practices Level 1	SIC 30	Motor	5.94	11.34	2%	11.34	1.88	2%	1.88	0.01	0.01	66.54	56.64
Process Support (Low)	SIC 30	Process	3.19	20.31	4%	20.31	3.36	4%	3.36	0.02	0.02	123.99	92.47
Process Motor VSD Controls	SIC 30	Motor	2.47	1.51	4%	1.51	0.16	4%	0.16	0.02	0.02	216.37	95.59
Process Compressed Air (Low)	SIC 30	Compressed Air	2.25	1.74	4%	1.74	0.29	4%	0.29	0.03	0.02	175.82	99.00
Process Support (Med)	SIC 30	Process	2.04	19.37	6%	19.37	3.20	6%	3.20	0.03	0.02	194.17	129.58
Motor Practices Level 2	SIC 30	Motor	1.55	3.30	6%	3.30	0.55	6%	0.55	0.04	0.02	255.74	136.14
Process Compressed Air (Med)	SIC 30	Compressed Air	1.14	1.89	7%	1.89	0.31	7%	0.31	0.06	0.02	346.22	142.19
Process Support (High)	SIC 30	Process	0.81	6.14	7%	0.00	1.02	7%	0.00	0.08	0.03	485.37	171.62
Process Compressed Air (High)	SIC 30	Compressed Air	0.48	1.44	7%	0.00	0.24	7%	0.00	0.14	0.03	822.15	184.45
Incandescent to HID	SIC 20	Lighting	3.95	0.05	1%	0.05	0.00	0%	0.00	0.01	0.01	N/A	N/A

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
MV to HID	SIC 20	Lighting	2.84	0.64	18%	0.64	0.00	0%	0.00	0.02	0.02	N/A	N/A
Photocell Controls	SIC 20	Lighting	1.74	0.06	20%	0.06	0.00	0%	0.00	0.03	0.02	N/A	N/A
Pulse Start MH	SIC 20	Lighting	1.29	0.15	24%	0.15	0.00	0%	0.00	0.04	0.02	N/A	N/A
T8/Electronic Ballasts (ROB)	SIC 20	Lighting	124.84	0.17	1%	0.17	0.03	1%	0.03	0.00	0.00	3.02	3.02
Reflectors/Design (ROB)	SIC 20	Lighting	16.55	0.18	2%	0.18	0.03	2%	0.03	0.00	0.00	22.77	13.36
Super T8s (ROB)	SIC 20	Lighting	7.60	0.20	4%	0.20	0.04	4%	0.04	0.01	0.00	49.62	26.62
Reflectors/Design	SIC 20	Lighting	16.09	1.60	15%	1.60	0.28	15%	0.28	0.00	0.00	23.42	24.24
T8/Electronic Ballasts	SIC 20	Lighting	105.79	1.27	24%	1.27	0.22	24%	0.22	0.00	0.00	3.56	16.57
Super T8s	SIC 20	Lighting	5.90	1.41	34%	1.41	0.25	34%	0.25	0.01	0.01	63.90	30.36
Occupancy Sensors	SIC 20	Lighting	1.14	1.03	42%	1.03	0.01	35%	0.01	0.05	0.01	4,114.68	88.34
Daylighting Controls	SIC 20	Lighting	0.18	0.25	43%	0.00	0.01	35%	0.00	0.43	0.03	12,957.60	211.35
Super T8s (ROB)	SIC 20	Lighting	12.95	0.40	11%	0.40	0.07	11%	0.07	0.01	0.01	29.10	29.10
Occupancy Sensors	SIC 20	Lighting	5.52	0.08	13%	0.08	0.01	13%	0.01	0.01	0.01	68.26	35.27
Compact Fluorescent Fixture (ROB)	SIC 20	Lighting	6.90	0.02	2%	0.02	0.00	2%	0.00	0.01	0.01	54.61	54.61
Compact Fluorescent Fixture	SIC 20	Lighting	6.77	0.19	19%	0.19	0.03	19%	0.03	0.01	0.01	55.66	55.55
Compact Fluorescent Lamp (ROB)	SIC 20	Lighting	5.03	0.04	22%	0.04	0.01	22%	0.01	0.01	0.01	74.89	58.68
Compact Fluorescent Lamp	SIC 20	Lighting	3.52	0.36	53%	0.36	0.06	53%	0.06	0.02	0.02	107.06	86.85
Occupancy Sensors	SIC 20	Lighting	0.82	0.06	58%	0.00	0.00	53%	0.00	0.07	0.02	5,763.65	124.26
Daylighting Controls	SIC 20	Lighting	0.07	0.01	60%	0.00	0.00	54%	0.00	1.16	0.04	34,848.73	279.19
HID (ROB)	SIC 20	Lighting	4.05	0.03	2%	0.03	0.01	2%	0.01	0.02	0.02	92.98	92.98
HID	SIC 20	Lighting	3.95	0.59	46%	0.59	0.10	46%	0.10	0.02	0.02	95.34	95.21
Occupancy Sensors	SIC 20	Lighting	0.94	0.08	52%	0.00	0.00	46%	0.00	0.06	0.02	5,002.89	138.18
T5 for High Bay	SIC 20	Lighting	0.73	0.01	53%	0.00	0.00	47%	0.00	0.09	0.02	516.78	145.12
Daylighting Controls	SIC 20	Lighting	0.22	0.02	54%	0.00	0.00	47%	0.00	0.34	0.03	10,267.80	202.87
Exit Signs (LED - ROB)	SIC 20	Lighting	1.52	0.01	7%	0.01	0.00	7%	0.00	0.04	0.04	354.32	354.32
Exit Signs (LED)	SIC 20	Lighting	1.42	0.12	61%	0.12	0.01	61%	0.01	0.04	0.04	378.95	376.34

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
HID (ROB)	SIC 20	Lighting	2.38	0.46	2%	0.46	0.08	2%	0.08	0.03	0.03	158.47	158.47
HID	SIC 20	Lighting	1.57	8.10	33%	8.10	1.41	33%	1.41	0.04	0.04	239.46	235.13
T5 for High Bay	SIC 20	Lighting	0.85	0.35	34%	0.00	0.06	34%	0.00	0.08	0.04	442.88	243.34
Roof Insulation	SIC 20	HVAC	2.57	0.04	1%	0.04	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	SIC 20	HVAC	8.56	0.55	10%	0.55	0.05	10%	0.05	0.01	0.01	81.56	81.56
Tune Up/Advanced Diagnostics	SIC 20	HVAC	3.71	0.20	14%	0.20	0.02	14%	0.02	0.02	0.01	188.00	110.39
High Efficiency Heat Pump	SIC 20	HVAC	3.94	0.26	18%	0.26	0.03	18%	0.03	0.02	0.01	176.98	127.52
Roof Insulation	SIC 20	HVAC	2.47	0.04	19%	0.04	0.00	19%	0.00	0.02	0.01	248.98	117.11
Commissioning	SIC 20	HVAC	0.40	0.11	21%	0.00	0.01	21%	0.00	0.17	0.03	1,725.97	288.67
Energy Management Systems	SIC 20	HVAC	0.38	0.76	35%	0.00	0.04	28%	0.00	0.15	0.08	2,919.59	958.26
Window Film	SIC 20	HVAC	0.26	0.02	36%	0.00	0.00	29%	0.00	0.27	0.08	2,710.50	982.07
High Efficiency AC	SIC 20	HVAC	1.93	0.66	14%	0.66	0.12	14%	0.12	0.04	0.04	216.36	216.36
Roof Insulation	SIC 20	HVAC	1.28	0.03	15%	0.03	0.01	15%	0.01	0.05	0.04	286.93	195.10
Energy Management Systems	SIC 20	HVAC	0.30	0.69	30%	0.00	0.06	21%	0.00	0.20	0.12	2,482.45	914.92
Window Film	SIC 20	HVAC	0.14	0.02	30%	0.00	0.00	22%	0.00	0.57	0.13	3,032.11	956.56
Proper Installation	SIC 20	HVAC	6.71	2.15	10%	2.15	0.40	10%	0.40	0.01	0.01	62.32	62.32
Tune Up/Advanced Diagnostics	SIC 20	HVAC	2.91	0.80	14%	0.80	0.15	14%	0.15	0.03	0.02	143.66	84.35
High Efficiency AC	SIC 20	HVAC	3.09	1.02	18%	1.02	0.19	18%	0.19	0.03	0.02	135.24	97.44
Roof Insulation	SIC 20	HVAC	1.22	0.15	19%	0.15	0.03	19%	0.03	0.06	0.02	302.64	93.56
Commissioning	SIC 20	HVAC	0.32	0.45	21%	0.00	0.08	21%	0.00	0.25	0.04	1,318.87	224.75
Energy Management Systems	SIC 20	HVAC	0.27	2.94	35%	0.00	0.24	27%	0.00	0.22	0.11	2,687.27	768.56
Window Film	SIC 20	HVAC	0.13	0.08	35%	0.00	0.02	28%	0.00	0.61	0.12	3,282.29	804.37
High Efficiency Chillers	SIC 20	HVAC	10.08	0.11	7%	0.11	0.02	7%	0.02	0.01	0.01	41.53	41.53
Tune Up/Advanced Diagnostics	SIC 20	HVAC	3.31	0.02	8%	0.02	0.00	8%	0.00	0.02	0.01	126.39	51.91
VSD Chillers	SIC 20	HVAC	2.40	0.02	9%	0.02	0.00	8%	0.00	0.03	0.01	530.56	69.62
Roof Insulation	SIC 20	HVAC	1.36	0.01	10%	0.01	0.00	9%	0.00	0.05	0.01	271.50	79.29

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Energy Management Systems	SIC 20	HVAC	0.38	0.15	19%	0.00	0.01	13%	0.00	0.16	0.09	1,941.13	675.70
Commissioning	SIC 20	HVAC	0.21	0.03	21%	0.00	0.01	15%	0.00	0.37	0.11	1,983.06	853.17
Window Film	SIC 20	HVAC	0.15	0.01	22%	0.00	0.00	16%	0.00	0.51	0.12	2,718.95	909.62
High Efficiency Motors	SIC 20	HVAC	14.03	0.49	2%	0.49	0.09	2%	0.09	0.00	0.00	25.03	25.03
Variable Air Volume Control (VSD)	SIC 20	HVAC	1.65	0.02	2%	0.02	0.00	2%	0.00	0.03	0.01	790.37	32.59
Energy Management Systems	SIC 20	HVAC	0.64	4.78	22%	0.00	0.34	10%	0.00	0.08	0.07	1,135.26	904.51
Heat Pump Water Heater	SIC 20	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	SIC 20	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Low Flow Fixtures	SIC 20	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Motors	SIC 20	Motor	10.01	5.55	1%	5.55	0.92	1%	0.92	0.01	0.01	39.49	39.49
Motor Practices Level 1	SIC 20	Motor	5.94	9.62	2%	9.62	1.59	2%	1.59	0.01	0.01	66.52	56.63
Process Support (Low)	SIC 20	Process	3.19	18.79	4%	18.79	3.11	4%	3.11	0.02	0.02	123.87	93.85
Process Motor VSD Controls	SIC 20	Motor	2.47	1.28	4%	1.28	0.14	4%	0.14	0.02	0.02	216.30	96.80
Process Compressed Air (Low)	SIC 20	Compressed Air	2.25	0.87	4%	0.87	0.14	4%	0.14	0.03	0.02	175.75	98.72
Process Support (Med)	SIC 20	Process	2.04	18.07	6%	18.07	2.99	6%	2.99	0.03	0.02	193.94	130.74
Motor Practices Level 2	SIC 20	Motor	1.55	2.80	6%	2.80	0.46	6%	0.46	0.04	0.02	255.64	136.94
Process Compressed Air (Med)	SIC 20	Compressed Air	1.14	0.94	6%	0.94	0.16	6%	0.16	0.06	0.02	346.02	140.37
Process Support (High)	SIC 20	Process	0.82	5.96	7%	0.00	0.99	7%	0.00	0.08	0.03	484.65	172.72
Process Compressed Air (High)	SIC 20	Compressed Air	0.48	0.72	7%	0.00	0.12	7%	0.00	0.14	0.03	821.37	180.00
Incandescent to HID	SIC 32	Lighting	3.95	0.03	1%	0.03	0.00	0%	0.00	0.01	0.01	N/A	N/A
MV to HID	SIC 32	Lighting	2.84	0.39	18%	0.39	0.00	0%	0.00	0.02	0.02	N/A	N/A
Photocell Controls	SIC 32	Lighting	1.74	0.04	20%	0.04	0.00	0%	0.00	0.03	0.02	N/A	N/A
Pulse Start MH	SIC 32	Lighting	1.29	0.09	24%	0.09	0.00	0%	0.00	0.04	0.02	N/A	N/A
T8/Electronic Ballasts (ROB)	SIC 32	Lighting	124.84	0.10	1%	0.10	0.02	1%	0.02	0.00	0.00	3.02	3.02
Reflectors/Design (ROB)	SIC 32	Lighting	16.55	0.11	2%	0.11	0.02	2%	0.02	0.00	0.00	22.77	13.36
Super T8s (ROB)	SIC 32	Lighting	7.60	0.12	4%	0.12	0.02	4%	0.02	0.01	0.00	49.62	26.62

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Reflectors/Design	SIC 32	Lighting	16.09	0.97	15%	0.97	0.17	15%	0.17	0.00	0.00	23.42	24.24
T8/Electronic Ballasts	SIC 32	Lighting	105.79	0.77	24%	0.77	0.13	24%	0.13	0.00	0.00	3.56	16.57
Super T8s	SIC 32	Lighting	5.90	0.85	34%	0.85	0.15	34%	0.15	0.01	0.01	63.90	30.36
Occupancy Sensors	SIC 32	Lighting	1.14	0.62	42%	0.62	0.01	35%	0.01	0.05	0.01	4,114.68	88.34
Daylighting Controls	SIC 32	Lighting	0.18	0.15	43%	0.00	0.00	35%	0.00	0.43	0.03	12,957.59	211.35
Super T8s (ROB)	SIC 32	Lighting	12.95	0.24	11%	0.24	0.04	11%	0.04	0.01	0.01	29.10	29.10
Occupancy Sensors	SIC 32	Lighting	5.52	0.05	13%	0.05	0.01	13%	0.01	0.01	0.01	68.26	35.27
Compact Fluorescent Fixture (ROB)	SIC 32	Lighting	6.90	0.01	2%	0.01	0.00	2%	0.00	0.01	0.01	54.61	54.61
Compact Fluorescent Fixture	SIC 32	Lighting	6.77	0.12	19%	0.12	0.02	19%	0.02	0.01	0.01	55.66	55.55
Compact Fluorescent Lamp (ROB)	SIC 32	Lighting	5.03	0.03	22%	0.03	0.00	22%	0.00	0.01	0.01	74.89	58.68
Compact Fluorescent Lamp	SIC 32	Lighting	3.52	0.22	53%	0.22	0.04	53%	0.04	0.02	0.02	107.06	86.85
Occupancy Sensors	SIC 32	Lighting	0.82	0.04	58%	0.00	0.00	53%	0.00	0.07	0.02	5,763.65	124.26
Daylighting Controls	SIC 32	Lighting	0.07	0.01	60%	0.00	0.00	54%	0.00	1.16	0.04	34,848.73	279.19
HID (ROB)	SIC 32	Lighting	4.05	0.02	2%	0.02	0.00	2%	0.00	0.02	0.02	92.98	92.98
HID	SIC 32	Lighting	3.95	0.36	46%	0.36	0.06	46%	0.06	0.02	0.02	95.34	95.21
Occupancy Sensors	SIC 32	Lighting	0.94	0.05	52%	0.00	0.00	46%	0.00	0.06	0.02	5,002.89	138.18
T5 for High Bay	SIC 32	Lighting	0.73	0.01	53%	0.00	0.00	47%	0.00	0.09	0.02	516.78	145.12
Daylighting Controls	SIC 32	Lighting	0.22	0.01	54%	0.00	0.00	47%	0.00	0.34	0.03	10,267.80	202.87
Exit Signs (LED - ROB)	SIC 32	Lighting	1.52	0.01	7%	0.01	0.00	7%	0.00	0.04	0.04	354.32	354.32
Exit Signs (LED)	SIC 32	Lighting	1.42	0.07	61%	0.07	0.01	61%	0.01	0.04	0.04	378.95	376.34
HID (ROB)	SIC 32	Lighting	2.38	0.28	2%	0.28	0.05	2%	0.05	0.03	0.03	158.47	158.47
HID	SIC 32	Lighting	1.57	4.89	33%	4.89	0.85	33%	0.85	0.04	0.04	239.46	235.13
T5 for High Bay	SIC 32	Lighting	0.85	0.21	34%	0.00	0.04	34%	0.00	0.08	0.04	442.88	243.34
Roof Insulation	SIC 32	HVAC	2.57	0.02	1%	0.02	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	SIC 32	HVAC	8.56	0.26	10%	0.26	0.03	10%	0.03	0.01	0.01	81.56	81.56
Tune Up/Advanced Diagnostics	SIC 32	HVAC	3.71	0.10	14%	0.10	0.01	14%	0.01	0.02	0.01	188.00	110.39

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
High Efficiency Heat Pump	SIC 32	HVAC	3.94	0.12	18%	0.12	0.01	18%	0.01	0.02	0.01	176.98	127.52
Roof Insulation	SIC 32	HVAC	2.47	0.02	19%	0.02	0.00	19%	0.00	0.02	0.01	248.98	117.11
Commissioning	SIC 32	HVAC	0.40	0.05	21%	0.00	0.01	21%	0.00	0.17	0.03	1,725.97	288.67
Energy Management Systems	SIC 32	HVAC	0.38	0.37	35%	0.00	0.02	28%	0.00	0.15	0.08	2,919.59	958.26
Window Film	SIC 32	HVAC	0.26	0.01	36%	0.00	0.00	29%	0.00	0.27	0.08	2,710.50	982.07
High Efficiency AC	SIC 32	HVAC	1.93	0.32	14%	0.32	0.06	14%	0.06	0.04	0.04	216.36	216.36
Roof Insulation	SIC 32	HVAC	1.28	0.02	15%	0.02	0.00	15%	0.00	0.05	0.04	286.93	195.10
Energy Management Systems	SIC 32	HVAC	0.30	0.33	30%	0.00	0.03	21%	0.00	0.20	0.12	2,482.45	914.92
Window Film	SIC 32	HVAC	0.14	0.01	30%	0.00	0.00	22%	0.00	0.57	0.13	3,032.11	956.56
Proper Installation	SIC 32	HVAC	6.71	1.03	10%	1.03	0.19	10%	0.19	0.01	0.01	62.32	62.32
Tune Up/Advanced Diagnostics	SIC 32	HVAC	2.91	0.38	14%	0.38	0.07	14%	0.07	0.03	0.02	143.66	84.35
High Efficiency AC	SIC 32	HVAC	3.09	0.49	18%	0.49	0.09	18%	0.09	0.03	0.02	135.24	97.44
Roof Insulation	SIC 32	HVAC	1.22	0.07	19%	0.07	0.01	19%	0.01	0.06	0.02	302.64	93.56
Commissioning	SIC 32	HVAC	0.32	0.21	21%	0.00	0.04	21%	0.00	0.25	0.04	1,318.87	224.75
Energy Management Systems	SIC 32	HVAC	0.27	1.42	35%	0.00	0.12	27%	0.00	0.22	0.11	2,687.27	768.56
Window Film	SIC 32	HVAC	0.13	0.04	35%	0.00	0.01	28%	0.00	0.61	0.12	3,282.29	804.37
High Efficiency Chillers	SIC 32	HVAC	10.08	0.05	7%	0.05	0.01	7%	0.01	0.01	0.01	41.53	41.53
Tune Up/Advanced Diagnostics	SIC 32	HVAC	3.31	0.01	8%	0.01	0.00	8%	0.00	0.02	0.01	126.39	51.91
VSD Chillers	SIC 32	HVAC	2.40	0.01	9%	0.01	0.00	8%	0.00	0.03	0.01	530.56	69.62
Roof Insulation	SIC 32	HVAC	1.36	0.01	10%	0.01	0.00	9%	0.00	0.05	0.01	271.50	79.29
Energy Management Systems	SIC 32	HVAC	0.38	0.07	19%	0.00	0.01	13%	0.00	0.16	0.09	1,941.13	675.70
Commissioning	SIC 32	HVAC	0.21	0.02	21%	0.00	0.00	15%	0.00	0.37	0.11	1,983.06	853.17
Window Film	SIC 32	HVAC	0.15	0.00	22%	0.00	0.00	16%	0.00	0.51	0.12	2,718.95	909.62
High Efficiency Motors	SIC 32	HVAC	14.03	0.24	2%	0.24	0.04	2%	0.04	0.00	0.00	25.03	25.03
Variable Air Volume Control (VSD)	SIC 32	HVAC	1.65	0.01	2%	0.01	0.00	2%	0.00	0.03	0.01	790.37	32.59
Energy Management Systems	SIC 32	HVAC	0.64	2.30	22%	0.00	0.17	10%	0.00	0.08	0.07	1,135.26	904.51

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Heat Pump Water Heater	SIC 32	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	SIC 32	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Low Flow Fixtures	SIC 32	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Motors	SIC 32	Motor	10.01	4.77	1%	4.77	0.79	1%	0.79	0.01	0.01	39.49	39.49
Motor Practices Level 1	SIC 32	Motor	5.94	8.27	2%	8.27	1.37	2%	1.37	0.01	0.01	66.55	56.65
Process Support (Low)	SIC 32	Process	3.19	13.58	4%	13.58	2.25	4%	2.25	0.02	0.02	124.03	91.03
Process Motor VSD Controls	SIC 32	Motor	2.47	1.10	4%	1.10	0.12	4%	0.12	0.02	0.02	216.12	94.33
Process Compressed Air (Low)	SIC 32	Compressed Air	2.25	2.47	4%	2.47	0.41	4%	0.41	0.03	0.02	175.63	101.07
Process Support (Med)	SIC 32	Process	2.03	12.68	6%	12.68	2.10	6%	2.10	0.03	0.02	194.30	128.90
Motor Practices Level 2	SIC 32	Motor	1.55	2.41	6%	2.41	0.40	6%	0.40	0.04	0.02	255.45	135.70
Process Compressed Air (Med)	SIC 32	Compressed Air	1.14	2.68	7%	2.68	0.44	7%	0.44	0.06	0.02	345.85	147.55
Process Support (High)	SIC 32	Process	0.81	3.62	7%	0.00	0.60	7%	0.00	0.08	0.03	485.80	171.44
Process Compressed Air (High)	SIC 32	Compressed Air	0.48	2.05	7%	0.00	0.34	7%	0.00	0.14	0.03	821.91	196.43
Incandescent to HID	Misc.Indust	Lighting	3.95	0.38	1%	0.38	0.00	0%	0.00	0.01	0.01	N/A	N/A
MV to HID	Misc.Indust	Lighting	2.84	4.69	18%	4.69	0.00	0%	0.00	0.02	0.02	N/A	N/A
Photocell Controls	Misc.Indust	Lighting	1.74	0.46	20%	0.46	0.00	0%	0.00	0.03	0.02	N/A	N/A
Pulse Start MH	Misc.Indust	Lighting	1.29	1.06	24%	1.06	0.00	0%	0.00	0.04	0.02	N/A	N/A
T8/Electronic Ballasts (ROB)	Misc.Indust	Lighting	124.84	1.21	1%	1.21	0.21	1%	0.21	0.00	0.00	3.02	3.02
Reflectors/Design (ROB)	Misc.Indust	Lighting	16.55	1.33	2%	1.33	0.23	2%	0.23	0.00	0.00	22.77	13.36
Super T8s (ROB)	Misc.Indust	Lighting	7.60	1.47	4%	1.47	0.26	4%	0.26	0.01	0.00	49.62	26.62
Reflectors/Design	Misc.Indust	Lighting	16.09	11.67	15%	11.67	2.03	15%	2.03	0.00	0.00	23.42	24.24
T8/Electronic Ballasts	Misc.Indust	Lighting	105.79	9.26	24%	9.26	1.61	24%	1.61	0.00	0.00	3.56	16.57
Super T8s	Misc.Indust	Lighting	5.90	10.26	34%	10.26	1.79	34%	1.79	0.01	0.01	63.90	30.36
Occupancy Sensors	Misc.Indust	Lighting	1.14	7.51	42%	7.51	0.09	35%	0.09	0.05	0.01	4,114.68	88.34
Daylighting Controls	Misc.Indust	Lighting	0.18	1.80	43%	0.00	0.06	35%	0.00	0.43	0.03	12,957.60	211.35
Super T8s (ROB)	Misc.Indust	Lighting	12.95	2.92	11%	2.92	0.51	11%	0.51	0.01	0.01	29.10	29.10

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Occupancy Sensors	Misc.Indust	Lighting	5.52	0.55	13%	0.55	0.10	13%	0.10	0.01	0.01	68.26	35.27
Compact Fluorescent Fixture (ROB)	Misc.Indust	Lighting	6.90	0.16	2%	0.16	0.03	2%	0.03	0.01	0.01	54.61	54.61
Compact Fluorescent Fixture	Misc.Indust	Lighting	6.77	1.40	19%	1.40	0.24	19%	0.24	0.01	0.01	55.66	55.55
Compact Fluorescent Lamp (ROB)	Misc.Indust	Lighting	5.03	0.30	22%	0.30	0.05	22%	0.05	0.01	0.01	74.89	58.68
Compact Fluorescent Lamp	Misc.Indust	Lighting	3.52	2.60	53%	2.60	0.45	53%	0.45	0.02	0.02	107.06	86.85
Occupancy Sensors	Misc.Indust	Lighting	0.82	0.44	58%	0.00	0.01	53%	0.00	0.07	0.02	5,763.65	124.26
Daylighting Controls	Misc.Indust	Lighting	0.07	0.11	60%	0.00	0.00	54%	0.00	1.16	0.04	34,848.73	279.19
HID (ROB)	Misc.Indust	Lighting	4.05	0.25	2%	0.25	0.04	2%	0.04	0.02	0.02	92.98	92.98
HID	Misc.Indust	Lighting	3.95	4.32	46%	4.32	0.75	46%	0.75	0.02	0.02	95.34	95.21
Occupancy Sensors	Misc.Indust	Lighting	0.94	0.60	52%	0.00	0.01	46%	0.00	0.06	0.02	5,002.89	138.18
T5 for High Bay	Misc.Indust	Lighting	0.73	0.09	53%	0.00	0.01	47%	0.00	0.09	0.02	516.78	145.12
Daylighting Controls	Misc.Indust	Lighting	0.22	0.14	54%	0.00	0.00	47%	0.00	0.34	0.03	10,267.80	202.87
Exit Signs (LED - ROB)	Misc.Indust	Lighting	1.52	0.10	7%	0.10	0.01	7%	0.01	0.04	0.04	354.32	354.32
Exit Signs (LED)	Misc.Indust	Lighting	1.42	0.87	61%	0.87	0.10	61%	0.10	0.04	0.04	378.95	376.34
HID (ROB)	Misc.Indust	Lighting	2.38	3.34	2%	3.34	0.58	2%	0.58	0.03	0.03	158.47	158.47
HID	Misc.Indust	Lighting	1.57	58.98	33%	58.98	10.27	33%	10.27	0.04	0.04	239.46	235.13
T5 for High Bay	Misc.Indust	Lighting	0.85	2.57	34%	0.00	0.45	34%	0.00	0.08	0.04	442.88	243.34
Roof Insulation	Misc.Indust	HVAC	2.57	0.36	1%	0.36	0.00	0%	0.00	0.02	0.02	N/A	N/A
Proper Installation	Misc.Indust	HVAC	8.56	4.84	10%	4.84	0.48	10%	0.48	0.01	0.01	81.56	81.56
Tune Up/Advanced Diagnostics	Misc.Indust	HVAC	3.71	1.80	14%	1.80	0.18	14%	0.18	0.02	0.01	188.00	110.39
High Efficiency Heat Pump	Misc.Indust	HVAC	3.94	2.30	18%	2.30	0.23	18%	0.23	0.02	0.01	176.98	127.52
Roof Insulation	Misc.Indust	HVAC	2.47	0.34	19%	0.34	0.03	19%	0.03	0.02	0.01	248.98	117.11
Commissioning	Misc.Indust	HVAC	0.40	1.00	21%	0.00	0.10	21%	0.00	0.17	0.03	1,725.97	288.67
Energy Management Systems	Misc.Indust	HVAC	0.38	6.74	35%	0.00	0.35	28%	0.00	0.15	0.08	2,919.59	958.26
Window Film	Misc.Indust	HVAC	0.26	0.19	36%	0.00	0.02	29%	0.00	0.27	0.08	2,710.50	982.07
High Efficiency AC	Misc.Indust	HVAC	1.93	5.83	14%	5.83	1.09	14%	1.09	0.04	0.04	216.36	216.36

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Roof Insulation	Misc.Indust	HVAC	1.28	0.30	15%	0.30	0.06	15%	0.06	0.05	0.04	286.93	195.10
Energy Management Systems	Misc.Indust	HVAC	0.30	6.16	30%	0.00	0.51	21%	0.00	0.20	0.12	2,482.45	914.92
Window Film	Misc.Indust	HVAC	0.14	0.18	30%	0.00	0.03	22%	0.00	0.57	0.13	3,032.11	956.56
Proper Installation	Misc.Indust	HVAC	6.71	19.08	10%	19.08	3.56	10%	3.56	0.01	0.01	62.32	62.32
Tune Up/Advanced Diagnostics	Misc.Indust	HVAC	2.91	7.09	14%	7.09	1.32	14%	1.32	0.03	0.02	143.66	84.35
High Efficiency AC	Misc.Indust	HVAC	3.09	9.06	18%	9.06	1.69	18%	1.69	0.03	0.02	135.24	97.44
Roof Insulation	Misc.Indust	HVAC	1.22	1.32	19%	1.32	0.25	19%	0.25	0.06	0.02	302.64	93.56
Commissioning	Misc.Indust	HVAC	0.32	3.95	21%	0.00	0.74	21%	0.00	0.25	0.04	1,318.87	224.75
Energy Management Systems	Misc.Indust	HVAC	0.27	26.09	35%	0.00	2.14	27%	0.00	0.22	0.11	2,687.27	768.56
Window Film	Misc.Indust	HVAC	0.13	0.75	35%	0.00	0.14	28%	0.00	0.61	0.12	3,282.29	804.37
High Efficiency Chillers	Misc.Indust	HVAC	10.08	0.98	7%	0.98	0.18	7%	0.18	0.01	0.01	41.53	41.53
Tune Up/Advanced Diagnostics	Misc.Indust	HVAC	3.31	0.14	8%	0.14	0.03	8%	0.03	0.02	0.01	126.39	51.91
VSD Chillers	Misc.Indust	HVAC	2.40	0.17	9%	0.17	0.01	8%	0.01	0.03	0.01	530.56	69.62
Roof Insulation	Misc.Indust	HVAC	1.36	0.11	10%	0.11	0.02	9%	0.02	0.05	0.01	271.50	79.29
Energy Management Systems	Misc.Indust	HVAC	0.38	1.34	19%	0.00	0.11	13%	0.00	0.16	0.09	1,941.13	675.70
Commissioning	Misc.Indust	HVAC	0.21	0.29	21%	0.00	0.05	15%	0.00	0.37	0.11	1,983.06	853.17
Window Film	Misc.Indust	HVAC	0.15	0.07	22%	0.00	0.01	16%	0.00	0.51	0.12	2,718.95	909.62
High Efficiency Motors	Misc.Indust	HVAC	14.03	4.38	2%	4.38	0.80	2%	0.80	0.00	0.00	25.03	25.03
Variable Air Volume Control (VSD)	Misc.Indust	HVAC	1.65	0.22	2%	0.22	0.01	2%	0.01	0.03	0.01	790.37	32.59
Energy Management Systems	Misc.Indust	HVAC	0.64	42.40	22%	0.00	3.04	10%	0.00	0.08	0.07	1,135.26	904.51
Heat Pump Water Heater	Misc.Indust	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Water Heater	Misc.Indust	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
Low Flow Fixtures	Misc.Indust	Other	0.00	0.00	0%	0.00	0.00	0%	0.00	N/A	N/A	N/A	N/A
High Efficiency Motors	Misc.Indust	Motor	10.01	24.04	1%	24.04	3.98	1%	3.98	0.01	0.01	39.49	39.49
Motor Practices Level 1	Misc.Indust	Motor	5.93	41.61	2%	41.61	6.88	2%	6.88	0.01	0.01	66.66	56.71
Process Support (Low)	Misc.Indust	Process	3.17	61.30	4%	61.30	10.14	4%	10.14	0.02	0.01	124.60	89.49

Measure	Building Type	End Use	Total Resource Cost Test (TRC)	Technical Energy Savings (GWh, Therms)	% GWh, Therm Savings	Economic Energy Savings (GWh, Therms)	Technical Peak Demand Savings (MW)	% MW Savings	Economic Peak Demand Savings (MW)	Marginal Energy Cost ($/kWh)	Avg Energy Cost ($/kWh)	Marginal Capacity Cost ($/kW)	Avg Capacity Cost ($/kW)
Process Motor VSD Controls	Misc.Indust	Motor	2.45	5.50	5%	5.50	0.60	4%	0.60	0.02	0.02	217.65	93.04
Process Compressed Air (Low)	Misc.Indust	Compressed Air	2.23	1.56	5%	1.56	0.26	5%	0.26	0.03	0.02	176.94	94.03
Process Support (Med)	Misc.Indust	Process	2.03	59.18	7%	59.18	9.79	7%	9.79	0.03	0.02	195.16	125.31
Motor Practices Level 2	Misc.Indust	Motor	1.54	12.07	7%	12.07	2.00	7%	2.00	0.04	0.02	257.36	133.15
Process Compressed Air (Med)	Misc.Indust	Compressed Air	1.13	1.70	7%	1.70	0.28	7%	0.28	0.06	0.02	348.75	134.94
Process Support (High)	Misc.Indust	Process	0.81	19.89	8%	0.00	3.29	8%	0.00	0.08	0.03	488.24	166.18
Process Compressed Air (High)	Misc.Indust	Compressed Air	0.48	1.30	8%	0.00	0.21	8%	0.00	0.14	0.03	827.70	169.96