MICHIGAN
LOWER PENINSULA
Electric Energy Efficiency Potential Study

Prepared for:

Michigan Public Service Commission

FINAL REPORT

August 11, 2017

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1 Executive Summary

1.1 BACKGROUND

Consumers Energy, DTE Energy and GDS Associates, Inc. ("GDS") coordinated to complete this assessment of electric energy efficiency potential for the Lower Peninsula for the Michigan Public Service Commission. This analysis provides a roadmap for policy makers and identifies the energy efficiency measures having the greatest potential savings and the measures that are the most cost effective. GDS combined the latest Energy Efficiency Potential Study results from DTE Energy and Consumers Energy into on study representing the Lower Peninsula of Michigan.

In addition to technical and economic potential estimates, the development of achievable potential estimates for a range of feasible energy efficiency measures is useful for program planning and modification purposes. Unlike achievable potential estimates, technical and economic potential estimates do not include customer acceptance considerations for energy efficiency measures, which are often among the most important factors when estimating the likely customer response to new programs. For this study, GDS Associates, Inc. (GDS), the consulting firm retained to conduct this study, produced the following estimates of energy efficiency potential:

- Technical Potential
- Economic Potential
- Achievable Potential *(One Scenario)*
  - SCENARIO • Based on Utility Cost Test (UCT) cost-effectiveness screening, incentives for program participants set at 50% of incremental measure costs and no budget constraints.

Definitions of the types of energy efficiency potential are provided below.

TECHNICAL POTENTIAL is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end-users to adopt the efficiency measures.

ECONOMIC POTENTIAL refers to the subset of the technical potential that is economically cost-effective as compared to conventional supply-side energy resources. Both technical and economic potential ignore market barriers to ensuring actual implementation of efficiency. Finally, they only consider the costs of efficiency measures themselves, ignoring any programmatic costs (e.g., marketing, analysis, administration) that would be necessary to capture them.

ACHIEVABLE POTENTIAL is the amount of energy use that efficiency can realistically be expected to displace assuming different market penetration scenarios for cost effective energy efficiency measures. An aggressive scenario, for example, could provide program participants with payments for the entire incremental cost of more energy efficient equipment. This is often referred to as "maximum achievable potential". Achievable potential takes into account real-world barriers to convincing end-users to adopt cost effective energy efficiency measures, the non-measure costs of delivering programs (for administration, marketing, tracking systems, monitoring and evaluation, etc.), and the capability of programs and administrators to ramp up program activity over time.[1] Achievable savings potential savings is a subset of economic potential.

[1] These definitions are from the November 2007 National Action Plan for Energy Efficiency "Guide for Conducting Energy Efficiency Potential Studies"

This potential study evaluates the following potential scenario for the Lower Peninsula:

[1] SCENARIO • Achievable potential represents the amount of energy use that energy efficiency can realistically be expected to displace assuming incentives equal to 50% of the incremental measure cost and no spending cap. Cost effectiveness of measures was determined with the UCT.

The achievable scenario includes an incentive level of 50% of incentive cost. This selection of the incentive level is consistent with the 2013 Michigan Statewide Study. The 2013 Study states "an incentive level of 50% of measure costs assumed in this study for the three achievable potential scenarios is a reasonable target based on the current financial incentive levels for program participants used by DTE Energy and Consumers Energy for their existing energy efficiency programs." Additionally, the incentive levels used in several studies reviewed by GDS as well as actual experience with incentive levels in other states confirm that an incentive level assumption of 50% or below is commonly used.[2]

The purpose of this energy efficiency potential study is to provide a foundation for the continuation of utility-administered electric energy efficiency programs in the Lower Peninsula and to determine the remaining opportunities for cost effective electric energy efficiency savings for the region. This detailed report presents results of the technical, economic, and achievable potential for electric energy efficiency measures in the Lower Peninsula service areas for two time periods:

- The ten-year period from January 1, 2017 through December 31, 2026
- The twenty-year period from January 1, 2017 through December 31, 2036

All results were developed using customized residential, commercial and industrial sector-level potential assessment analytic models and Consumers and DTE-specific cost effectiveness criteria including the most recent Consumers and DTE specific avoided cost projections for electricity. To help inform these energy efficiency potential models, up-to-date energy efficiency measure data were primarily obtained from the following sources:

[1] 2016 Michigan Energy Measures Database (MEMD)

[2] Energy efficiency baseline studies conducted by Consumers Energy and DTE Energy

[3] 2009 EIA Residential Energy Consumption Survey (RECS)

[4] 2012 EIA Commercial Building Energy Consumption Survey (CBECS)[3]

[5] 2010 EIA Manufacturing Energy Consumption Survey (MECS)

The above data sources provided valuable information regarding the current saturation, costs, savings and useful lives of electric energy efficiency measures considered in this study.

The results of this study provide detailed information on energy efficiency measures that are the most cost effective and have the greatest potential electric savings for the Lower Peninsula. The data used for this report were the best available at the time this analysis was developed. As building and appliance codes and energy efficiency standards change, and as energy prices fluctuate, additional opportunities for energy efficiency may occur while current practices may become outdated.

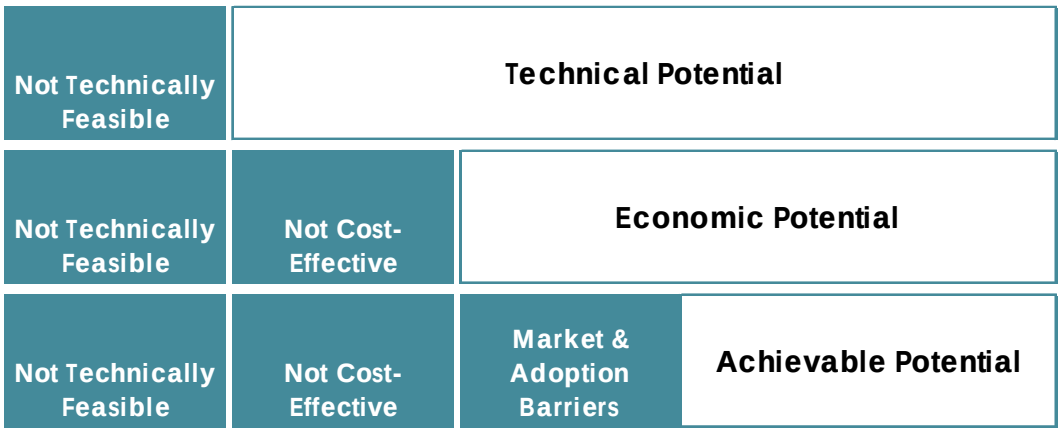
[2] GDS Associates October 25, 2013 survey of financial incentives used in energy efficiency programs implemented by Consumers Energy, DTE Energy, Ameren-Illinois, Efficiency Maine, Wisconsin Focus on Energy, and Xcel Energy (Minnesota).
[3] This is the latest publicly available CBECS data released by the Energy Information Administration (EIA).

1.2 STUDY SCOPE

The study examines the potential to reduce electric consumption and peak demand through the implementation of energy efficiency technologies and practices in residential, commercial, and industrial facilities in the Lower Peninsula service area. This study assesses electric energy efficiency potential in this area over twenty years, from 2017 through 2036.

The main objective of this study was to evaluate the electric energy efficiency technical, economic and achievable potential savings for the Lower Peninsula, based upon cost effectiveness screening with the UCT benefit/cost test. As noted above, the scope of this study distinguishes among three types of energy efficiency potential; (1) technical, (2) economic, and (3) achievable potential. FIGURE 1-1 below provides a graphical representation of the relationship of the various definitions of energy efficiency potential.

FIGURE 1-1. TYPES OF ENERGY EFFICIENCY POTENTIAL[4]



Limitations to the scope of study: As with any assessment of energy efficiency potential, this study necessarily builds on a large number of assumptions and data sources, including the following:

- Energy efficiency measure lives, measure savings and measure costs
- The discount rate for determining the net present value of future savings
- Projected penetration rates for energy efficiency measures
- Projections of Consumers and DTE specific electric avoided costs
- Future changes to current energy efficiency codes and standards for buildings and equipment

While the GDS Team has sought to use the best and most current available data, there are many assumptions where there may be reasonable alternative assumptions that would yield somewhat different results. Furthermore, while the lists of energy efficiency measures examined in this study represent most commercially available measures, these measure lists are not exhaustive.

With respect to non-energy benefits of energy efficiency programs, GDS did not place a value on reductions in power plant emissions of CO_2 or other emissions.

Finally, there was no attempt to place a dollar value on some difficult to quantify benefits arising from installation of some measures, such as increased comfort or increased safety, which may in turn support some personal choices to implement particular measures that may otherwise not be cost-effective or are only marginally cost-effective.

[4] Reproduced from "Guide to Resource Planning with Energy Efficiency" November 2007. US EPA. Figure 2-1.

1.3 SUMMARY OF RESULTS

This study examined several hundred electric energy efficiency measures in the residential, commercial and industrial sectors combined.

The data in FIGURE 1-2 below shows that cost effective electric energy efficiency resources can play a significantly expanded role in the Lower Peninsula' utilities energy resource mix over the next twenty years. For the Consumers Energy and DTE Energy service areas overall, the achievable potential for electricity savings based on the UCT cost effectiveness test screening is 14.4% of forecast kWh sales for 2026, and 20.4% of forecast kWh sales in 2036.

FIGURE 1-2. ELECTRIC ENERGY EFFICIENCY POTENTIAL SAVINGS SUMMARY

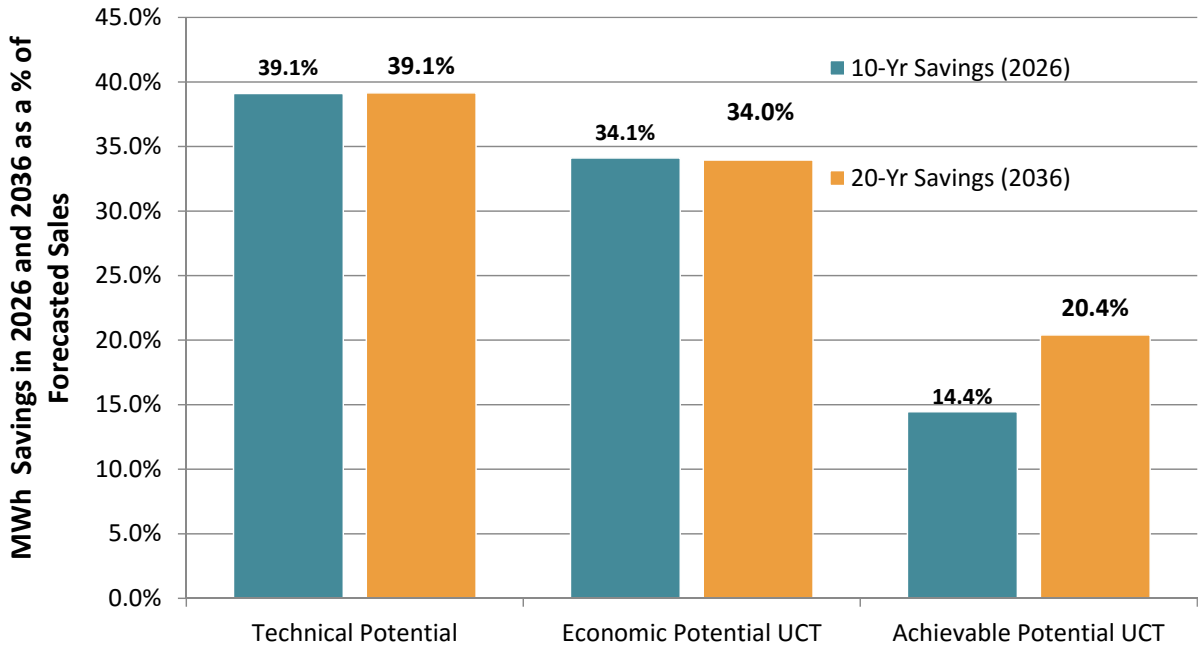


TABLE 1-1 and TABLE 1-2 present additional detail, providing the energy and demand efficiency savings potential for all scenarios over a period of and 10 and 20 years, respectively.

TABLE 1-1. SUMMARY OF TECHNICAL, ECONOMIC AND ACHIEVABLE ELECTRIC ENERGY AND DEMAND SAVINGS FOR 2026

End Use	Technical Potential	Economic Potential (UCT)	Achievable Potential (UCT)
Electric Savings as % of Sales Forecast			
Savings % - Residential	39.1%	34.3%	15.3%
Savings % - Commercial	44.2%	38.2%	17.3%
Savings % - Industrial	32.0%	28.3%	9.6%
Savings % - Total	**39.1%**	**34.1%**	**14.4%**
Electric MWh Savings			
Savings MWh - Residential	11,565,206	10,141,317	4,514,301
Savings MWh - Commercial	14,989,750	12,938,100	5,853,787
Savings MWh - Industrial	7,838,376	6,926,596	2,341,684
Savings MWh - Total	**34,393,332**	**30,006,012**	**12,709,772**

End Use	Technical Potential	Economic Potential (UCT)	Achievable Potential (UCT)
Electric Summer Peak Savings as % of Summer Peak Demand Forecast			
Savings % - Residential	23.7%	16.4%	7.0%
Savings % - Commercial	37.7%	32.9%	13.8%
Savings % - Industrial	36.5%	31.5%	10.1%
Savings % - Total	**31.5%**	**25.6%**	**10.1%**
Electric Summer Peak Savings			
Savings MW - Residential	2,058	1,426	606
Savings MW - Commercial	2,846	2,484	1,042
Savings MW - Industrial	1,556	1,343	429
Savings MW - Total	**6,460**	**5,253**	**2,077**

TABLE 1-2. SUMMARY OF TECHNICAL, ECONOMIC AND ACHIEVABLE ELECTRIC ENERGY AND DEMAND SAVINGS FOR 2036

End Use	Technical Potential	Economic Potential (UCT)	Achievable Potential (UCT)
Electric Savings as % of Sales Forecast			
Savings % - Residential	41.5%	35.7%	19.5%
Savings % - Commercial	43.6%	37.6%	24.3%
Savings % - Industrial	30.5%	26.9%	16.3%
Savings % - Total	**39.1%**	**34.0%**	**20.4%**
Electric MWh Savings			
Savings MWh - Residential	12,590,202	10,852,314	5,933,338
Savings MWh - Commercial	15,002,164	12,949,132	8,345,812
Savings MWh - Industrial	7,838,376	6,926,596	4,183,081
Savings MWh - Total	**35,430,742**	**30,728,042**	**18,462,231**
Electric Summer Peak Savings as % of Summer Peak Demand Forecast			
Savings % - Residential	28.9%	18.8%	9.8%
Savings % - Commercial	37.6%	32.9%	21.0%
Savings % - Industrial	34.9%	30.2%	16.6%
Savings % - Total	**33.4%**	**26.4%**	**15.3%**
Electric Summer Peak Savings			
Savings MW - Residential	2,545	1,658	858
Savings MW - Commercial	2,849	2,487	1,588
Savings MW - Industrial	1,556	1,343	738
Savings MW - Total	**6,950**	**5,487**	**3,183**

TABLE 1-3 provides the projected levelized cost of conserved energy for the two periods of 2017-2026 and 2017-2036. Additionally, this chart contains the first-year and lifetime MWh saved for the two periods. This levelized cost per first-year kWh saved can be used to provide program planners and decision-makers with the expected cost to utilities to acquire the electric savings for the achievable potential scenario examined in this report. It is important for program planners and other decision-makers to have a good understanding of the cost to utilities to acquire these levels of energy efficiency savings.

Cumulative Annual Savings describes the amount of savings that are active across a portfolio which have been installed up to that point in time and which have not yet burned out or expired. This is a snapshot

perspective that is commonly associated with long-term resource planning and load forecasting, as it focuses on resource and system needs at specific times over long periods. This is also the perspective that we focus on primarily for Achievable Potential.[5]

TABLE 1-3. LEVELIZED COST OF ENERGY ($/KWH)

Item	Achievable UCT	
	First 10-Years 2017-2026	Full 20-Year 2017-2036
First-Year MWh Saved	16,787,544	37,737,579
Lifetime MWh Saved	171,807,083	364,776,074
Levelized Cost of Energy ($/kWh)	$0.0201	$0.0205
Achievable Potential (Cumulative Annual EE Savings) MWh	12,709,772	18,462,268
Average Achievable Potential as a % of Sales	14.4%	20.4%

Detailed workbooks containing the levelized cost assumptions and data inputs are found in Appendix F: ANNUAL SAVINGS, BUDGETS, & COST OF CONSERVED ENERGY.

The current achievable scenario includes an incentive level of 50% of incremental cost. This selection of the incentive level is consistent with the 2013 Michigan Statewide Study. The 2013 Study states "an incentive level of 50% of measure costs assumed in this study for the three achievable potential scenarios is a reasonable target based on the current financial incentive levels for program participants used by DTE Energy and Consumers Energy for their existing energy efficiency programs." Additionally, the incentive levels used in several studies reviewed by GDS as well as actual experience with incentive levels in other states confirm that an incentive level assumption of 50% or below is commonly used.

TABLE 1-4 presents the annual utility budget in total and by sector required to achieve the electric energy savings levels in each of the two achievable potential scenarios. These tables also present the percent of annual utility revenues needed each year to fund programs to obtain energy savings levels for the achievable potential scenario.

A 2015 report by the American Council for an Energy Efficient Economy (ACEEE) offers information regarding the current savings and spending related to energy efficiency by state.[6] Based on self-reported data, twelve states annually **spent more than 2%** of electric sales revenue on electric energy efficiency programs in 2014. GDS also examined actual energy efficiency savings data for 2010 and 2011 from the US Energy Information Administration (EIA) on the top twenty energy efficiency electric utilities. These top twenty utilities saved over 2% of annual kWh sales in 2010 with their energy efficiency programs, and 3.8% of annual kWh sales in 2011.[7] These percentage savings are attributable to energy efficiency measures installed in a one-year time frame and demonstrate what can be accomplished with full-scale and aggressive implementation of programs.

TABLE 1-4. ANNUAL ELECTRIC ENERGY EFFICIENCY PROGRAM BUDGETS ASSOCIATED WITH THE ACHIEVABLE UCT SCENARIO (IN MILLIONS)

	Residential	Commercial	Industrial	Total Budgets	% of Annual Revenue
2017	$118.7	$145.9	$42.2	$306.8	3.2%

[5] [5]Ameren Illinois Potential Study, 2016. In addition, a 2010 report by Itron discusses how utility forecasting is concerned with cumulative savings rather than first year savings. Itron, 2010. See page 5 of Itron report.
[6] American Council for an Energy Efficient Economy, "The 2015 State Energy Efficiency Scorecard", Report #U1509, October 2015.
[7] GDS will add data for 2012 to 2014 for the final version of this report.

	Residential	Commercial	Industrial	Total Budgets	% of Annual Revenue
2018	$124.5	$146.7	$42.8	$314.0	3.2%
2019	$127.7	$147.8	$43.4	$318.9	3.2%
2020	$129.2	$148.7	$44.1	$322.1	3.2%
2021	$131.2	$157.6	$44.8	$333.6	3.2%
2022	$139.8	$160.3	$45.7	$345.8	3.3%
2023	$148.5	$162.2	$46.5	$357.2	3.3%
2024	$157.1	$166.2	$47.4	$370.6	3.4%
2025	$169.0	$179.9	$48.2	$397.1	3.6%
2026	$172.5	$184.8	$49.2	$406.5	3.6%
2027	$167.2	$114.1	$43.9	$325.1	2.8%
2028	$148.9	$116.0	$45.3	$310.2	2.6%
2029	$142.9	$171.4	$52.4	$366.7	3.1%
2030	$141.8	$173.6	$53.3	$368.7	3.0%
2031	$140.5	$169.9	$54.4	$364.8	3.0%
2032	$151.7	$222.3	$73.1	$447.1	3.6%
2033	$156.1	$237.8	$76.3	$470.1	3.7%
2034	$157.1	$236.3	$77.4	$470.8	3.6%
2035	$176.6	$243.6	$82.4	$502.6	3.8%
2036	$161.0	$244.7	$83.6	$489.3	3.7%

1.4 ENERGY EFFICIENCY POTENTIAL SAVINGS DETAIL BY SECTOR

Note that Sections 6, 7 and 8 of this report include additional detail about the electric energy efficiency savings potential in the Lower Peninsula by 2036.

1.5 COST-EFFECTIVENESS FINDINGS

This potential study concludes that significant cost effective electric energy efficiency potential remains in the Lower Peninsula service areas. TABLE 1-5 and TABLE 1-6 show the present value benefits, costs and benefit-cost ratios for the Achievable scenario.

TABLE 1-5. BENEFIT-COST RATIOS FOR ACHIEVABLE POTENTIAL SCENARIOS FOR 2017 TO 2026 TIME PERIOD

Benefit Cost Ratios for 2017 to 2026 Time Period				
Achievable Potential Scenarios	NPV $ Benefits	NPV $ Costs	Benefit/Cost Ratio	Net Benefits
Achievable UCT	$7,038,687,634	$2,410,172,341	2.92	$4,628,515,292

TABLE 1-6. BENEFIT-COST RATIOS FOR ACHIEVABLE POTENTIAL SCENARIOS FOR 2017 TO 2036 TIME PERIOD

Benefit Cost Ratios for 2017 to 2036 Time Period				
Achievable Potential Scenarios	NPV $ Benefits	NPV $ Costs	Benefit/Cost Ratio	Net Benefits
Achievable UCT	$11,947,534,742	$3,644,814,744	3.30	$8,302,719,998

In addition, GDS calculated UCT benefit/cost ratios for each individual energy efficiency measure considered in this study. Only measures that had a UCT benefit/cost ratio greater than or equal to 1.0 were retained in the economic and achievable potential savings estimates. Low income-specific measures with a UCT ratio of 0.50 or greater were retained in the residential analysis of economic and achievable potential.

1.6 REPORT ORGANIZATION

The remainder of this report is organized as follows:

Section 2: Glossary of Terms defines key terminology used in the report.

Section 3: Introduction highlights the purpose of this study and the importance of energy efficiency.

Section 4: Characterization of Electric Energy Consumption provides an overview of Consumers Energy and DTE Energy service areas and a brief discussion of the historical and forecasted electric energy sales by sector as well as electric peak demand.

Section 5: Potential Study Methodology details the approach used to develop the estimates of technical, economic and achievable potential savings for electric energy efficiency savings.

Section 6: Residential Electric Energy Efficiency Potential Estimates *(2017-2036)* provides a breakdown of the technical, economic, and achievable electric energy efficiency savings potential in the residential sector.

Section 7: Commercial Sector Electric Energy Efficiency Potential Estimates *(2017-2036)* provides a breakdown of the technical, economic, and achievable electric energy efficiency savings potential in the commercial sector.

Section 8: Industrial Sector Electric Energy Efficiency Potential Estimates *(2017-2036)* provides a breakdown of the technical, economic, and achievable electric energy efficiency savings potential in the industrial sector.

Section 9: Scenario Analysis provides potential estimates for three sensitivity scenarios, including Increased Incentives, Optimistic Conditions and a Carbon Price Adjustment.

2 Glossary of Terms

The following list defines many of the key energy efficiency terms used throughout this energy efficiency potential study.

ACHIEVABLE POTENTIAL: The November 2007 National Action Plan for Energy Efficiency "Guide for Conducting Energy Efficiency Potential Studies" defines achievable potential as the amount of energy use that energy efficiency can realistically be expected to displace assuming the most aggressive program scenario possible (*e.g.*, providing end-users with payments for the entire incremental cost of more efficient equipment). This is often referred to as maximum achievable potential. Achievable potential considers real-world barriers to convincing end-users to adopt efficiency measures, the non-measure costs of delivering programs (for administration, marketing, tracking systems, monitoring and evaluation, etc.), and the capability of programs and administrators to ramp up program activity over time.

APPLICABILITY FACTOR: The fraction of the applicable housing units or businesses that is technically feasible for conversion to the efficient technology from an engineering perspective (e.g., it may not be possible to install CFLs in all light sockets in a home because the CFLs may not fit in every socket in a home).

AVOIDED COSTS: For purposes of this report, the electric avoided costs are defined as the generation, transmission and distribution costs that can be avoided in the future if the consumption of electricity can be reduced with energy efficiency or demand response programs.

BASE ACHIEVABLE POTENTIAL: For purposes of this study, an achievable potential scenario which assumes incentives are set to 50% of the incremental or full measure cost.

BASE CASE EQUIPMENT END-USE INTENSITY: The electricity used per customer per year by each base-case technology in each market segment. This is the consumption of the electric energy using equipment that the efficient technology replaces or affects. For example, if the efficient measure is a high efficiency light bulb (CFL), the base end-use intensity would be the annual kWh use per bulb per household associated with a halogen incandescent light bulb that provides equivalent lumens to the CFL.

BASE CASE FACTOR: The fraction of the market that is applicable for the efficient technology in a given market segment. For example, for the residential electric clothes washer measure, this would be the fraction of all residential customers that have an electric clothes washer in their household.

COINCIDENCE FACTOR: The fraction of connected load expected to be "on" and using electricity coincident with the electric system peak period.

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COST-EFFECTIVENESS: A measure of the relevant economic effects resulting from the implementation of an energy efficiency measure or program. If the benefits are greater than the costs, the measure is said to be cost-effective.

CUMULATIVE ANNUAL SAVINGS: Cumulative Annual Savings describes the amount of savings that are active across a portfolio which have been installed up to that point in time and which have not yet burned out or expired. This is a snapshot perspective that is commonly associated with long-term resource planning and load forecasting, as it focuses on resource and system needs at specific times over long periods. This is also the perspective that is focused on primarily for Achievable Potential.

COMMERCIAL SECTOR: Comprised of non-manufacturing premises typically used to sell a product or provide a service, where electricity is consumed primarily for lighting, space cooling and heating, office equipment, refrigeration and other end uses. Business types are included in Section 5 – Methodology.

DEMAND RESPONSE: Refers to electric demand resources involving dynamic hourly load response to market conditions, such as curtailment or load control programs.

EARLY REPLACEMENT: Refers to an energy efficiency measure or efficiency program that seeks to encourage the replacement of functional equipment before the end of its operating life with higher-efficiency units.

ECONOMIC POTENTIAL: The November 2007 National Action Plan for Energy Efficiency "Guide for Conducting Energy Efficiency Potential Studies" refers to the subset of the technical potential that is economically cost-effective as compared to conventional supply-side energy resources as economic potential. Both technical and economic potential ignore market barriers to ensuring actual implementation of efficiency. Finally, they only consider the costs of efficiency measures themselves, ignoring any programmatic costs (e.g., marketing, analysis, administration, evaluation) that would be necessary to capture them.

END-USE: A category of equipment or service that consumes energy (*e.g.*, lighting, refrigeration, heating, process heat, cooling).

ENERGY EFFICIENCY: Using less energy to provide the same or an improved level of service to the energy consumer in an economically efficient way. Sometimes "conservation" is used as a synonym, but that term is usually taken to mean using less of a resource even if this results in a lower service level (*e.g.*, setting a thermostat lower or reducing lighting levels).

ENERGY USE INTENSITY (EUI): A unit of measurement that describes a building's energy use. EUI represents the energy consumed by a building relative to its size.[8]

FREE DRIVER: Individuals or businesses that adopt an energy efficient product or service because of an energy efficiency program, but are difficult to identify either because they do not receive an incentive or are not aware of the program.

FREE RIDER: Participants in an energy efficiency program who would have adopted an energy efficiency technology or improvement in the absence of a program or financial incentive.

GROSS SAVINGS: Gross energy (or demand) savings are the change in energy consumption or demand that results directly from program-promoted actions (e.g., installing energy-efficient lighting) taken by program participants regardless of the extent or nature of program influence on their actions.

INCENTIVE COSTS: A rebate or some form of payment used to encourage electricity consumers to implement a given demand-side management (DSM) technology.

INCREMENTAL ANNUAL SAVINGS: Incremental Annual Savings represents the annualized, first-year savings that come only from measures installed in the given year. This is a perspective that is commonly associated with program implementation, as it focuses on resource acquisition targets in the present. This

[8] See http://www.energystar.gov/index.cfm?fuseaction=buildingcontest.eui

is also the perspective that we focus on primarily for a short-term implementation cycle on Program-Level Potential.

INDUSTRIAL SECTOR: Comprised of manufacturing premises typically used for producing and processing goods, where electricity is consumed primarily for operating motors, process cooling and heating, and space heating, ventilation, and air conditioning (HVAC). Business types are included in section 5 – Methodology.

MAXIMUM (OR MAX) ACHIEVABLE: An achievable potential scenario which assumes incentives for program participants are equal to 100% of measure incremental or full costs.

MEASURE: Any action taken to increase energy efficiency, whether through changes in equipment, changes to a building shell, implementation of control strategies, or changes in consumer behavior. Examples are higher-efficiency central air conditioners, occupancy sensor control of lighting, and retro-commissioning. In some cases, bundles of technologies or practices may be modeled as single measures. For example, an ENERGY STAR® ™ home package may be treated as a single measure.

MMBtu: A measure of power, used in this report to refer to consumption and savings associated with natural gas consuming equipment. One British thermal unit (symbol Btu or sometimes BTU) is a traditional unit of energy equal to about 1055 joules. It is the amount of energy needed to heat one pound of water by one degree Fahrenheit. MMBtu is defined as one million BTUs.

MW: A unit of electrical output, equal to one million watts or one thousand kilowatts. It is typically used to refer to the output of a power plant.

MWh: One thousand kilowatt-hours, or one million watt-hours. One MWh is equal to the use of 1,000,000 watts of power in one hour.

NET-TO-GROSS RATIO: A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts

NET SAVINGS: Net energy or demand savings refer to the portion of gross savings that is attributable to the program. This involves separating out the impacts that are a result of other influences, such as consumer self-motivation. Given the range of influences on consumers' energy consumption, attributing changes to one cause (i.e., a particular program) or another can be quite complex.

NON-INCENTIVE COST: Costs incurred by the utility that do not include incentives paid to the customer (i.e.: program administrative costs, program marketing costs, data tracking and reporting, program evaluation, etc.)

NONPARTICIPANT SPILLOVER: Savings from efficiency projects implemented by those who did not directly participate in a program, but which nonetheless occurred due to the influence of the program.

PARTICIPANT COST: The cost to the participant to participate in an energy efficiency program.

PARTICIPANT SPILLOVER: Additional energy efficiency actions taken by program participants as a result of program influence, but actions that go beyond those directly subsidized or required by the program.[9]

[9] The definitions of participant and nonparticipant spillover were obtained from the National Action Plan for Energy Efficiency Report titled "Model Energy Efficiency Program Impact Evaluation Guide", November 2007, page ES-4.

PORTFOLIO: Either a collection of similar programs addressing the same market, technology, or mechanisms; or the set of all programs conducted by one energy efficiency organization or utility.

PROGRAM: A mechanism for encouraging energy efficiency that may be funded by a variety of sources and pursued by a wide range of approaches (typically includes multiple energy efficiency measures).

PROGRAM POTENTIAL: The November 2007 National Action Plan for Energy Efficiency 'Guide for Conducting Energy Efficiency Potential Studies" refers to the efficiency potential possible given specific program funding levels and designs as program potential. Often, program potential studies are referred to as "achievable" in contrast to "maximum achievable." In effect, they estimate the achievable potential from a given set of programs and funding. Program potential studies can consider scenarios ranging from a single program to a full portfolio of programs. A typical potential study may report a range of results based on different program funding levels.

REMAINING FACTOR: The fraction of applicable units that have not yet been converted to the electric or natural gas energy efficiency measure; that is, one minus the fraction of units that already have the energy efficiency measure installed.

REPLACE-ON-BURNOUT: An energy efficiency measure is not implemented until the existing technology it is replacing fails or burns out. An example would be an energy efficient water heater being purchased after the failure of the existing water heater at the end of its useful life.

RESOURCE ACQUISITION COSTS: The cost of energy savings associated with energy efficiency programs, generally expressed in costs per first year or per lifetime MWH saved ($/MWh), kWh ($/kWh), or MMBtu saved ($/MMBtu) in this report.

RETROFIT: Refers to an efficiency measure or efficiency program that seeks to encourage the replacement of functional equipment before the end of its operating life with higher-efficiency units (also called "early retirement") or the installation of additional controls, equipment, or materials in existing facilities for purposes of reducing energy consumption (e.g., increased insulation, low flow devices, lighting occupancy controls, economizer ventilation systems).

SAVINGS FACTOR: The percentage reduction in electricity or natural gas consumption resulting from application of the efficient technology. The savings factor is used in the formulas to calculate energy efficiency potential.

SOCIETAL COST TEST: Measures the net benefits of the energy efficiency program for a region or service area as a whole. Costs included in the SCT are costs to purchase and install the energy efficiency measure and overhead costs of running the energy efficiency program. The SCT may also include non-energy costs, such as reduced customer comfort levels. The benefits included are the avoided costs of energy and capacity, plus environmental and other non-energy benefits that are not currently valued by the market.

TECHNICAL POTENTIAL: The theoretical maximum amount of energy use that could be displaced by energy efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end-users to adopt the energy efficiency measures

TOTAL RESOURCE COST TEST: The TRC measures the net benefits of the energy efficiency program for a region or service area as a whole from the combined perspective of the utility and program participants. Costs included in the TRC are costs to purchase and install the energy efficiency measure and overhead costs of running the energy efficiency program. Costs include all costs for the utility and the participants.

The benefits included are the avoided costs of energy and capacity plus any quantifiable non-energy benefits (such as reduced emissions of carbon dioxide).

UTILITY COST TEST: The UCT measures the net benefits of the energy efficiency program for a region or service area as a whole from the utility's perspective. Costs included in the UCT are incentives and the utility's costs to design, implement and evaluate a program. The benefits included are the avoided utility costs of energy and capacity.

3 Introduction

This report assesses the potential for electric energy efficiency programs to assist the Lower Peninsula in meeting future electric energy service needs. This section of the report provides the following information:

- Defines the term "energy efficiency"
- Describes the general benefits of energy efficiency programs
- Provides results of similar electric energy efficiency potential studies conducted in Michigan and other states

The purpose of this electric energy efficiency potential study is to provide a detailed assessment of the technical, economic and achievable potential for electric energy efficiency measures for the Lower Peninsula service area. This study has examined a full array of energy efficiency technologies and energy efficient building practices that are technically achievable. The results of this study can be used as a roadmap to develop energy efficiency goals and programs for the Lower Peninsula in the short and long-term. The strategies that will be developed based on this potential study can guide the direction and scope of Lower Peninsula administered energy efficiency programs in reducing electricity consumption in the Consumers Energy and DTE Energy service areas.

3.1 INTRODUCTION TO ENERGY EFFICIENCY

Efficient energy use, often referred to as energy efficiency, is using less energy to provide the same level of energy service. An example would be insulating a home or business in order to use less heating and cooling energy to achieve the same inside temperature. Another example would be installing LED lighting in place of less efficient halogen lights to attain the same level of illumination. Energy efficiency can be achieved through more efficient technologies and/or processes as well as through changes in individual behavior.

3.1.1 General Benefits of Energy Efficiency

There are a number of benefits that can accrue to Lower Peninsula electric customers due to electric energy efficiency programs. These benefits include avoided cost savings, non-electric benefits such as water and fossil fuel savings, environmental benefits, economic stimulus, job creation, risk reduction, and energy security.

Avoided electric energy and capacity costs are based upon the costs an electric utility would incur to either construct or operate new electric power plants, purchase power from another source or to operate existing power plants. These avoided costs of electricity include both fixed and variable costs that can be directly avoided through a reduction in electricity usage. The energy component includes the costs associated with the production of electricity, while the capacity component includes costs associated with the capability to deliver electric energy during peak load periods. Capacity costs consist primarily of the costs associated with building peaking generation facilities. The forecasts of electric energy and capacity avoided costs and natural gas avoided costs used in this study were provided to GDS by Consumers Energy and DTE Energy.

At the consumer level, energy efficient products often cost more than their standard efficiency counterparts, but this additional cost is balanced by lower energy consumption and lower energy bills. Over time, the money saved from energy efficient products will pay consumers back for their initial investment as well as save them money on their electric bills. Although some energy efficient technologies are complex and expensive, such as installing new high efficiency windows or a high efficiency boiler,

many are simple and inexpensive. Installing LED lighting or low-flow water devices, for example, can be done by most individuals.

Although the reduction in electric costs is the primary benefit to electricity consumers to be gained from investments in energy efficiency, Consumers Energy, DTE Energy and society as a whole can also benefit in other ways. Many electric efficiency measures also deliver non-energy benefits. For example, low-flow water devices and efficient clothes washers also reduce water consumption.[10] Similarly, weatherization measures that improve the building shell not only save on air conditioning costs in the summer, but also can save the customer money on space heating fuels, such as natural gas or propane. Reducing electricity consumption also reduces harmful emissions from power plants, such as SO_X, NO_X, CO_2 and particulates into the environment.[11]

Energy efficiency programs create both direct and indirect jobs. The manufacture and installation of energy efficiency products involves the manufacturing sector as well as research and development, service, and installation of jobs. These are skilled positions that are not easily outsourced to other states and countries. The creation of indirect jobs is more difficult to quantify, but result from households and businesses experiencing increased discretionary income from reduced energy bills. These savings produce multiplier effects, such as increased investment in other goods and services driving job creation in other markets.

Energy efficiency reduces risks associated with fuel price volatility, unanticipated capital cost increases, environmental regulations, supply shortages, and energy security. Aggressive energy efficiency programs can help eliminate or postpone the risk associated with committing to large investments for generation facilities a decade or more before they are needed. Energy efficiency is also not subject to the same supply and transportation constraints that impact fossil fuels. Finally, energy efficiency reduces competition between states and utilities for fuels, and reduces dependence on fuels imported from other states or countries to support electricity production. Energy efficiency can help meet future demand increases and reduce dependence on out-of-state or overseas resources.

3.2 THE LOWER PENINSULA ENERGY CONTEXT

3.2.1 Slight Increase in MWh Sales for the 2017 to 2036 Time Period

The annual kWh sales and electric system peak load for the Lower Peninsula are projected to stay constant over the two decades. The electric load forecast provided to GDS by Consumers Energy and DTE Energy indicates that residential, commercial and industrial MWh sales will increase at an overall rate of 0.4% per year over the next two decades. This report assesses the potential for electric energy efficiency programs to assist the Lower Peninsula utilities in meeting future electric energy service needs.

3.2.2 Energy Efficiency Activity

Making homes and buildings more energy efficient is seen as a key strategy for addressing energy security, reducing reliance on fossil fuels from other countries, assisting consumers to lower energy bills, and addressing concerns about climate change. Faced with rapidly increasing energy prices, constraints in energy supply and demand, and energy reliability concerns, states are continuing to turn to energy

[10] As of February 16, 2016, the ENERGY STAR web site (www.energystar.gov) states that "The average American family washes about 300 loads of laundry each year. ENERGY STAR can help families cut their related energy and water costs. ENERGY STAR certified clothes washers use about 25% less energy and 40% less water than regular washers."

[11] The 2014 ENERGY STAR Annual Report states that "In 2014, millions of consumers and 16,000 partners tapped the value of ENERGY STAR and achieved impressive financial and environmental results. Their investments in energy-efficient technologies and practices reduced utility bills by $34 billion and will continue to provide cost savings for years to come. Americans, with the help of ENERGY STAR, prevented more than 300 million metric tons of GHG emissions in 2014 alone — providing over $12 billion in benefits to society due to reducing damages from climate change."

efficiency programs as a reliable, cost-effective, and quick resource to deploy. Between 1998 and 2010, U.S. spending for electric energy efficiency programs increased fivefold, from approximately $900 million to $4.6 billion. In 2014, total spending for electricity efficiency programs reached nearly $5.7 billion.[12]

3.2.3 Recent Energy Efficiency Potential Studies

TABLE 3-1 below provides the results from a GDS review of recent, publicly available energy efficiency potential studies conducted throughout the United States. It is useful to examine these results to understand if they are similar to this latest study for the Lower Peninsula.

TABLE 3-1. RESULTS OF RECENT, PUBLICLY AVAILABLE ENERGY EFFICIENCY POTENTIAL STUDIES IN THE US

State	Study Year	Author	Study Period	# of Years	Achievable Potential (Percent of MWh Sales Forecast)
ComEd	2013	ICF International	2013-2018	6	10.0%
New York	2014	Optimal Energy	2015-2030	16	18.0%
Ohio (AEP)-Base Case	2014	American Electric Power	2015-2034	20	24.0%
Pennsylvania	2015	Pennsylvania Statewide Evaluator	2016-2025	10	13.2%
USA	2014	Electric Power Research Institute	2015-2035	21	14.0%

The achievable scenario includes an incentive level of 50% of incremental measure cost. This selection of the incentive level is consistent with the 2013 Michigan Statewide Study. The 2013 Study states "an incentive level of 50% of measure costs assumed in this study for the three achievable potential scenarios is a reasonable target based on the current financial incentive levels for program participants used by DTE Energy and Consumers Energy for their existing energy efficiency programs." Additionally, the incentive levels used in several studies reviewed by GDS as well as actual experience with incentive levels in other states confirm that an incentive level assumption of 50% or below is commonly used.[13]

The U.S. Department of Energy maintains an "Energy Efficiency Potential Studies Catalog"[14]. A copy of the catalog is provided in Appendix A. The catalog provides a summary of the energy efficiency potential studies compiled by the US DOE. This U.S. DOE web site reports that "States, utilities, and non-governmental organizations across the country have commissioned analyses over the years to identify potential energy savings (typically for electricity) available within their jurisdictions. These studies can be used to fulfill a variety of needs, including energy efficiency program planning, state goal setting, utility resource planning, and other priorities."

A 2015 report by the American Council for an Energy Efficient Economy (ACEEE) offers information regarding the current savings and spending related to energy efficiency by state.[15] Based on self-reported data, twelve states annually **spent more than 2%** of electric sales revenue on electric energy efficiency programs in 2014. GDS also examined actual energy efficiency savings data for 2010 and 2011 from the US Energy Information Administration (EIA) on the top twenty energy efficiency electric utilities. These

[12] American Council for an Energy Efficient Economy, "The 2015 State Energy Efficiency Scorecard", Report #U1509, October 2015, page 22.
[13] GDS Associates October 25, 2013 survey of financial incentives used in energy efficiency programs implemented by Consumers Energy, DTE Energy, Ameren-Illinois, Efficiency Maine, Wisconsin Focus on Energy, and Xcel Energy (Minnesota).
[14] at http://energy.gov/eere/slsc/energy-efficiency-potential-studies-catalog#catalog
[15] American Council for an Energy Efficient Economy, "The 2015 State Energy Efficiency Scorecard", Report #U1509, October 2015.

top twenty utilities saved over 2% of annual kWh sales in 2010 with their energy efficiency programs, and 3.8% of annual kWh sales in 2011. These percentage savings are attributable to energy efficiency measures installed in a one-year time frame and demonstrate what can be accomplished with full-scale and aggressive implementation of programs.

3.3 COST-EFFECTIVENESS FINDINGS

The UCT calculations in this study follow the prescribed methodology detailed in the latest version of the California Standard Practice Manual (CA SPM). The California Standard Practice Manual establishes standard procedures for cost-effectiveness evaluations for utility-sponsored or public benefits programs and is generally considered to be an authoritative source for defining cost-effectiveness criteria and methodology. This manual is often referenced by many other states and utilities.

The GDS cost-effectiveness screening tool used for this study quantifies all of the benefits and costs included in the UCT test. For purposes of this study, quantified benefits of the UCT Test include electric energy and capacity avoided supply costs. GDS has not included any value for reduced carbon emissions. Costs include all utility costs, any increase in supply costs, as well as any additional operation and maintenance costs. In addition, the GDS screening tool is capable of evaluation of cost-effectiveness based on various market replacement approaches, including replace-on-burnout, retrofit, and early retirement.

The forecast of electric avoided costs of energy and generation capacity were obtained from Consumers Energy and DTE Energy.

This energy efficiency potential study concludes that there remains significant achievable cost effective potential for electric energy efficiency measures and programs in the Lower Peninsula service areas. TABLE 3-2 presents the UCT benefit-cost ratios for scenarios examined in this study for the ten and twenty-year implementation periods starting in 2017.

TABLE 3-2. SCENARIO #1: UTILITY COST TEST BENEFIT-COST RATIOS FOR THE ACHIEVABLE POTENTIAL SCENARIO BASED ON UCT SCREENING (50% INCENTIVES) FOR 10-YEAR AND 20-YEAR IMPLEMENTATION PERIODS

Achievable Potential Scenarios	UCT $ Benefits	UCT $ Costs	UCT Benefit/Cost Ratio
10-yr period	$7,038,687,634	$2,410,172,341	2.92
20-yr period	$11,947,534,742	$3,644,814,744	3.28

4 Characterization of Electricity Consumption in the Lower Peninsula Service Territory

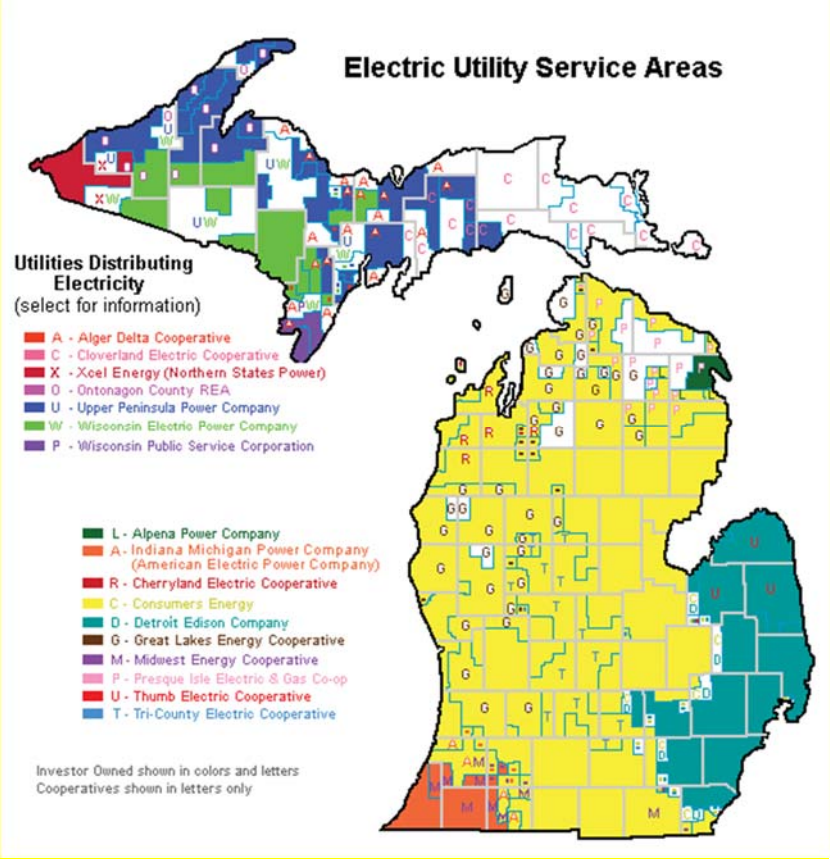
This chapter provides historical and forecast information on electricity consumption, consumption by market segment and by energy end use, and electric customers in the Lower Peninsula service territories. This chapter also provides an overview of the number of households and housing units in this service areas. Developing this information is a fundamental part of any energy efficiency potential study. It is necessary to understand how energy is consumed in a utility service area or region before one can assess the energy efficiency savings potential that remains to be tapped.

4.1 MICHIGAN ELECTRIC UTILITIES

There are multiple utilities that provide electric to Michigan customers. According to data from the Michigan Public Service Commission, Michigan has 8 investor-owned electric utilities, 41 municipal electric utilities, and 9 rural electric distribution cooperatives. The two largest electric utilities are DTE Energy and Consumers Energy. These two utilities provide approximately 92% of electric energy sales in the State.

FIGURE 4-1 shows the service areas for electric distribution utilities in Michigan, with the largest two companies, DTE Energy and Consumers Energy taking up much of the geographic region of the state. Note that the size of utility service areas varies greatly.

FIGURE 4-1. MICHIGAN ELECTRIC UTILITY SERVICE TERRITORIES



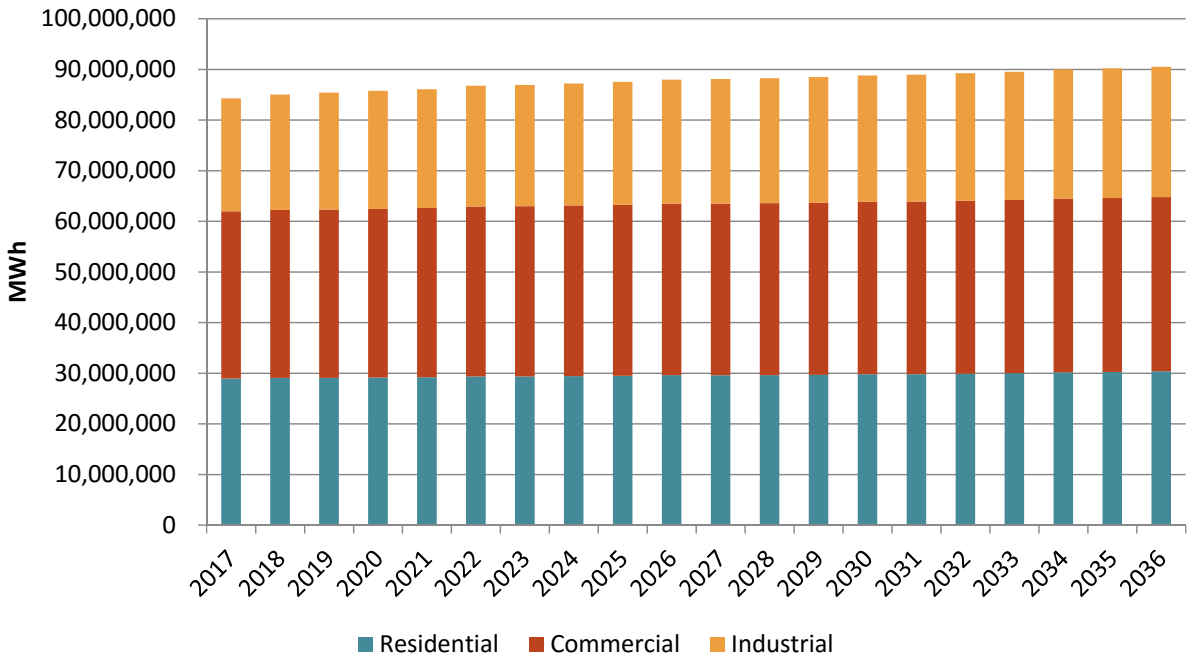
4.2 RESIDENTIAL, COMMERCIAL AND INDUSTRIAL SECTOR BASELINE SEGMENTATION FINDINGS

This section provides detailed information on the breakdown of Lower Peninsula residential, commercial and industrial sector electricity sales by market segment and end use.

4.2.1 Electricity Sales Forecast by Sector for the Lower Peninsula Service Area

FIGURE 4-2 and TABLE 4-1 show forecast electricity sales by sector (in MWh) for the Lower Peninsula service area for the period 2017 to 2036. The energy forecast does not include the impact of future DSM efforts. As a result, the forecast of annual electric sales for the Lower Peninsula service area shown below do reflect the impacts of current energy efficiency programs.

FIGURE 4-2. LP FORECAST OF ANNUAL ELECTRIC SALES BY MARKET SEGMENT, 2017-2036 (MWH)



The Lower Peninsula forecast of electricity sales shown in FIGURE 4-2 above highlights that the Company expects future MWh sales to have minimal growth for the next two decades, 0.4% per year. The commercial sector is forecast to have the largest share of annual MWh sales, followed by the residential and industrial sectors.

TABLE 4-1. LOWER PENINSULA ENERGY PROJECTED ELECTRIC MWH SALES BY SECTOR FOR 2017 TO 2036

Year	Residential Electric Sales (MWh)	Commercial Electric Sales (MWh)	Industrial Electric Sales (MWh)	Total Electric Sales (MWh)
2017	28,943,876	33,021,600	22,311,018	84,276,493
2018	29,056,782	33,184,497	22,799,149	85,040,428
2019	29,067,603	33,225,755	23,114,898	85,408,256
2020	29,127,318	33,310,442	23,317,505	85,755,265
2021	29,200,552	33,426,568	23,456,077	86,083,197
2022	29,339,390	33,555,264	23,881,169	86,775,822
2023	29,356,964	33,618,644	23,946,666	86,922,273
2024	29,423,485	33,700,835	24,091,101	87,215,421
2025	29,484,707	33,778,953	24,252,358	87,516,018
2026	29,597,395	33,884,254	24,480,965	87,962,615

Year	Residential Electric Sales (MWh)	Commercial Electric Sales (MWh)	Industrial Electric Sales (MWh)	Total Electric Sales (MWh)
2027	29,585,102	33,900,536	24,591,803	88,077,441
2028	29,619,360	33,947,520	24,694,719	88,261,599
2029	29,668,923	33,994,719	24,804,508	88,468,149
2030	29,783,419	34,081,146	24,933,855	88,798,421
2031	29,795,485	34,086,122	25,057,229	88,938,836
2032	29,893,657	34,138,686	25,181,463	89,213,806
2033	30,006,590	34,183,905	25,317,656	89,508,152
2034	30,185,672	34,311,379	25,483,408	89,980,458
2035	30,245,557	34,345,297	25,611,261	90,202,115
2036	30,360,660	34,407,494	25,736,571	90,504,726

4.2.2 Electricity Consumption by Market Segment

FIGURE 4-3 shows the breakdown of expected annual electricity consumption by building type for the Lower Peninsula commercial sector. The Office market sector (27%) contributes the largest share of commercial electricity consumption, followed by the Other (21%) category and Retail buildings (12%).

FIGURE 4-3. LOWER PENINSULA COMMERCIAL ELECTRICITY CONSUMPTION (MWH) BY BUSINESS TYPE

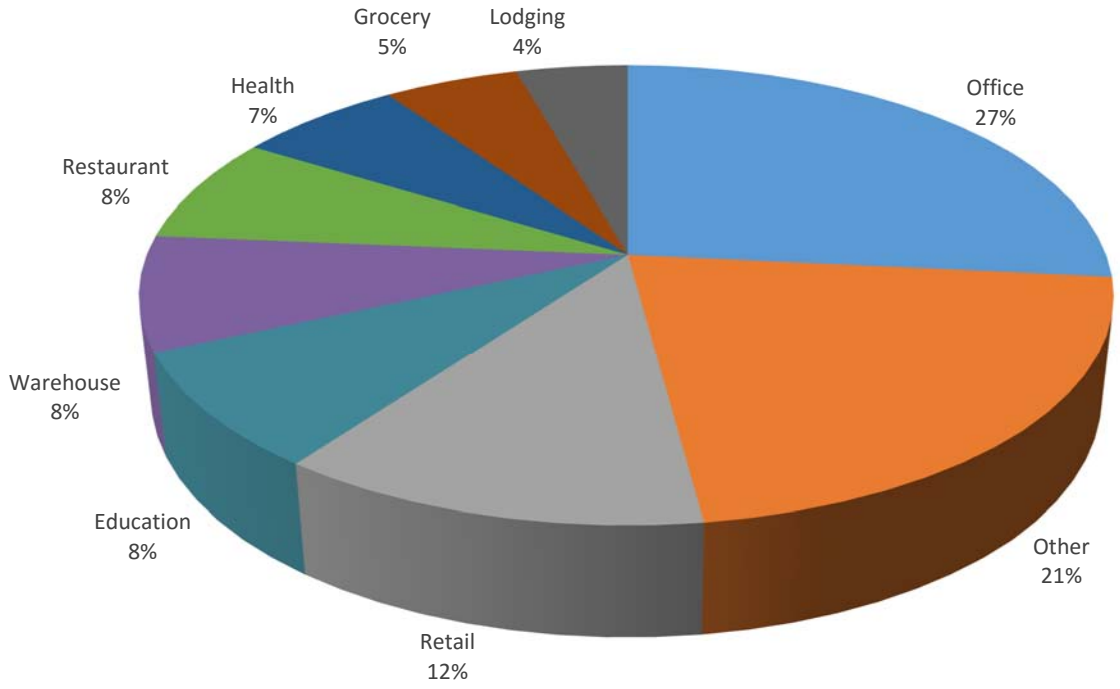


FIGURE 4-4 shows a similar breakdown of sales by industrial market segment for the industrial sector. Primary Metals (16% of annual industrial electricity sales) is the largest sector, followed by Automotive Manufacturing (14%) and Rubber and Plastics (13%). Reviewing and understanding information on Lower Peninsula sales of electricity by commercial and industrial market segment is an important step in the development of the estimates of future energy efficiency savings potential. TABLE 4-2 and TABLE 4-3 provide the actual MWh data market segment breakdown for the Lower Peninsula's commercial and industrial electricity sales.

FIGURE 4-4. LOWER PENINSULA INDUSTRIAL ELECTRICITY CONSUMPTION (MWH) BY INDUSTRY TYPE

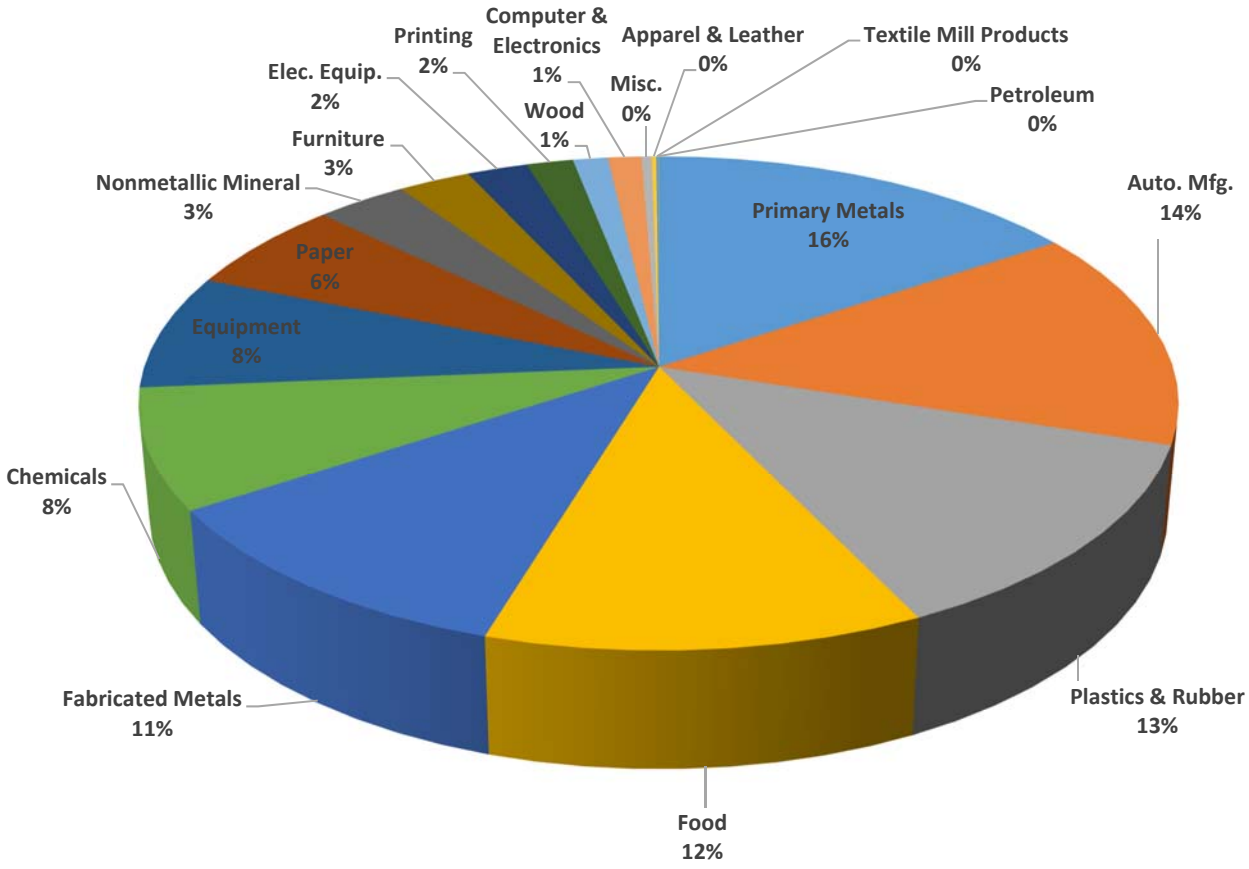


TABLE 4-2. LOWER PENINSULA COMMERCIAL SECTOR ELECTRIC ENERGY CONSUMPTION BY BUSINESS TYPE

Business Type	LP Commercial Sector Electricity Consumption (MWh)	Percent of Total Commercial Sector Sales
Office	8,764,273	27%
Other	7,060,191	21%
Retail	4,004,585	12%
Education	2,724,755	8%
Warehouse	2,661,933	8%
Restaurant	2,456,490	7%
Health	2,149,740	7%
Grocery	1,750,524	5%
Lodging	1,449,111	4%
Total	**33,021,600**	**100%**

TABLE 4-3. LOWER PENINSULA INDUSTRIAL ENERGY CONSUMPTION BY INDUSTRY TYPE

Industry Type	LP Industrial Electricity Consumption (MWh)	Electricity Share
Primary Metals	4,020,052	16%
Auto. Mfg.	3,706,066	14%
Plastics & Rubber	3,291,707	13%
Food	3,057,505	12%
Fabricated Metals	2,851,612	11%

Industry Type	LP Industrial Electricity Consumption (MWh)	Electricity Share
Chemicals	2,028,042	8%
Equipment	1,932,817	8%
Paper	1,549,342	6%
Nonmetallic Mineral	849,307	3%
Furniture	666,577	3%
Elec. Equip.	561,057	2%
Printing	429,801	2%
Wood	321,707	1%
Computer & Electronics	308,839	1%
Misc.	95,225	0%
Apparel & Leather	41,179	0%
Textile Mill Products	18,016	0%
Petroleum	7,721	0%
Total	**25,736,571**	**100%**

4.2.3 Electric Consumption by End-Use

TABLE 4-4 shows the breakdown of Lower Peninsula expected electric energy consumption by commercial building type and end use. The EIA Commercial Building Energy Consumption Survey 2012[16] results released in May 2016 (CBECS) were used to allocate energy consumption results to different end-uses for the Consumers Energy Study. The DTE Energy study was completed before the release of the new CBECS data and the 2003 CBECS data was use for that study. The 2012 CBECS data shows that energy consumption has shifted significantly since the last CBECS study in 2003. Specifically, lighting represented 40% of commercial energy used in 2003, and now represents only 19%. Refrigeration and Office Equipment/Plug Loads have increased by 5% and 7% respectively. This trend is driven by the installation of many high efficiency lighting products in commercial buildings since 2003.

TABLE 4-5 and TABLE 4-6 show the same end-use energy breakdown for the industrial sector by market segment. Lighting, miscellaneous and ventilation end-uses are the largest end use for the commercial sector, 32%, 18% and 14% respectively. As for the industrial sector, machine drives represent the largest end use, followed by process heating and process cooling.

[16] http://www.eia.gov/consumption/commercial/

TABLE 4-4. BREAKDOWN LOWER PENINSULA COMMERCIAL ELECTRICITY SALES BY BUILDING TYPE AND END-USE

	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other	Total
Lighting	52%	35%	21%	36%	35%	33%	18%	26%	26%	32%
Cooling	6%	11%	4%	10%	9%	13%	9%	16%	13%	10%
Ventilation	8%	13%	4%	14%	11%	20%	12%	20%	18%	14%
Water Heating	0%	2%	0%	0%	1%	0%	2%	1%	0%	1%
Refrigeration	14%	15%	57%	4%	8%	4%	32%	6%	6%	12%
Space Heating	1%	5%	3%	4%	4%	2%	3%	3%	3%	3%
Office Equipment	4%	4%	3%	17%	10%	10%	2%	15%	5%	9%
Miscellaneous	14%	15%	9%	15%	22%	18%	22%	13%	28%	18%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

TABLE 4-5. LOWER PENINSULA ELECTRIC INDUSTRIAL ENERGY CONSUMPTION BY INDUSTRY TYPE AND END USE (TABLE 1 OF 2)

	Food	Textile Mill Products	Apparel & Leather	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral
Conventional Boiler Use	3%	1%	1%	1%	2%	1%	1%	1%	1%
Process Heating	5%	9%	6%	6%	3%	4%	0%	4%	18%
Process Cooling and Refrigeration	28%	6%	4%	1%	1%	5%	5%	8%	11%
Machine Drive	43%	47%	36%	72%	75%	46%	83%	59%	43%
Electro-Chemical Processes	0%	1%	1%	1%	1%	1%	0%	15%	0%
Other Process Use	1%	1%	2%	1%	4%	1%	2%	1%	3%
Facility HVAC (g)	8%	16%	26%	6%	4%	24%	4%	6%	10%
Facility Lighting	8%	15%	16%	8%	4%	9%	3%	4%	8%
Other Facility Support	2%	3%	4%	2%	1%	3%	1%	1%	2%
Onsite Transportation	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other Non-Process Use	0%	0%	0%	1%	0%	1%	0%	0%	0%
End Use Not Reported	2%	1%	4%	2%	4%	4%	2%	1%	2%
Total Industrial	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

TABLE 4-6. ELECTRIC INDUSTRIAL ENERGY CONSUMPTION BY INDUSTRY TYPE AND END USE (TABLE 2 OF 2)

	Primary Metals	Fabricated Metals	Equipment	Computers & Electronic	Electrical Equipment	Auto Mfg.	Furniture	Misc.
Conventional Boiler Use	0%	0%	1%	1%	1%	1%	1%	1%
Process Heating	32%	21%	11%	10%	15%	11%	5%	11%
Process Cooling and Refrigeration	1%	3%	3%	9%	4%	5%	1%	5%
Machine Drive	28%	41%	40%	23%	37%	36%	47%	30%
Electro-Chemical Processes	26%	3%	0%	2%	5%	2%	1%	5%
Other Process Use	3%	3%	3%	5%	4%	4%	2%	3%
Facility HVAC (g)	4%	9%	20%	30%	15%	19%	18%	25%
Facility Lighting	3%	11%	15%	12%	10%	15%	17%	14%
Other Facility Support	1%	2%	4%	5%	7%	3%	4%	4%
Onsite Transportation	0%	0%	0%	0%	0%	1%	1%	0%
Other Non-Process Use	0%	0%	1%	1%	0%	1%	1%	0%
End Use Not Reported	0%	6%	1%	4%	0%	3%	4%	1%
Total Industrial	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

5 Potential Study Methodology

This section describes the overall methodology GDS utilized to develop the electric energy efficiency potential study. The main objective of this energy efficiency potential study is to quantify the technical, economic and achievable potential for electric energy efficiency savings in the Lower Peninsula electric service area. This report provides estimates of the potential kWh and kW electric savings for each level (technical, economic and achievable potential) of energy efficiency potential.

This document describes the general steps and methods that were used at each stage of the analytical process necessary to produce the various estimates of energy efficiency potential. GDS did not examine delivery approaches for energy efficiency programs as this task was not included in the scope of work for this study.

5.1 OVERVIEW OF APPROACH

GDS used a bottom-up approach to estimate energy efficiency potential in the residential sector. Bottom-up approaches begin with characterizing the eligible equipment stock, estimating savings and screening for cost-effectiveness first at the measure level, then summing savings at the end-use and service area levels. In the commercial and industrial sectors, the GDS team utilized a top-down modeling approach to first estimate measure-level savings and costs as well as cost-effectiveness, and then applied cost-effective measure savings to all applicable shares of electric energy load. Further details of the market research and modeling techniques utilized in this assessment are provided in the following sections.

5.2 FORECAST DISAGGREGATION FOR THE COMMERCIAL AND INDUSTRIAL SECTORS

For the commercial sector, the baseline electric energy forecasts for the Lower Peninsula service area were disaggregated by combining sales breakdowns by business type provided by Consumers Energy and DTE Energy with regional energy estimates by business type available from the U.S. Energy Information Administration (EIA)[17] The forecasts were then further disaggregated by end use based on end use consumption estimates from the Commercial Building Energy Consumption Survey (CBECS). The disaggregated forecast provided the foundation for the development of energy efficiency potential estimates for the commercial sector. The commercial sector, as defined in this analysis, is comprised of the following business segments:

- *Warehouse*
- *Retail*
- *Grocery*
- *Office*
- *Lodging*
- *Healthcare*
- *Restaurant*
- *Education*
- *Other*

For the industrial sector, the baseline electric forecast was disaggregated by industry type and then by end use. The industry type breakdowns are based on Lower Peninsula electric sales by market segment data. Further disaggregation by end use is based on data from the EIA's 2010 Manufacturing Energy Consumption Survey (MECS). The disaggregated forecast data provides the foundation for the development of energy efficiency potential estimates for the industrial sector.

End use electric energy consumption estimates were calculated for the following end use categories for specific manufacturing segments:

- **INDIRECT USES – BOILERS**
  - Conventional boiler use
- **DIRECT USES - PROCESS**

[17] 2012 EIA Commercial Building Energy Consumption Survey (CBECS), East North Central and Midwest Regions.

- Process heating (e.g., kilns, furnaces, ovens, strip heaters)
- Process cooling & refrigeration
- Machine drive
- Electro-chemical processes
- Other direct process use

- **DIRECT USES – NON-PROCESS**
  - Facility heating, ventilation and air conditioning
  - Facility lighting
  - Other facility support (e.g., cooking, water heating, office equipment)
- **OTHER NON-PROCESS USE**

Commercial and industrial baseline energy consumption data were advanced to 2017 and future years based upon the observed historical trend in the Lower Peninsula nonresidential consumption and the forecast of electric sales for the Lower Peninsula's commercial and industrial sectors.

It was not necessary to develop a disaggregated residential sales forecast because a bottom-up approach was used for the residential sector.

5.3 MEASURE LIST ANALYSIS

5.3.1 Measure List Development

Energy efficiency measures considered in the study include measures in the 2016 Michigan Energy Measure Database (MEMD), as well as other energy efficiency measures based on GDS' knowledge and current databases of electric end-use technologies and energy efficiency measures in other jurisdictions. The study includes measures and practices that are currently commercially available as well as emerging technologies. Emerging technology research was focused on measures that are either commercially available but currently not widely accepted, or are not currently available but expected to be commercialized over the analysis timeframe.[18]

As seen in TABLE 5-1. NUMBER OF MEASURES EVALUATED, GDS analyzed 568 energy efficiency measure types. Many measures required multiple permutations for different applications, such as different building types, efficiency levels, and replacement decision types. GDS developed a total of 6,207 measure permutations for this study, and tested all measures for cost-effectiveness using the Utility Cost Test (UCT). The parameters for cost-effectiveness calculations under the UCT are discussed in detail later in this section of the report. Approximately 79% of the measures had a measure UCT benefit-cost ratio of 1.0 or higher.[19]

TABLE 5-1. NUMBER OF MEASURES EVALUATED

	# of Measures	Total # of Measure Permutations	# with UCT ≥ 1
By Sector			
Residential	131	546	319
Commercial	245	2205	1809
Industrial	192	3456	2790

[18] For example, an ENERGY STAR criteria was recently established for clothes dryers. High efficiency clothes dryers were included as an emerging technology (these measures are also in the MEMD), even though the commercialization of high efficiency clothes dryers has not become widespread.

[19] The residential included some low income-specific measures with a UCT ratio less than 1.0 in the economic and achievable potential analysis. Low income-specific measures with a UCT ratio of 0.50 or greater were retained in the residential analysis of economic and achievable potential. This approach recognizes that low-income measures and programs may not always be cost-effective, but are offered by utilities to generate savings and address equity concerns.

	# of Measures	Total # of Measure Permutations	# with UCT ≥ 1
By Sector			
Total	***568***	***6,207***	***4,918***

A complete listing of the energy efficiency measures included in this study is provided in the Appendices of this report.

5.3.2 Measure Characterization

A significant amount of data is needed to estimate the kWh and kW savings potential for individual energy efficiency measures or programs across the residential and non-residential sectors in the Lower Peninsula service area. GDS used Consumers Energy, DTE Energy or Michigan-specific data wherever it was available and reflective of recent updates. Considerable effort was expended to identify, review, and document all available data sources.[20] This review has allowed the development of reasonable and supportable assumptions regarding: measure lives; measure costs (incremental or full costs as appropriate); measure electric savings; and saturations for each energy efficiency measure included in the final list of measures examined in this study. This study addresses electric energy efficiency potential, but natural gas savings have been analyzed to the extent that some measures yield both electric and natural gas savings. Only the electric portion of the costs and savings of these measures are addressed in this assessment of electric energy efficiency potential.

Costs and savings for new construction and replace on burnout measures are calculated as the incremental difference between the code minimum equipment and the energy efficiency measure. This approach is utilized because the consumer must select an efficiency level that is at least the code minimum equipment when purchasing new equipment. The incremental cost is calculated as the difference between the cost of high efficiency and standard efficiency (code compliant) equipment. However, for retrofit or direct install measures, the measure cost was considered to be the "full" cost of the measure, as the baseline scenario assumes the consumer would not make energy efficiency improvements in the absence of a program. In general, the savings for retrofit measures are calculated as the difference between the energy use of the removed equipment and the energy use of the new high efficiency equipment (until the removed equipment would have reached the end of its useful life).

SAVINGS ● Estimates of annual measure savings as a percentage of base equipment usage were developed from a variety of sources, including:

- 2016 Michigan Energy Measures Database
- Secondary sources such as the American Council for an Energy-Efficient Economy ("ACEEE"), Department of Energy ("DOE"), Energy Information Administration ("EIA"), ENERGY STAR savings calculators, Air Conditioning Contractors of America ("ACCA") and other technical potential studies and Technical Reference Manuals (TRMs)
- Program evaluations conducted by Consumers Energy and DTE Energy

MEASURE COSTS ● Measure costs represent either incremental or full costs, and typically also include the incremental cost of measure installation. For purposes of this study, nominal measures costs were held constant over time. This general assumption is being made because historically many measure costs (e.g., CFL bulbs, Energy Star appliances, etc.) have declined over time, while some measure costs have increased over time (e.g., fiberglass insulation). One exception to this assumption will be an assumed decrease in costs for light emitting diode (LED) bulbs, and to a lesser extent, compact fluorescent light

[20] The appendices and supporting databases to this report provide the data sources used by GDS to obtain up-to-date data on energy efficiency measure costs, savings, useful lives and saturations.

(CFL) bulbs over the study horizon. LED bulb consumer costs have been declining rapidly over the last several years and future cost projections predict a continued decrease in bulb costs.[21] The GDS team's treatment of LED bulb costs and market penetration are discussed in greater detail in Section 5.3.4, "Review of LED Lighting Assumptions."

When available, GDS obtained measure cost estimates from the MEMD. For measures not in the database, GDS referenced the following data sources:

- Secondary sources such as ACEEE, ENERGY STAR, and other technical potential studies and TRMs
- Retail store pricing (such as web sites of Home Depot and Lowe's) and industry experts
- Consumers Energy and DTE Energy program evaluation reports

MEASURE LIFE ● Represents the number of years that energy-using equipment is expected to operate. Useful life estimates have been obtained from the following data sources:

- MEMD
- Manufacturer data
- Savings calculators and life-cycle cost analyses
- Secondary sources such as ACEEE, ENERGY STAR, and other technical potential studies
- The California Database for Energy Efficient Resources ("DEER") database
- Evaluation reports
- GDS and other consultant research or technical reports

BASELINE AND EFFICIENT TECHNOLOGY SATURATIONS ● In order to assess the amount of electric energy efficiency savings still available, estimates of the current saturation of baseline equipment and energy efficiency measures, or for the non-residential sector the amount of energy use that is associated with a specific end use (such as HVAC) and percent of that energy use that is associated with energy efficient equipment are necessary. Up-to-date measure saturation data were primarily obtained from the following recent studies:

- 2014 Consumers Energy residential appliance saturation and home characteristics study
- 2011 Michigan Residential Baseline Study conducted by the MPSC
- Non-Residential Energy efficiency baseline study conducted for Consumers Energy in 2016[22]
- 2011 Michigan Commercial Baseline Study conducted by the MPSC
- 2009 EIA Residential Energy Consumption Survey
- 2007 American Housing Survey
- 2010 EIA Manufacturing Energy Consumption Survey (MECS)
- 2012 EIA Commercial Building Energy Consumption Survey (CBECS)

Further detail regarding the development of measure assumptions for energy efficiency in the residential and non-residential sectors are provided in this report in later sections. Additionally, as noted above, the appendices of the report provide a comprehensive listing of all energy efficiency measure assumptions and data sources.

5.3.3 Treatment of Codes and Standards

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

[21] [21] 2014 DOE SSL Multi-Year Program Plan & NEEP Residential Lighting Strategy Report..

[22] Consumer's Energy 2016 Non-Residential Baseline Study completed by EMI Consulting, January 2016.

- General Service lighting baselines reflect the minimum efficiency standards and schedule established in the Energy Independence and Security Act of 2007 (EISA 2007). As a result, the baseline efficiency for most general lighting was assumed to be a halogen bulb through May 31, 2020. Beginning in 2021, the analysis reflects the adjustments included in the EISA 2007 backstop provision, and the general service lighting baseline shifts to the CFL bulb. This shift in baseline impacts all bulbs, including those installed prior to 2020.
- The baseline efficiency for air source heat pumps (ASHP) increased to 14 SEER/8.2 HSPF23 in 2015. As the existing stock of ASHPs was estimated to turn over, the baseline efficiency was assumed to be the new federal standard.
- In 2015, the DOE makes amended standards effective for residential water heaters that required updated energy factors (EF) depending on the type of water heater and the rated storage volume. For storage tank water heaters with a volume of 55 gallons or less, the new standard (EF=0.948) becomes essentially the equivalent of today's efficient storage tank water heaters.
- In March 2015, the DOE amended the standards for residential clothes washers. The new standards require the Integrated Modified Energy Factor (MEF) (ft3/kWh/cycle) to meet certain thresholds based on the machine configurations. Version 7.0 of the ENERGY STAR specification took effect in March 2015. These amended federal and ENERGY STAR standards have been factored into the MEMD and have thus been accounted for in the study.
- In January 2015, the DOE amended the standards for residential clothes dryers. The new standards will require the EF (pounds/kWh) to meet certain thresholds based on the machine configurations. Version 1.0 of the ENERGY STAR specification for residential clothes dryers took effect in January 2015. The DOE-amended standards and the ENERGY STAR specification for residential clothes dryers have been factored into the study.
- In line with the phase-in of 2005 EPAct regulations, the baseline efficiency for general service linear fluorescent lamps was moved from the T12 light bulb to a T8 light bulb.

5.3.4 Review of LED Lighting Assumptions

It is important to review the various assumptions that were made throughout this analysis given the emerging market for LEDs and the overall historical importance of lighting to energy efficiency portfolios.

Savings: Screw-in LED bulbs were assumed to replace the current federal code baseline according to the requirements of the EISA 2007 legislation. For the first four years of the analysis (2017 through 2020), LED bulb savings are calculated relative to a halogen incandescent bulb for standard screw-in sockets. For the remaining years of the analysis, the GDS team assumes the CFL bulb becomes the code baseline, and standard screw-in LED savings are calculated against the CFL bulb.[24]

Costs: LED bulb costs are widely projected to decrease significantly over the next two decades. Current estimates project standard LED screw-in bulbs at $4.00 by 2020 and $2.40 by 2030.[25] Similarly, LED reflector bulbs are assumed to decline to $7.00 in 2020 and $5.00 by 2030. Based on these declining projections, as well as the current price of LED bulbs and estimated interim price points, the GDS team developed annual cost projections for standard and reflector screw-in LED bulbs. TABLE 5-2 shows the

[23] SEER: Seasonal Energy Efficiency Ratio; HSPF: Heating Seasonal Performance Factor.
[24] Specialty and reflector LED bulbs are not impacted by the EISA backstop provision in the same manner; the federal baselines for these bulb types were not anticipated to change during the analysis timeframe.
[25] Energy Information Administration. Technology Forecast Updates – Residential and Commercial Building Technologies, Reference Case. The 2014 DOE SSL Multi-Year Program Plan, NEEP Residential Lighting Strategy, and IMS Research (Does LED Lighting Have a Tipping Point?) all estimate the $4.00 LED standard screw-in bulbs price point in 2020.

annual projections for a standard 60-watt equivalent LED screw-in bulb, a specialty LED bulb, and a 65-watt equivalent LED reflector.

TABLE 5-2. PRICE PROJECTIONS FOR RESIDENTIAL LED LIGHTING

Bulb Technology	2017	2018	2019	2020	2025	2030
Standard LED	$7.54	$6.36	$5.18	$4.00	$3.20	$2.40
Specialty LED	$9.60	$8.40	$7.20	$6.00	$5.00	$4.00
LED Reflector	$21.67	$16.78	11.89	$7.00	$6.00	$5.00

Market Acceptance: To recognize the increasing market adoption of LED bulbs and the increased focus on LED technologies in energy efficiency programs, the GDS' potential analysis also projected an increasing focus on LED screw-in bulb technologies over CFL bulbs. TABLE 5-3 shows the annual applicability of standard LED vs. CFL bulbs assumed in the residential sector. For example, in 2017, 70% of all assumed efficient screw-in bulb installations will be LED bulbs. As noted above, the screw-in lighting baseline effectively becomes the CFL bulb for standard bulbs in 2020, and all assumed efficient installations shift to LEDs in the following year (and all subsequent years).

TABLE 5-3. ASSUMED ANNUAL APPLICABILITY OF LED BULBS

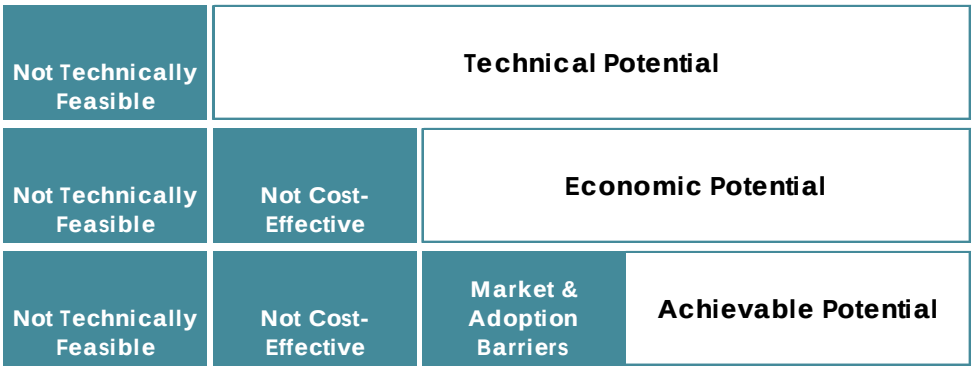
Bulb Technology	2017	2018	2019	2020	2021
CFL Bulb	30%	15%	10%	5%	0%
LED Bulb	70%	85%	90%	95%	100%

5.4 POTENTIAL SAVINGS OVERVIEW

Potential studies often distinguish between several types of energy efficiency potential: technical, economic, and achievable. However, because there are often important definitional issues between studies, it is important to understand the definition and scope of each potential estimate as it applies to this analysis. The first two types of potential, technical and economic, provide a theoretical upper bound for energy savings from energy efficiency measures. Still, even the best designed portfolio of programs is unlikely to capture 100 percent of the technical or economic potential. Therefore, achievable potential attempts to estimate what may realistically be achieved, when it can be captured, and how much it would cost to do so.

FIGURE 5-1 illustrates the three most common types of energy efficiency potential.

FIGURE 5-1. TYPES OF ENERGY EFFICIENCY POTENTIAL[26]



5.5 TECHNICAL POTENTIAL

Technical potential is the theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints such as cost-effectiveness and the willingness of end users to adopt the efficiency measures. Technical potential is only constrained by factors such as technical feasibility and applicability of measures. Under technical potential, GDS assumed that 100% of new construction and burnout measures are adopted as those opportunities become available (e.g., as new buildings are constructed they immediately adopt efficiency measures), while retrofit opportunities are replaced incrementally (10% per year) until 100% of homes (residential) and stock (commercial and industrial) are converted to the efficient measures over a period of 10 years. [27]

In instances where technical reasons do not permit the installation of the efficient equipment in all eligible households or nonresidential facilities an applicability factor is used to limit the potential. The alternative technologies are then utilized to meet the remaining market potential. The applicability factor was also used to delineate between two (or more) competing technologies for the same electrical end use. In the technical potential estimate, priority was given to measures that produced the most savings.[28]

In developing the overall potential electricity savings, the analysis also accounts for the interactive effects of measures designed to impact the same end-use. For instance, if a home or business were to install energy efficient heating and cooling equipment, the overall space heating and cooling consumption in that home would decrease. As a result, the remaining potential for energy savings derived from duct sealing or other building shell equipment would be reduced.

5.5.1 Core Equation for the Residential Sector

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

EQUATION 5-1. CORE EQUATION FOR RESIDENTIAL SECTOR TECHNICAL POTENTIAL

[26] Reproduced from "Guide to Resource Planning with Energy Efficiency" November 2007. US EPA. Figure 2-1.
[27] Low-income direct install measures were assumed to occur at a rate of 5% annually over the entire 20-year study timeframe.
[28] For estimates of economic and achievable potential, priority was generally assigned to measures that were found to be most cost-effective, according to the UCT Test.

WHERE:

- **Total Number of Households** = the number of households in the market segment (e.g. the number of households living in detached single-family buildings)
- **Base Case Equipment End-use Intensity** = the electricity used per customer per year by each base-case technology in each market segment. In other words, the base case equipment end-use intensity is the consumption of the electrical energy using equipment that the efficient technology replaces or affects.
- **Saturation Share** = this variable has two parts: the first is the fraction of the end-use electrical energy that is applicable for the efficient technology in a given market segment. For example, for residential water heating, the saturation share would be the fraction of all residential electric customers that have electric water heating in their household; the second is the share of market for a given end-use (i.e. Electric water heating) that is applicable for the efficient technology that has not yet been converted to an efficient technology.
- **Applicability Factor** = the fraction of the applicable units that is technically feasible for conversion to the most efficient available technology from an engineering perspective (e.g., it may not be possible to install CFLs in all light sockets in a home because the CFLs may not fit in every socket).[29]
- **Savings Factor** = the percentage reduction in electricity consumption resulting from the application of the efficient technology.

5.5.2 Core Equation for the Commercial Sector

The core equation utilized in the commercial sector technical potential analysis for each individual efficiency measure is shown below.

EQUATION 5-2. CORE EQUATION FOR COMMERCIAL SECTOR TECHNICAL POTENTIAL

WHERE:

- **Total end-use kWh sales by commercial sector and by building type (commercial) or industry type (industrial)** = the forecasted electric sales level for a given end use (e.g., space heating) in a commercial market segment (e.g., office buildings, wholesale or retail facilities, etc.).
- **Base Case factor** = the fraction of end-use energy applicable for the efficient technology in a given commercial sector type. For example, with fluorescent lighting, this would be the fraction of all lighting kWh in a given commercial building type that is associated with fluorescent fixtures.
- **Remaining factor** = the fraction of applicable kWh sales associated with equipment not yet converted to the electric energy efficiency measure; that is, one minus the fraction of the industry type with energy efficiency measures already installed.
- **Convertible factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (e.g., it may not be possible to install variable-frequency drives (VFDs) on all motors.
- **Savings factor** = the fraction of electric consumption reduced by application of the efficient technology.

5.5.3 Core Equation for the Industrial Sector

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

Estimating energy efficiency potential for the industrial sector can be more challenging than it is for the residential and commercial sectors because of the significant differences in the way energy is used across manufacturing industries (or market segments). The auto industry uses energy in a very different manner than does a plastics manufacturer. Further, even within a particular industrial segment, energy use is influenced by the particular processes utilized, past investments in energy efficiency, the age of the facility, and the corporate operating philosophy.

Recognizing the variability of energy use across industry types and the significance of process energy use in the industrial sector, GDS employed a top-down approach that constructed an energy profile based on local economic data, national energy consumption surveys and any available Michigan studies related to industrial energy consumption.

The core equation for estimating technical potential in the industrial sector analysis for each measure is provided below:

EQUATION 5-3. CORE EQUATION FOR INDUSTRIAL SECTOR TECHNICAL POTENTIAL

WHERE:

- **Total end-use sales by industry type** = the forecasted electric sales level for a given end use (e.g., space heating) by industrial industry type (e.g., fabricated metals, automobile manufacturing, paper and allied products, etc.).
- **Base Case factor** = the fraction of end-use energy applicable for the efficient technology in a given industry type. For example, with fluorescent lighting, this would be the fraction of all lighting kWh in a given industry type that is associated with fluorescent fixtures.
- **Remaining factor** = the fraction of applicable sales associated with equipment not yet converted to the electric energy-efficiency measure; that is, one minus the fraction of the industry type with energy-efficiency measures already installed.
- **Convertible factor** = the fraction of the equipment or practice that is technically feasible for conversion to the efficient technology from an engineering perspective (e.g., it may not be possible to install variable-frequency drives (VFDs) on all motors).
- **Savings factor** = the fraction of energy consumption reduced by application of the efficient technology.

5.6 ECONOMIC POTENTIAL

Economic potential refers to the subset of the technical potential that is economically cost-effective (based on screening with the UCT Test) as compared to conventional supply-side energy resources. GDS has calculated the benefit/cost ratios for this study according to the cost effectiveness test definitions provided in the November 2008 National Action Plan for Energy Efficiency (NAPEE) guide titled "Understanding Cost Effectiveness of Energy Efficiency Programs". Both technical and economic potential ignore market barriers to ensuring actual implementation of energy efficiency. Finally, they typically only consider the costs of efficiency measures themselves, ignoring any programmatic costs (e.g., marketing, analysis, administration, program evaluation, etc.) that would be necessary to capture them.

Furthermore, all measures that were not found to be cost-effective based on the results of the measure-level cost effectiveness screening were excluded from the economic and achievable potential. Then allocation factors were re-adjusted and applied to the remaining measures that were cost effective

5.6.1 Utility Cost Test

The UCT examines the costs and benefits of an energy efficiency program from the perspective of the entity implementing the program (utility, government agency, nonprofit, or other third party). GDS set incentives at 50% of measure costs when calculating the UCT. When conducting screening at the measure level, GDS only included utility incentive costs. For achievable potential, GDS included all costs incurred by the utility, including all other non-incentive costs. Overhead costs include the utility's administration, marketing, research and development, evaluation, and measurement and verification costs. Incentive costs are payments made to the utility's customers to offset purchase or installations costs. The benefits from the utility perspective are the savings derived from not delivering the energy to customers. Depending on the jurisdiction and type of utility, the "avoided costs" can include avoided or reduced wholesale electricity purchases, generation costs, power plant construction, transmission and distribution facilities, ancillary service and system operating costs, and other components.

TABLE 5-4 shows the key assumptions used by GDS in the development of the economic and achievable potential estimates based upon cost effectiveness screening using the UCT:

TABLE 5-4. KEY ASSUMPTIONS USED BY GDS IN THE DEVELOPMENT OF MEASURE-LEVEL SCREENING

Key Assumption	Used in UCT Screening
Utility weighted average cost of capital for the discount rate	Yes
Forecasts of electric energy and capacity avoided costs provided to GDS by Consumers Energy	Yes
Forecast of avoided transmission and distribution costs	Yes
Average line losses provided by Consumers Energy	Yes
MISO planning reserve margin	Yes
Electricity and natural gas savings benefits both valued in the cost effectiveness test for electric or natural gas energy efficiency programs	Yes
Value of avoided bulb purchases for high efficiency light bulbs	No
Water savings where applicable	No
Tax credits	No
Non-energy benefits	No

Based on discussions with Consumers Energy and DTE Energy, GDS has used average line losses to adjust kWh and kW savings at the customer meter to the generation level of the electric grid. The utilities recognize that in theory it would be appropriate to use marginal line losses instead of average line losses for this adjustment of savings. Because no studies or data exist at relating to marginal line losses on the Lower Peninsula electric grid, the study Team decided to use average line losses.

5.6.2 Financial Incentives for Program Participants

There are several reasons why an incentive level of 50% of measure costs (and not 100% of measure costs) was assumed for the two achievable potential scenarios examined for this study:

[1] First, an incentive level of 50% of measure costs assumed in this study for the two achievable potential scenarios is a reasonable target based on the current financial incentive levels for program participants used by Consumers Energy and DTE Energy for their existing energy efficiency programs.

[2] Second, GDS has reviewed other energy efficiency potential studies conducted in the US. The incentive levels used in several studies reviewed by GDS as well as actual experience with incentive levels in other states confirm that an incentive level assumption of 50% or below is commonly used.[30] It is interesting to note that the majority of energy efficiency programs offered by NYSERDA offer no incentives to consumers.

[3] Third, and most important, the highly recognized 2004 National Energy Efficiency Best Practices Study concluded that use of an incentive level of 100% of measure costs is not recommended as a program strategy.[31] This national best practices study concluded that it is very important to limit incentives to participants so that they do not exceed a pre-determined portion of average or customer-specific incremental cost estimates. The report states that this step is critical to avoid grossly overpaying for energy savings. This best practices report also notes that if incentives are set too high, free-ridership problems will increase significantly. Free riders dilute the market impact of program dollars.

[4] Fourth, financial incentives are only one of many important programmatic marketing tools. Program designs and program logic models also need to make use of other education, training and marketing tools to maximize consumer awareness and understanding of energy efficient products. A program manager can ramp up or down expenditures for the mix of marketing tools to maximize program participation and savings. The February 2010 National Action Plan for Energy Efficiency Report titled "Customer Incentives for Energy Efficiency Through Program Offerings" states on page 1 that "Incentives can be used in conjunction with other program strategies to achieve market transformation, whereby there is a lasting change in the availability and demand for energy-efficient goods and services." On page 11 of this report it is stated that "Well-designed incentives address the key market barriers in the target market. Financial incentives are designed to be just high enough to gain the desired level of program participation. In some cases, financial incentives can be bundled with financing, information, or technical services to reach program participation and energy savings goals at lower total program cost than using financial incentives alone."

5.7 ACHIEVABLE POTENTIAL

Achievable potential was determined as the amount of energy and demand that can realistically be saved assuming an aggressive program marketing strategy and with three scenarios. Achievable potential takes into account barriers that hinder consumer adoption of energy efficiency measures such as financial, political and regulatory barriers, and the capability of programs and administrators to ramp up activity over time. This potential study evaluated one achievable potential scenario. In this scenario, achievable potential represents the amount of energy use that efficiency can realistically be expected to displace assuming incentives equal to 50% of the incremental measure cost and no spending cap. Cost effectiveness of measures was determined with the UCT. The long-term market penetration for Scenario #1 was estimated based on the utilities paying incentives equal to 50% of measure costs. Year-by-year estimates of achievable potential for the period 2017 to 2036 were estimated by applying market penetration curves to this long-term penetration rate estimate. In general, these curves were developed based on willingness to pay data collected through survey research. Although this simplifies what an adoption curve would look like in practice, it succeeds in providing a concise method for estimating achievable savings potential over a specified period of time.

[30] GDS October 25, 2013 survey of financial incentives used in energy efficiency programs implemented by Consumers Energy, Ameren-Illinois, Efficiency Maine, Wisconsin Focus on Energy, and Xcel Energy (Minnesota).

[31] See "National Energy Efficiency Best Practices Study, Volume NR5, Non-Residential Large Comprehensive Incentive Programs Best Practices Report", prepared by Quantum Consulting for Pacific Gas and Electric Company, December 2004, page NR5-51.

While many different incentive scenarios could be modeled, the number of achievable potential scenarios that could be developed was limited to two scenarios due to the available budget for this potential study[32].

For new construction, energy efficiency measures can be implemented when each new home or building is constructed, thus the rate of availability will be a direct function of the rate of new construction. For existing buildings, energy efficiency potential in the existing stock of buildings will be captured over time through two principal processes:

[1] As equipment replacements are made normally in the market when a piece of equipment is at the end of its effective useful life (referred to as "replace-on-burnout" or "turnover" vintage).

[2] At any time in the life of the equipment or building (referred to as "retrofit" or "early replacement" vintage).

For the replace-on-burnout measures, the opportunity to replace existing equipment with high efficiency equipment is when equipment fails beyond repair or if the consumer is in the process of building or remodeling. Using this approach, only equipment that needs to be replaced in a given year will be eligible to be upgraded to energy efficient equipment.

For the retrofit measures, savings can theoretically be captured at any time; however, in practice, it takes many years to retrofit an entire stock of buildings, even with the most aggressive of energy efficiency programs.

5.7.1 Market Penetration Methodology

GDS assessed achievable potential on a measure-by-measure basis. In addition to accounting for the natural replacement cycle of equipment in the achievable potential scenario, GDS estimated measure specific maximum adoption rates that reflect the presence of possible market barriers and associated difficulties in achieving the 100% market adoption assumed in the technical and economic scenarios. The methodology utilized to forecast participation within each customer sector is described below.

5.7.1.1 Residential

The initial step in the market penetration methodology was to assess the long-term market adoption potential for residential energy efficiency technologies. As noted earlier in the report, there are approximately 550 residential measures included in this study. Due to the wide variety of measures across multiple end-uses, GDS employed varied measure and end-use-specific ultimate adoption rates versus a singular universal market adoption curve. These long-term market adoption estimates were based on publicly available DSM research including market adoption rate surveys and other utility program benchmarking.[33] GDS relied on one additional source for this study compared to the 2013 study.[34] This added reference point strengthened the market adoption estimates while also affirming that the estimates used in the 2013 study were reasonable. GDS also acknowledges that estimating future market adoption of energy efficient technologies is a difficult and uncertain practice, and that reliance on additional studies and alternate methods could produce different estimates of achievable potential.

Once the long-term market adoption rate was determined, GDS estimated initial year adoption rates by calibrating the estimates of 2017 annual potential to recent historical levels achieved by Consumers Energy's and DTE's Energy Optimization portfolios. This calibration effort ensures that the forecasted

[32] Neither of the two scenarios are considered a "maximum" achievable scenario. Maximum achievable scenarios assume 100% incentives. The two achievable potential scenarios included in the report assume 50% incentives. This approach approximates the level incentives historically offered by Consumers Energy and DTE Energy.
[33] Massachusetts Multifamily Market Characterization and Potential Study Volume I. May 2012. Cadmus Group. & Appliance Recycling Program Process Evaluation and Market Characterization. Volume I. CALMAC Study ID# SCE0337.01. September 2012. Cadmus.
[34] 2014 Pennsylvania Statewide Act 129 Residential Baseline Study - April 2014. Submitted by GDS Associates Inc. in partnership with Nexant Inc., Research Into Action, and Apex Analytics.

achievable potential in 2017 is realistic and attainable. GDS then assumed a linear ramp rate over 10 years from the initial year market adoption rate to the various long-term market adoption rates for each specific end-use. TABLE 5-5 below provides the maximum market adoption rates used for the residential sector in the achievable potential scenarios.

TABLE 5-5. MARKET ADOPTION RATES (BASED ON 50% INCENTIVES) BY END USE – RESIDENTIAL SECTOR

End Use	Initial Year Adoption Rate	Ultimate Adoption Rate
Lighting	50%	50%
Appliances	14%	55%
Electronics	14%	70%
Water Heating	14%	50%
HVAC Shell	14%	40%
HVAC Equipment	14%	50%
Miscellaneous	14%	50%
Cross-Cutting	30%	50%
Low Income	80%	80%

For the lighting end-use, the initial year adoption rate is set equal to the ultimate adoption rate. This recognizes the high penetration of efficient lighting in the Lower Peninsula service territory. The lack of growth in the adoption rate for lighting recognizes that this is a mature market and not likely to increase market share over time, though significant savings can still be achieved by continuing to offer lighting programs. The low-income sector is assumed to have an initial year adoption rate of 80% which is equal to the ultimate adoption rate. The high starting point recognizes that participation should be expected to be high with 100% incentives being offered for low-income measures. The overall penetration of low-income measures is constrained to the extent that it is assumed that it will take 20 years to reach all the customers in this sector.

One caveat to this approach is that the ultimate long-term adoption rate is generally a simple function of incentive levels and payback. There are many other possible elements that may influence a customer's willingness to purchase an energy efficiency measure. For example, increased marketing and education programs can have a critical impact on the success of energy efficiency programs. Additionally, other perceived measure benefits, such as increased comfort or safety as well as reduced maintenance costs could also factor into a customer's decision to purchase and install energy efficiency measures. Although these additional elements are not explicitly accounted for under this incentive/payback analysis, the estimated adoption rates and penetration curves provide a concise method for estimating achievable savings potential over a specified period.

Non-Residential

The non-residential approach for estimating market adoption rates is very similar to the residential sector approach. GDS employed varied, measures-specific maximum adoption rates versus a singular universal market adoption curve. These long-term market adoption estimates were based on the following survey results reported in the 2010 DTE Electric and Natural Gas Potential Study.[35] The study results were used for the 2013 Michigan Statewide study regarding adoption factors. The study reported the adoption factors by end-use shown in TABLE 5-6 below.

[35] Assessment of Nonresidential Electric and Natural Gas Energy Efficiency Potential (2010–2029), Prepared for Consumers Energy by The Cadmus Group, Inc.

TABLE 5-6. ADOPTION FACTORS BY EQUIPMENT AND INCENTIVE LEVEL

Equipment Type	50%	75%	100%
Lighting	66%	70%	75%
AC / HVAC	63%	68%	74%
Motors	69%	73%	77%
Variable Speed	66%	67%	69%
Refrigeration	65%	71%	76%
Energy Mgmt. System	59%	67%	74%
Food Service	66%	69%	73%
Process Measures	65%	67%	69%
Water Heating	67%	74%	80%
Overall	**65%**	**69%**	**74%**

GDS used the data shown above to estimate long term market penetration for commercial and industrial (process) measures based on the assumed incentive level stated as a percent of incremental cost.

GDS assumed two different paths to achieving long term market penetration, one for full cost measures such as insulation and another for incremental cost measures such as energy efficient fluorescent lighting. The participation for the maximum achievable cost effective savings was allocated equally at 5% per year across the full twenty years for replace on burnout/new construction incremental cost measures. The retrofit measures, in keeping with the rate of participant achievement of the previous study, was allocated at 10% per year for the first ten years of the study.

As with the residential approach, the non-residential market penetration methodology uses the relationship between incentives and program participation as a concise quantitative method for estimating achievable savings potential over a specified period. While there are many other elements that may influence a business customer's willingness to install an energy efficiency measure, such as access to capital, corporate policy or reduced maintenance costs, these factors are difficult to quantify and fit into a forecasting approach.

6 Residential Electric Energy Efficiency Potential Estimates

This section provides electric energy efficiency potential estimates for the residential sector in the Lower Peninsula service area. Estimates of technical, economic and achievable potential are provided.

This analysis assumes residential MWh sales will continue to be fairly stable with some moderate growth across the 2017-2036 timeframe. The residential electric potential calculations are based upon these approximate consumption values and sales forecast figures over the time horizon covered by the study. The potential is calculated for the entire residential sector and includes breakdowns of the potential associated with each end use.

6.1 RESIDENTIAL ENERGY EFFICIENCY MEASURES EXAMINED

For the residential sector, there were 546 total electric savings measures included in the potential energy savings analysis[36]. TABLE 6-1 provides a brief description of the types of measures included for each end use in the residential model. The list of measures was developed based on a review of the MEMD and measures found in other residential potential studies and TRMs from the Midwest. Measure data includes incremental costs, electric energy and demand savings, natural gas savings, and measure life.

TABLE 6-1. MEASURES AND PROGRAMS INCLUDED IN THE ELECTRIC RESIDENTIAL SECTOR ANALYSIS

End Use Type	End Use Description	Measures Included
HVAC Envelope	Building envelope upgrades	– Air/duct sealing – Duct insulation and duct sealing – Improved insulation – Efficient windows – Window film – Cool roofs
HVAC Equipment	Heating/cooling/ventilation equipment	– Existing central AC tune-up – Efficient air-source heat pump – Dual fuel heat pumps – Geothermal heat pumps – Ductless mini-split systems – Efficient central AC systems – Programmable thermostats – Efficient room air conditioners – Room air conditioner recycling – Efficient chillers – Chiller controls – Efficient furnace fans
Water Heating	Domestic hot water	– Heat pump water heater – Solar water heater – Low flow showerhead/faucet aerator – Gravity film heat exchangers – Pipe wrap – Restriction valves (ShowerStart / TubSpout)

[36] This total represents the number of unique electric energy efficiency measures and all permutations of these unique measures. For example, there are 16 permutations of the ENERGY STAR Clothes Washer measure to account for the various housing types, water heating type and presence and fuel type of dryers.

End Use Type	End Use Description	Measures Included
Lighting	Interior/exterior lighting	– Specialty CFLs – Standard CFLs – Standard LED bulbs – Specialty LED bulbs – Efficient fluorescent tube lighting – LED night lights – Occupancy sensors
Appliances	High-efficiency appliances / retirement of inefficient appliances	– ENERGY STAR clothes washers – ENERGY STAR refrigerator – ENERGY STAR freezers – ENERGY STAR dishwashers – ENERGY STAR dehumidifiers – ENERGY STAR dryers – Secondary refrigerator/freezer recycling – Dehumidifier recycling
Electronics	High efficiency consumer electronics	– Controlled power strips – Efficient set-top boxes – ENERGY STAR desktops – Efficient laptops – Efficient televisions – LCD Monitors
Behavioral	Consumer response to feedback from utility and smartphone applications	– Home energy reports – Mobile applications
Other	Efficient pool equipment	– Efficient pool pump motors

6.2 RESIDENTIAL SECTOR RESULTS

This section presents estimates for electric technical, economic, and achievable potential for the residential sector. Each of the tables in the technical, economic and achievable sections present the respective potential for efficiency savings expressed as cumulative annual energy savings (MWh), percentage of savings by end use, and savings as a percentage of forecast sales. Data is provided on a 10-year and 20-year time horizon.

This energy efficiency potential study considers the impacts of the Energy and Independence and Security Act (EISA) as an improving code standard for the residential sector. The EISA improves the baseline efficiency of several types of lighting products, including CFL or LED bulbs. Other known increases to federal minimum efficiency standards over the time period studied have also been accounted for in the analysis. These included changes to the efficiency standards central air conditioners, electric water heaters, and appliances.

There are a variety of factors which contribute to uncertainty surrounding the savings estimates produced by this energy efficiency potential study. These factors can include the following:

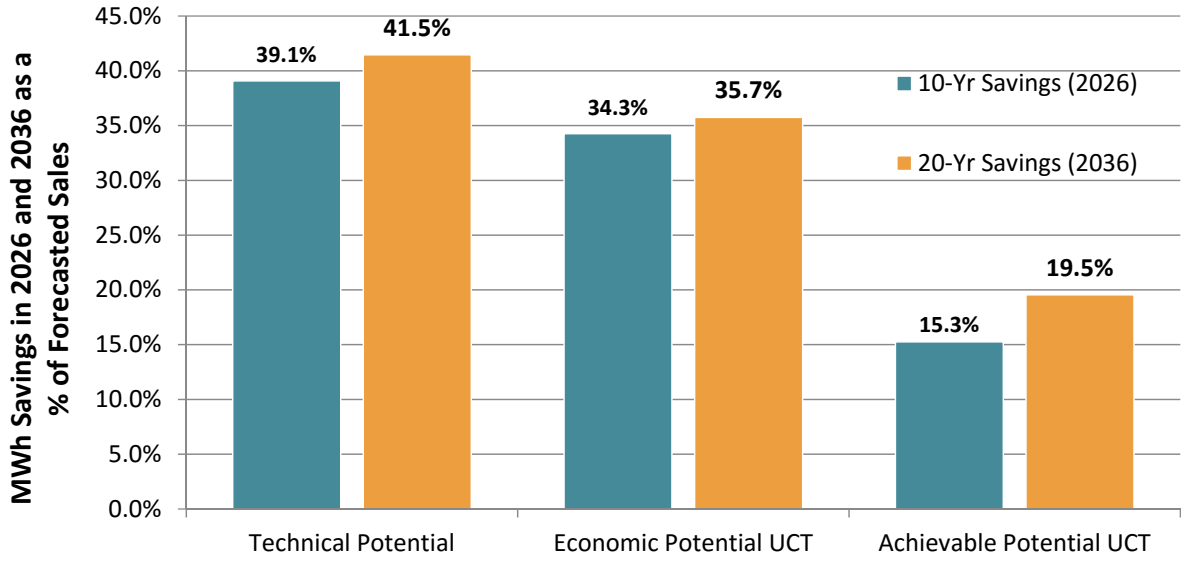
- Uncertainty about economic and fuel price forecasts used as inputs to the electric sales forecast
- The accuracy of results generated by building energy simulation modeling software
- Changes to codes and standards in the future which cannot be anticipated at the present time, and,
- Uncertainty regarding the future adoption of energy efficiency technologies which have minimal market share at the present time, such as LED lighting.

GDS has addressed the areas of uncertainty as robustly as possible given the time and budget constraints of this project. For example, GDS assumed an increasing market adoption of LEDs over the life of the study due to expected increases in program activity over the near term as well as expected decreased in LED bulb costs.[37] GDS also assimilated baseline study data into the estimates of weather sensitive measure savings where possible to adjust values acquired from the MEMD. These adjustments apply to measures such as insulation, for which savings are provided on a square footage basis in the MEMD.

6.2.1 Summary of Findings

FIGURE 6-1 illustrates the estimated savings potential for each of the scenarios included in this study.

FIGURE 6-1. SUMMARY OF RESIDENTIAL ELECTRIC ENERGY EFFICIENCY POTENTIAL AS A % OF 2026 AND 2036 SALES FORECASTS



The potential estimates are expressed as cumulative 10-year and 20-year savings, as percentages of the respective 2026 and 2036 sector sales. The technical potential is 39.1% in 2026 and 41.5% in 2036. The 10-year and 20-year economic potential is 34.3% and 35.7% based on the UCT screen, assuming an incentive level equal to 50% of the measure cost. The slight drop from technical potential to economic potential indicates that most measures contributing to technical potential are cost-effective, particularly when screening based on the UCT.

The 10-year and 20-year achievable potential savings are: 15.3% and 19.5% for the Achievable UCT scenario. The Achievable UCT scenario assumes 50% incentives and includes measures that passed the UCT Test.

6.2.2 Technical Potential

Technical potential represents the quantification of savings that can be realized if all technologically available energy-efficiency measures are adopted in all feasible instances, regardless of cost. TABLE 6-2 shows that it is technically feasible to save nearly 11.6 million MWh in the residential sector between 2017 and 2026, as well as approximately 12.6 million MWh during the 20-year period from 2017 to 2036 statewide, representing 39.1% of 10-year residential sales, and 41.5% of 20-year residential sales. HVAC Equipment, lighting, and HVAC Shell measures are the greatest contributors to the technical

[37] Only LED bulbs are reflected in the estimate of technical and economic potential due to the greater savings opportunities. CFL and LED bulbs are included in the estimates of achievable potential to allow for the possibility of future CFL purchases. However, the assumed share of CFLs is increasingly minor relative to historical levels.

potential. TABLE 6-3 shows the demand savings potential in 2026 and 2036. The ten and twenty-year summer peak demand savings potential is 2,058 MW and 2,545 MW, respectively, which is 23.7% and 28.9% of the peak forecast.

TABLE 6-2. RESIDENTIAL SECTOR TECHNICAL POTENTIAL ENERGY SAVINGS BY END USE

End Use	2026 Energy (MWh)	% of 2026 Savings	2036 Energy (MWh)	% of 2036 Savings
Lighting	2,331,208	20.2%	2,601,412	20.7%
Appliances	1,291,740	11.2%	718,441	5.7%
Electronics	1,422,123	12.3%	1,499,973	11.9%
Water Heating	1,472,704	12.7%	1,714,205	13.6%
HVAC Shell	1,638,416	14.2%	1,990,981	15.8%
HVAC Equipment	2,970,343	25.7%	3,623,786	28.8%
Miscellaneous	171,763	1.5%	177,475	1.4%
Cross-Cutting	266,910	2.3%	263,929	2.1%
Total	**11,565,206**	**100.0%**	**12,590,202**	**100.0%**
% of Annual Sales Forecast	*39.1%*		*41.5%*	

TABLE 6-3. RESIDENTIAL SECTOR TECHNICAL POTENTIAL DEMAND SAVINGS

	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	2,058	23.7%	2,545	28.9%

6.2.3 Economic Potential

Economic potential is a subset of technical potential, which only accounts for measures that are cost-effective. The UCT was used for this study because it is mandated in Michigan to be the primary cost-effectiveness test used when considering energy efficiency programs. 58% of all measures that were included in the electric potential analysis passed the UCT.

TABLE 6-4 indicates that the economic potential based on the UCT screen is 10.1 million MWh during the 10-year period from 2017 to 2026, and the economic potential more than 10.8 million MWh during the 20-year period from 2017 to 2036. This represents 34.3% and 35.7% of residential sales across the respective 10-year and 20-year timeframes. HVAC Equipment, lighting, and HVAC Shell measures are the greatest contributors to the economic potential. TABLE 6-5 shows the demand savings potential in 2026 and 2036. The five and ten-year summer peak demand savings potential is 1,426 MW and 1,658 MW, respectively, which is 16.4% and 18.8% of the peak forecast.

TABLE 6-4. RESIDENTIAL SECTOR ECONOMIC POTENTIAL (UCT) ENERGY SAVINGS BY END USE

End Use	2026 Energy (MWh)	% of 2026 Savings	2036 Energy (MWh)	% of 2036 Savings
Lighting	2,105,537	20.8%	2,373,223	21.9%
Appliances	1,284,618	12.7%	707,045	6.5%
Electronics	1,363,617	13.4%	1,440,067	13.3%
Water Heating	1,288,110	12.7%	1,487,399	13.7%
HVAC Shell	1,486,521	14.7%	1,884,108	17.4%
HVAC Equipment	2,152,991	21.2%	2,493,267	23.0%
Miscellaneous	171,763	1.7%	177,475	1.6%
Cross-Cutting	288,160	2.8%	289,729	2.7%

End Use	2026 Energy (MWh)	% of 2026 Savings	2036 Energy (MWh)	% of 2036 Savings
Total	**10,141,317**	**100.0%**	**10,852,314**	**100.0%**
% of Annual Sales Forecast	*34.3%*		*35.7%*	

TABLE 6-5: RESIDENTIAL SECTOR ECONOMIC POTENTIAL (UCT) DEMAND SAVINGS

	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	1,426	16.4%	1,658	18.8%

6.2.4 Achievable Potential

Achievable potential is a refinement of economic potential that considers the estimated market adoption of energy efficiency measures based on the incentive level and measure payback, the natural replacement cycle of equipment, and the capabilities of programs and administrators to ramp up program activity over time. Achievable potential also considers the non-measure costs of delivering programs (for administration, marketing, monitoring and evaluation, etc.). For purposes of this analysis, administrative costs were assumed to be equivalent to $0.0581 per first-year kWh saved, which was based on a review historical EIA data of typical program administrator costs of several utility energy efficiency programs in and around Michigan, including Consumers Energy.

The non-incentive acquisition cost of first-year kWh saved for each sector is based upon EIA Form 861 reported experience in 5 Mid-Western States in 2014. For purposes of this study GDS relied upon this regional data as the best data source for non-incentive costs that are likely to be experienced in the Lower Peninsula Service area going forward. GDS escalated this acquisition cost by inflation for this study's planning horizon. Actual non-incentive cost the Lower Peninsula utilities may differ from the regional data based upon program design and other planning factors.[38]

This study estimated achievable potential for two scenarios. The Achievable UCT Scenario determines the achievable potential of all measures included in the UCT economic screening[39] assuming incentives equal to 50% of the measure cost.[40]

6.2.4.1 Achievable UCT Scenario

TABLE 6-6 through TABLE 6-7 show the estimated savings for the Achievable UCT scenario over 10 and 20-year time horizons. As noted above, the scenario assumes an incentive level approximately equal to 50% of the incremental measure cost and include an estimate 10-year market adoption rates based on incentive levels and equipment replacement cycles. The 10-year and 20-year Achievable UCT potential savings estimates are approximately 4.5 million MWh and 5.9 million MWh. This equates to 15.3% and 19.5% of sector sales in 2026 and 2036.

[38] Per Consumers Energy Staff, the best and most recent analysis they have for C&I rebates as a percentage of incremental costs is 22%. This number was calculated from prescriptive measures where there is good incremental cost data available, but they use it as their rough estimate for the overall % of incremental costs their rebates cover across their entire portfolio because calculating this percentage on custom projects is extremely difficult and subjective.

[39] Some LED measures which failed the 2017 UCT screen are included in the economic and achievable potential because of the ongoing decline in LED costs which is expected to continue in the next several years.

[40] Traditional low income measures associated with Michigan's Weatherization Assistance Program were evaluated using 100% incentives across all three achievable potential scenarios. All other measures were evaluated at the 50% incentive level.

TABLE 6-6. RESIDENTIAL ACHIEVABLE UCT POTENTIAL ELECTRIC ENERGY SAVINGS BY END USE

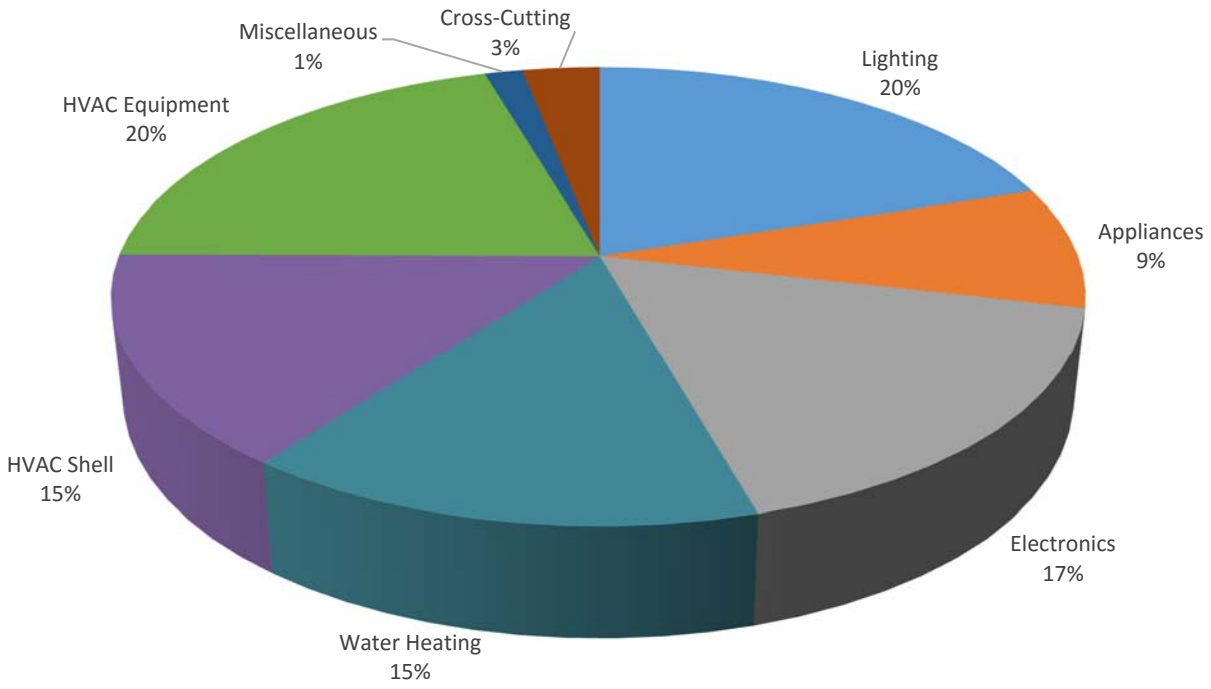
End Use	2026 Energy (MWh)	% of 2026 Savings	2036 Energy (MWh)	% of 2036 Savings
Lighting	1,104,124	24.5%	1,186,621	20.0%
Appliances	567,988	12.6%	511,537	8.6%
Electronics	714,905	15.8%	1,008,046	17.0%
Water Heating	562,456	12.5%	866,855	14.6%
HVAC Shell	568,552	12.6%	884,327	14.9%
HVAC Equipment	751,727	16.7%	1,207,227	20.3%
Miscellaneous	60,152	1.3%	88,738	1.5%
Cross-Cutting	184,397	4.1%	179,987	3.0%
Total	**4,514,301**	**100.0%**	**5,933,338**	**100.0%**
% of Annual Sales Forecast	*15.3%*		*19.5%*	

TABLE 6-7. RESIDENTIAL ACHIEVABLE UCT POTENTIAL DEMAND SAVINGS

	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	606	7.0%	858	9.8%

FIGURE 6-2 shows the percentage of electric savings by each end use for the Achievable UCT scenario. HVAC Equipment represents 20% of the total electric savings. Remaining potential from specialty and reflector sockets, also represents the 20% of the remaining potential.

FIGURE 6-2. RESIDENTIAL SECTOR 2036 ACHIEVABLE UCT ELECTRIC POTENTIAL SAVINGS, BY END USE



6.2.4.2 Annual Achievable Electric Savings Potential

TABLE 6-8 and TABLE 6-9 show cumulative annual energy savings (MWh) for each year across the 20-year time horizon for the study, broken out by end use. The year by year associated incentive and administrative costs to achieve these savings are shown in Section 6.3.

Cumulative Annual and Incremental Annual savings as a percent of forecasted sales is found in Appendix F. Cumulative Annual Savings is used to develop an overall program planning perspective and Incremental Annual Savings is commonly associated with program implementation, such as short-term implementation plans to obtain Program-Level Potential.

TABLE 6-8. CUMULATIVE ANNUAL RESIDENTIAL ELECTRIC ENERGY MWH SAVINGS IN THE ACHIEVABLE UCT POTENTIAL SCENARIO, BY END USE FOR THE LOWER PENINSULA

	Lighting	Appliances	Electronics	Water Heating	HVAC Shell	HVAC Equipment	Misc.	Cross-Cutting	Total	% of Annual Forecast Sales
2017	223,276	40,150	44,289	38,330	43,820	46,990	3,467	131,134	571,455	4.6%
2018	442,880	85,452	99,087	81,193	90,815	99,111	7,508	137,711	1,043,756	8.5%
2019	661,320	135,861	164,195	128,359	140,874	157,836	12,111	143,891	1,544,446	12.6%
2020	878,462	191,353	239,488	179,605	193,892	223,129	17,270	149,659	2,072,859	17.0%
2021	595,197	251,959	309,519	234,791	249,790	295,031	22,994	158,021	2,117,303	17.3%
2022	715,424	317,723	385,201	293,792	308,484	373,142	29,293	163,842	2,586,901	21.0%
2023	835,738	388,644	460,310	356,375	369,853	457,918	36,168	169,281	3,074,289	25.1%
2024	956,021	464,687	539,738	422,236	433,756	549,311	43,610	174,362	3,583,720	29.1%
2025	1,076,458	515,570	625,380	491,052	500,042	647,270	51,608	179,217	4,086,598	33.1%
2026	1,104,124	567,988	714,905	562,456	568,552	751,727	60,152	184,397	4,514,301	36.3%
2027	1,134,067	597,783	868,317	615,472	616,488	827,253	65,649	182,084	4,907,114	39.5%
2028	1,164,943	617,614	929,325	665,646	661,721	897,759	70,547	180,602	5,188,157	41.7%
2029	1,196,441	628,893	958,687	713,218	704,340	963,487	74,850	179,485	5,419,400	43.3%
2030	1,228,130	632,133	972,919	747,703	736,420	1,024,535	78,563	178,824	5,599,227	44.2%
2031	1,259,718	625,962	981,849	777,820	766,058	1,080,929	81,691	178,197	5,752,222	45.3%
2032	1,245,277	611,437	987,404	803,642	793,962	1,119,450	84,239	178,269	5,823,680	45.4%
2033	1,222,231	586,592	992,715	825,328	819,673	1,151,348	86,215	178,598	5,862,700	45.2%
2034	1,195,443	553,245	997,781	843,046	843,261	1,176,613	87,624	179,216	5,876,228	44.7%
2035	1,190,578	533,165	1,002,950	856,897	864,828	1,195,243	88,468	179,516	5,911,645	44.8%
2036	1,186,621	511,537	1,008,046	866,855	884,327	1,207,227	88,738	179,987	5,933,338	44.5%

TABLE 6-9. CUMULATIVE ANNUAL ELECTRIC RESIDENTIAL DEMAND SAVINGS (MW) IN THE ACHIEVABLE UCT POTENTIAL SCENARIO, BY END USE FOR THE LOWER PENINSULA

	Lighting	Appliances	Electronics	Water Heating	HVAC Shell	HVAC Equipment	Misc.	Cross-Cutting	Total	% of Annual Forecast Sales
2017	23	8	5	3	12	2	3	15	69.6	1.9%
2018	46	16	11	7	24	4	6	16	129.0	3.6%
2019	68	26	19	10	38	6	9	16	192.4	5.4%
2020	90	37	28	15	52	9	13	17	259.9	7.3%
2021	61	49	36	19	67	11	17	18	278.6	7.8%
2022	73	62	45	24	84	14	22	19	341.8	9.5%
2023	85	76	54	29	101	16	27	19	407.4	11.3%
2024	98	92	63	34	118	19	32	20	476.2	13.2%
2025	110	104	73	40	137	22	38	20	544.5	15.1%
2026	113	118	83	46	156	25	44	21	605.7	16.6%
2027	116	126	99	50	170	31	48	21	661.5	18.2%
2028	119	133	106	54	183	38	52	21	705.3	19.4%
2029	122	138	110	58	196	44	55	20	743.0	20.3%
2030	125	141	112	61	205	51	58	20	773.8	20.9%
2031	129	143	113	63	215	58	60	20	801.0	21.5%
2032	127	143	114	65	223	62	62	20	817.4	21.8%
2033	125	142	115	67	232	66	63	20	829.5	21.9%
2034	122	138	115	68	239	70	65	20	838.2	21.8%
2035	121	137	116	69	246	74	65	20	849.0	22.0%
2036	121	134	116	70	253	77	65	21	857.9	22.0%

6.2.5 Residential Electric Savings Summary by Measure Group

TABLE 6-10 provides an end-use breakdown of the residential electric savings potential estimates for technical and economic potential, and the achievable potential scenario. The table indicates how the savings potential decreases systematically from the technical potential scenario to the Achievable UCT potential scenario as additional limiting factors such as cost-effectiveness requirements and anticipated market adoption at given funding levels are introduced.

TABLE 6-10. LP RESIDENTIAL SECTOR CUMULATIVE ANNUAL ELECTRIC SAVINGS POTENTIAL BY MEASURE BY 2036

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Lighting			
Standard CFLs	0	0	0
Standard LEDs	228,021	228,021	119,513
Specialty CFLs	115,656	115,656	53,623
Specialty LEDs	1,201,610	1,201,610	573,525
Reflector CFLs	0	0	23,903
Reflector LEDs	792,228	792,228	396,230
Efficient Fluorescent Tube Lighting	154,993	0	0
LED night lights	35,708	35,708	19,826
Occupancy sensors	73,196	0	0
Appliances			
ENERGY STAR clothes washers	171,974	171,974	94,586
ENERGY STAR refrigerator	130,405	119,009	67,620
ENERGY STAR freezers	61,148	61,148	28,337
ENERGY STAR dishwashers	40,273	40,273	22,150
ENERGY STAR dehumidifiers	82,361	82,361	45,040
ENERGY STAR dryers	112,614	112,614	60,073
Secondary refrigerator/freezer recycling	119,666	119,666	188,219
Dehumidifier recycling	0	0	3,681
Room AC recycling	0	0	1,832
Electronics			
Controlled Power Strips	819,655	759,749	531,823
Efficient set-top boxes	194,517	194,517	136,162
ENERGY STAR desktops	125,397	125,397	87,778
Efficient laptops	40,599	40,599	28,420
Efficient televisions	289,325	289,325	202,527
LCD Monitors	30,481	30,481	21,337
Water Heating			
Heat pump water heaters	1,082,784	1,082,784	533,107
Solar water heater	153,711	0	0
Low flow showerhead/faucet aerator	284,028	287,403	236,799
Gravity film heat exchangers	77,866	0	0
Pipe wrap	60,254	60,976	54,409
Flow restriction valves (ShowerStart/TubSpout)	55,561	56,236	42,540
HVAC Envelope			
Air Sealing	497,106	504,870	271,882

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Duct insulation/sealing	164,933	171,526	73,833
Improved Insulation	559,938	348,891	202,529
Efficient windows	769,004	858,821	336,083
Window film	0	0	0
Cool Roofs	0	0	0
HVAC Equipment			
Central AC tune-up*	0	10,289	6,006
Efficient air-source heat pump	73,571	68,100	32,619
Dual fuel heat pumps*	0	6,148	2,963
Geothermal heat pumps	72,660	0	0
Ductless mini-split systems	1,290,604	1,290,604	644,009
Efficient central AC systems	943,589	183,608	87,398
Programmable thermostats	166,070	164,064	82,032
Efficient room air conditioners	35,439	35,439	16,915
Efficient chillers	8,462	8,462	3,558
Chiller controls	0	0	0
Efficient furnace fans	934,509	635,686	327,183
Other			
Efficient pool pump motors	177,475	177,475	88,738
Cross-Cutting/Behavioral			
Home Energy Reports#	263,929	289,729	179,987
Mobile applications	98,881	90,866	4,543
Total			
Total	12,590,202	10,852,314	5,933,338
Percent of Annual Sector Sales Forecast	41.5%	35.7%	19.5%

6.3 ACHIEVABLE POTENTIAL BENEFITS & COSTS

The tables below provide the net present value (NPV) benefits and costs associated with the achievable potential scenario for the residential sector at the 10-year and 20-year periods. TABLE 6-11 and TABLE 6-12 shows the NPV benefits and costs associated with the Achievable UCT Scenario.

TABLE 6-11. 10-YEAR BENEFIT-COST RATIOS FOR ACHIEVABLE UCT SCENARIO – RESIDENTIAL SECTOR ONLY

10-year	NPV Benefits	NPV Costs	B/C Ratio	Net Benefits
Achievable UCT	$1,860,603,905	$978,245,232	1.90	$882,358,673

TABLE 6-12. 20-YEAR BENEFIT-COST RATIOS FOR ACHIEVABLE UCT SCENARIO– RESIDENTIAL SECTOR ONLY

20-year	NPV Benefits	NPV Costs	B/C Ratio	Net Benefits
Achievable UCT	$3,001,508,984	$1,461,493,710	2.05	$1,540,015,274

Year by year budgets, broken out by incentive and administrative costs, are depicted in TABLE 6-13 and TABLE 6-14 shows the revenue requirements as a percentage of forecasted sector sales.

TABLE 6-13: ANNUAL PROGRAM BUDGETS ASSOCIATED WITH THE ACHIEVABLE UCT SCENARIO (IN MILLIONS)

Achievable UCT	Incentives	Admin.	Total Costs
2017	$85.5	$33.2	$118.7
2018	$88.6	$35.9	$124.5
2019	$88.9	$38.8	$127.7
2020	$87.5	$41.7	$129.2
2021	$92.2	$39.0	$131.2
2022	$97.6	$42.2	$139.8
2023	$103.0	$45.5	$148.5
2024	$108.3	$48.8	$157.1
2025	$115.5	$53.5	$169.0
2026	$118.6	$53.9	$172.5
2027	$112.5	$54.7	$167.2
2028	$100.3	$48.6	$148.9
2029	$95.6	$47.3	$142.9
2030	$94.2	$47.7	$141.8
2031	$92.6	$47.9	$140.5
2032	$99.2	$52.5	$151.7
2033	$100.7	$55.4	$156.1
2034	$100.5	$56.6	$157.1
2035	$110.4	$66.2	$176.6
2036	$100.4	$60.5	$161.0

TABLE 6-14: ANNUAL ACHIEVABLE SCENARIO BUDGETS AS A % OF ANNUAL SECTOR REVENUE

Year	Achievable UCT
2017	2.7%
2018	2.8%
2019	2.8%
2020	2.8%
2021	2.8%
2022	2.9%
2023	3.0%
2024	3.1%
2025	3.3%
2026	3.3%
2027	3.1%
2028	2.7%
2029	2.6%
2030	2.5%
2031	2.4%
2032	2.6%
2033	2.6%
2034	2.6%
2035	2.8%
2036	2.5%

7 Commercial Electric Energy Efficiency Potential Estimates

This section provides electric energy efficiency potential estimates for the commercial sector for the Lower Peninsula service area. Estimates of technical, economic and achievable electric energy efficiency potential are provided in separate sections of this chapter of the study.

7.1 ELECTRIC ENERGY EFFICIENCY MEASURES EXAMINED

For the commercial sector, there were 245 unique energy efficiency measures included in the electric energy savings potential analysis. TABLE 7-1 provides a brief description of the types of measures included for each end use in the commercial sector. The list of measures was developed based on a review of the latest MEMD, measures found in other TRMs and measures included in other commercial energy efficiency potential studies. For each measure, the analysis considered incremental costs, energy and demand savings, and measure useful lives.

TABLE 7-1. TYPES OF ELECTRIC ENERGY EFFICIENCY MEASURES INCLUDED IN THE COMMERCIAL SECTOR ANALYSIS

End Use Type	End Use Description	Measures Included
Office Equipment	Office Equipment Improvements	– Appliances – High Efficiency Office Equipment – Smart Power Strips – Computer Energy Management Controls – Computer Room Upgrades
Compressed Air	Compressor Equipment	– Efficient Air Compressors – Automatic Drains – Cycling and High Efficiency Dryers – Low Pressure Drop-Filters – Air-Entraining Air Nozzles – Receiver Capacity Addition – Compressed Air Audits, Leak Repair, and Flow Control – Suction Line Insulation
Cooking	Cooking Equipment Improvements	– Efficient Cooking Equipment
Envelope	Space Heating and Space Cooling	– Building Envelope Improvements – Cool Roofing – Integrated Building Design
HVAC Controls	Space Cooling and Space Heating	– Programmable Thermostats – EMS Installation/Optimization – Hotel Guest Room Occupancy Control System – Retrocommissioning & Commissioning
Lighting	Lighting Improvements	– Efficient Lighting Equipment – Fixture Retrofits – Ballast Replacement – Premium Efficiency T8 and T5 – High Bay Lighting Equipment – LED Bulbs and Fixtures – Light Tube – CFL Retrofits – Lighting Controls – Efficient Design for New Construction – LED Traffic Signals and Street Lighting
Other	Transformer Equipment Other	– Efficient Transformers – Optimized Snow and Ice Melt Controls – EC Plug Fans in Data Centers – Engine Block Heater Timer

End Use Type	End Use Description	Measures Included
Pools	Pool Equipment	– Efficient Equipment and Controls – Heat Pump Pool Heaters
Refrigeration	Refrigeration Improvements	– Vending Misers – Refrigerated Case Covers – Economizers – Efficient Refrigeration – Upgrades Motors and Controls – Door Heater Controls – Efficient Compressors and Controls – Door Gaskets and Door Retrofits – Refrigerant Charging Correction – Ice-Makers
Space Cooling	Cooling System Upgrades	– Efficient Chillers – Efficient Cooling Equipment – Ground/Water Source Heat Pump – Chiller Tune-up/Diagnostics – High Efficiency Pumps
Space Heating	Heating System Improvements	– Efficient Heating Equipment – Ground/Water Source Heat Pump – Efficient Heating Pumps, Motors, and Controls
Ventilation	Ventilation Equipment	– Enthalpy Economizer – Variable Speed Drive Controls – Improved Duct Sealing – Destratification Fans – Controlled Ventilation Optimization – Demand Controlled Ventilation
Water Heating	Water Heating Improvements	– Efficient Equipment – High Efficiency HW Appliances – Low Flow Equipment – Pipe and Tank Insulation – Heat Recovery Systems – Efficient HW Pump and Controls – Solar Water Heating System

7.2 COMMERCIAL SECTOR RESULTS

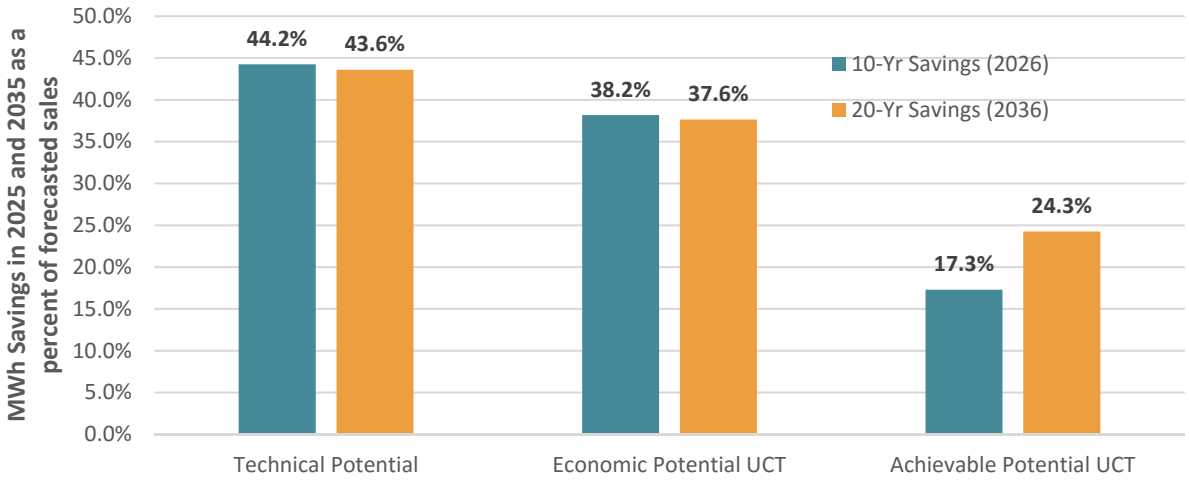
This section presents estimates for electric technical, economic, and achievable savings potential for the commercial sector. Each of the tables in the technical, economic and achievable sections presents the respective potential for efficiency savings expressed as cumulative annual savings (MWh) and percentage of commercial sector forecast annual MWh sales. Data is provided for 10 and 20-year.

This energy efficiency potential study considers the impacts of the December 2007 Energy and Independence and Security Act (EISA) as an improving energy efficiency code standard for the commercial sector. EISA improves the baseline efficiency of compact fluorescent lamps (CFL), general service fluorescent lamps (GSFL), high intensity discharge (HID) lamps and ballasts and motors, all applicable in the commercial sector.

7.2.1 Summary of Findings

FIGURE 7-1 illustrates the estimated energy efficiency savings potential in the Lower Peninsula service area for each of the scenarios included in this study.

FIGURE 7-1. SUMMARY OF COMMERCIAL ELECTRIC ENERGY EFFICIENCY POTENTIAL AS A % OF SALES FORECASTS



The potential savings estimates are expressed as cumulative annual 10-year and 20-Year savings, as percentages of the respective 2026 and 2036 commercial sector electricity sales forecasts. The technical savings potential for the commercial sector is 44.2% in 2026 and 43.6% in 2036. The 10-year and 20-year economic potential is 38.2% and 37.6% (respectively) based on the UCT screen, assuming an incentive level set equal to 50% of the measure cost.

The 10-year and 20-year achievable potential savings are: 17.3% and 24.3% for the Achievable UCT scenario. The Achievable UCT scenario assumes 50% incentives and includes measures that passed the UCT Test.

7.2.2 Technical Potential

Technical potential represents the quantification of savings that can be realized if energy-efficiency measures passing the qualitative screening are applied in all feasible instances, regardless of cost. TABLE 7-2 shows that it is technically feasible to save approximately 15 million MWh annually in the commercial sector by 2026, and by 2036 across the Lower Peninsula, representing 44.2% of the commercial sales forecast in 2026, and 43.6% of the commercial sales forecast in 2036. TABLE 7-3 shows the demand savings potential in 2026 and 2036. The ten and twenty-year summer peak demand savings technical potential is 2,846 MW and 2,849 MW, respectively, which is 37.7% and 37.6% of the peak forecasts for 2026 and 2036.

Lighting represents the majority of the technical energy efficiency savings potential at 33% of 20-year savings followed by Refrigeration at 20%. In recent years, commercial lighting consistently had the majority of potential energy savings for commercial buildings. For Consumer's Energy, potential study, GDS used the 2012 CBECS energy consumption results to allocate energy to different end-uses. The 2012 CBECS data shows that energy consumption has shifted significantly since the last CBECS study in 2003. Specifically, lighting represented 40% of commercial energy used in 2003, and now represents only 19%. Refrigeration and Office Equipment/Plug Loads have increased by 5% and 7% respectively. This trend is driven by the installation of many high efficiency lighting products in commercial buildings since 2003. The DTE Energy study was performed before the release of the 2012 CBECS and the 2003 CBECS was used to segregate energy into building types and end-uses.

TABLE 7-2. COMMERCIAL SECTOR TECHNICAL POTENTIAL ELECTRIC ENERGY SAVINGS BY END USE

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Lighting	4,992,813	33%	4,996,447	33%
Cooling	1,653,803	11%	1,655,671	11%
Ventilation	2,130,143	14%	2,131,403	14%
Water Heating	201,434	1%	201,556	1%
Refrigeration	2,955,384	20%	2,958,253	20%
Space Heating	445,462	3%	445,782	3%
Office Equipment	1,504,945	10%	1,506,641	10%
Miscellaneous	1,105,766	7%	1,106,411	7%
Total	**14,989,750**	**100%**	**15,002,164**	**100%**
% of Annual Sales Forecast	***44.2%***		***43.6%***	

TABLE 7-3. COMMERCIAL SECTOR TECHNICAL POTENTIAL ELECTRIC DEMAND SAVINGS

End Use	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	2,846	37.7%	2,849	37.6%

7.2.3 Economic Potential

Economic potential is a subset of technical potential and only includes measures that are cost-effective. This analysis of cost-effectiveness screen is based on the Utility Cost Test (UCT). The utility incentive was assumed to be equal to 50% of the measure incremental cost. The UCT was used for cost effectiveness screening for this study because it this is the mandatory test used in Michigan. Eighty-two percent of all measures that were included in the electric potential analysis for the commercial sector passed the UCT on a measure level basis.

TABLE 7-4 indicates that the economic potential based on the UCT screen is approximately 12.9 million MWh annually by 2026 and 12.9 million by 2036. This represents 38.2% and 37.6% of commercial sales in 2026 and 2036, respectively. Lighting, refrigeration and ventilation energy efficiency measures make up most the savings potential.

TABLE 7-4. COMMERCIAL SECTOR ECONOMIC POTENTIAL (UCT) ELECTRIC ENERGY SAVINGS BY END USE

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Lighting	4,571,500	35%	4,574,973	35%
Cooling	1,088,230	8%	1,089,525	8%
Ventilation	1,702,881	13%	1,704,126	13%
Water Heating	200,023	2%	200,144	2%
Refrigeration	2,776,475	21%	2,779,174	21%
Space Heating	259,952	2%	260,128	2%
Office Equipment	1,314,012	10%	1,315,475	10%
Miscellaneous	1,025,028	8%	1,025,586	8%
Total	**12,938,100**	**100%**	**12,949,132**	**100%**
% of Annual Sales Forecast	***38.2%***		***37.6%***	

TABLE 7-5 shows the peak demand savings economic potential in 2026 and 2036. The ten and twenty-year summer peak demand savings economic potential is 2,484 MW and 2,487 MW, respectively, which is 32.9% and 32.9% of the peak forecasts in 2026 and 2036, respectively.

TABLE 7-5. COMMERCIAL SECTOR ECONOMIC POTENTIAL (UCT) ELECTRIC DEMAND SAVINGS

End Use	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	2,484	32.9%	2,487	32.9%

7.2.4 Achievable Potential

Achievable potential is an estimate of energy savings that can feasibly be achieved given market barriers and equipment replacement cycles. This study estimated achievable potential for two scenarios. The Achievable UCT Scenario determines the achievable potential of all measures that passed the UCT economic screening assuming incentives equal to 50% of the measure cost. Unlike the economic potential, the commercial achievable potential takes into account the estimated market adoption of energy efficiency measures based on the incentive level and the natural replacement cycle of equipment.

7.2.4.1 Achievable UCT Scenario

TABLE 7-6 shows the estimated cumulative annual savings for the Achievable UCT scenario over 10 and 20-year time horizons. As noted above, this scenario assumes an incentive level approximately equal to 50% of the incremental measure cost and includes estimated 20-year market adoption rates based on incentive levels and equipment replacement cycles. TABLE 7-7 shows the peak demand savings Achievable UCT potential in 2026 and 2036.

TABLE 7-6. COMMERCIAL ACHIEVABLE UCT POTENTIAL ELECTRIC ENERGY SAVINGS BY END USE

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Lighting	1,952,509	33%	2,971,376	36%
Cooling	485,527	8%	670,293	8%
Ventilation	833,655	14%	1,100,179	13%
Water Heating	104,497	2%	118,036	1%
Refrigeration	1,364,594	23%	1,835,851	22%
Space Heating	106,260	2%	161,074	2%
Office Equipment	583,280	10%	849,265	10%
Miscellaneous	423,465	7%	639,738	8%
Total	**5,853,787**	**100%**	**8,345,812**	**100%**
% of Annual Sales Forecast	***17.3%***		***24.3%***	

TABLE 7-7: COMMERCIAL SECTOR ACHIEVABLE UCT POTENTIAL ELECTRIC DEMAND SAVINGS

End Use	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	1,042	13.8%	1,588	21.0%

FIGURE 7-2 shows the estimated 20-year cumulative annual achievable potential energy efficiency savings potential broken out by end use across the entire commercial sector. Lighting and refrigeration end uses together account for 58% of the energy efficiency savings in this scenario.

FIGURE 7-2. COMMERCIAL SECTOR 2036 ACHIEVABLE UCT POTENTIAL SAVINGS BY END USE

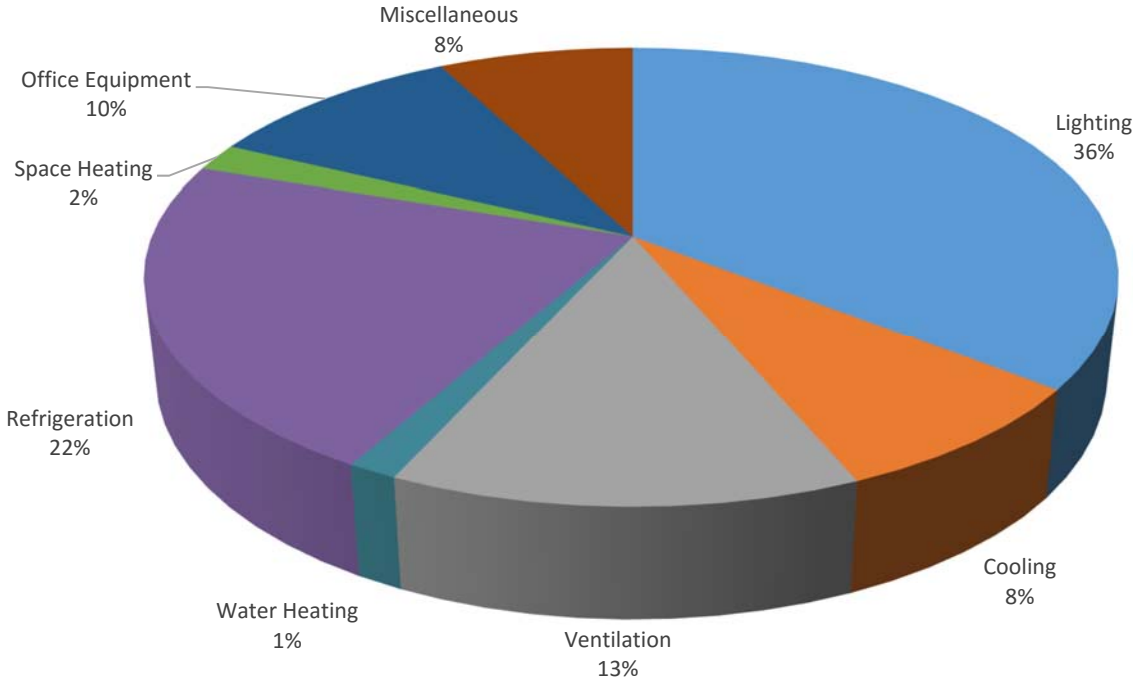
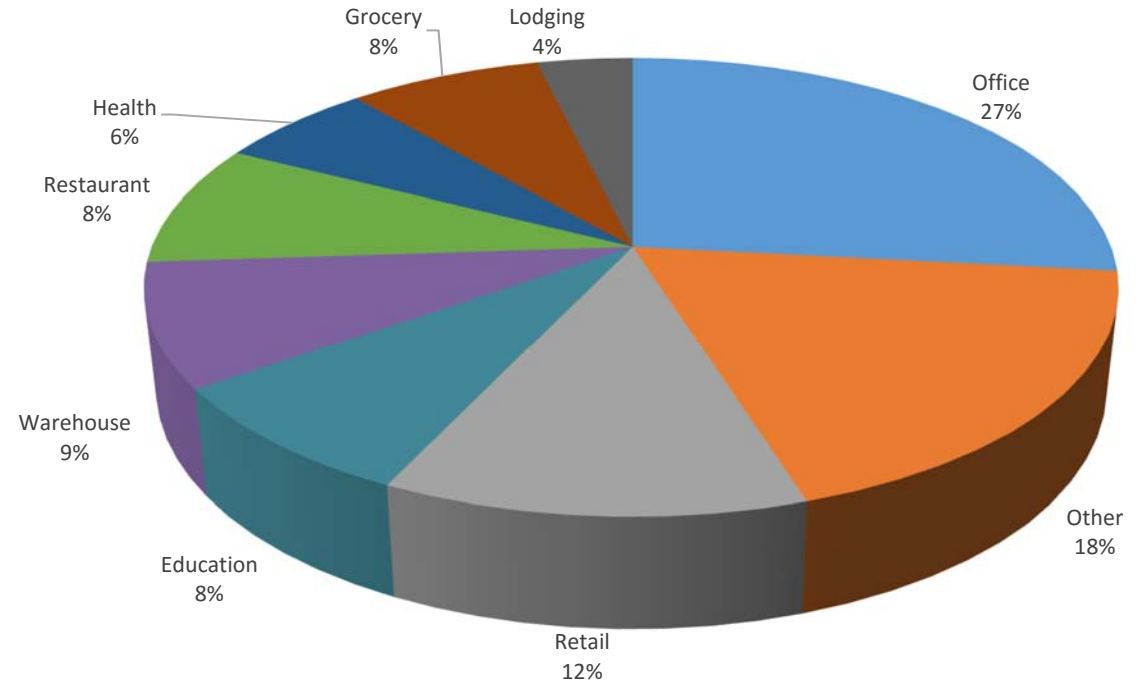


FIGURE 7-3 shows the breakdown of estimated savings in 2036 by building type for the achievable potential scenario. The vast majority of savings come from existing/turnover measures, meaning energy efficient equipment is installed to replace existing equipment that has failed, with less than 1% of savings potential coming from new construction. Approximately 27% of the potential savings are found in Offices, followed by 18% in Other building types and 12% in Retail establishments.

FIGURE 7-3. COMMERCIAL ACHIEVABLE POTENTIAL SAVINGS IN 2036 BY BUILDING TYPE



7.2.4.2 Annual Achievable Electric Savings Potential

TABLE 7-8 and TABLE 7-9 show cumulative annual electric energy savings and demand savings for the Achievable scenario for each year across the 20-year horizon for the study, broken out by end use. The year by year associated incentive and administrative costs to achieve these savings are shown in Section 7.3.

Cumulative Annual and Incremental Annual savings as a percent of forecasted sales is found in Appendix F. Cumulative Annual Savings is used to develop an overall program planning perspective and Incremental Annual Savings is commonly associated with program implementation, such as short-term implementation plans to obtain Program-Level Potential.

TABLE 7-8. CUMULATIVE ANNUAL COMMERCIAL SECTOR ELECTRIC ENERGY SAVINGS (MWH) IN THE ACHIEVABLE UCT POTENTIAL SCENARIO BY END USE

	Lighting	Office Equipment	Refrigeration	Space Cooling Chillers	Space Cooling Unitary and Split AC	Space Heating	Compressed Air	Water Heating	Ventilation	Cooking	Pools	Other	Total	% of Annual Sales Forecast
2017	195,251	58,328	136,459	25,908	22,645	10,626	22,012	10,450	83,365	12,289	1,705	6,341	585,379	1.7%
2018	390,502	116,656	272,919	51,816	45,289	21,252	44,023	20,899	166,731	24,577	3,410	12,682	1,170,757	3.4%
2019	585,753	174,984	409,378	77,725	67,934	31,878	66,035	31,349	250,096	36,866	5,116	19,023	1,756,136	5.1%
2020	781,004	233,312	545,838	103,633	90,578	42,504	88,046	41,799	333,462	49,154	6,821	25,365	2,341,515	6.8%
2021	976,255	291,640	682,297	129,541	113,223	53,130	110,058	52,248	416,827	61,443	8,526	31,706	2,926,893	8.5%
2022	1,171,506	349,968	818,756	155,449	135,867	63,756	132,070	62,698	500,193	73,731	10,231	38,047	3,512,272	10.2%
2023	1,366,757	408,296	955,216	181,357	158,512	74,382	154,081	73,148	583,558	86,020	11,936	44,388	4,097,651	11.9%
2024	1,562,008	466,624	1,091,675	207,266	181,156	85,008	176,093	83,598	666,924	98,308	13,642	50,729	4,683,030	13.6%
2025	1,757,259	524,952	1,228,134	233,174	203,801	95,634	198,104	94,047	750,289	110,597	15,347	57,070	5,268,408	15.3%
2026	1,952,509	583,280	1,364,594	259,082	226,445	106,260	220,116	104,497	833,655	122,886	17,052	63,412	5,853,787	17.0%
2027	2,054,396	609,878	1,411,720	266,567	237,437	111,741	223,150	105,755	860,307	135,174	17,111	69,753	6,102,989	17.7%
2028	2,156,283	636,477	1,458,845	274,053	248,428	117,223	226,183	107,014	886,960	147,463	17,171	76,094	6,352,192	18.5%
2029	2,258,170	663,075	1,505,971	281,538	259,419	122,704	229,217	108,272	913,612	159,751	17,230	82,435	6,601,395	19.2%
2030	2,360,056	689,674	1,553,097	289,023	270,410	128,186	232,251	109,530	940,265	172,040	17,289	88,776	6,850,597	19.9%
2031	2,461,943	716,272	1,600,222	296,508	281,402	133,667	235,285	110,789	966,917	184,328	17,348	95,117	7,099,800	20.6%
2032	2,563,830	742,871	1,647,348	303,994	292,393	139,149	238,318	112,047	993,570	196,617	17,408	101,459	7,349,002	21.4%
2033	2,665,716	769,469	1,694,474	311,479	303,384	144,630	241,352	113,306	1,020,222	208,905	17,467	107,800	7,598,205	22.1%
2034	2,767,603	796,068	1,741,600	318,964	314,376	150,112	244,386	114,564	1,046,874	221,194	17,526	114,141	7,847,407	22.8%
2035	2,869,490	822,666	1,788,725	326,450	325,367	155,593	247,420	115,822	1,073,527	233,482	17,585	120,482	8,096,610	23.5%
2036	2,971,376	849,265	1,835,851	333,935	336,358	161,074	250,454	117,081	1,100,179	245,771	17,645	126,823	8,345,812	24.3%

TABLE 7-9. CUMULATIVE ANNUAL COMMERCIAL SECTOR ELECTRIC DEMAND SAVINGS (MW) IN THE ACHIEVABLE UCT POTENTIAL SCENARIO BY END USE

	Lighting	Office Equipment	Refrigeration	Space Cooling Chillers	Space Cooling Unitary and Split AC	Space Heating	Compressed Air	Water Heating	Ventilation	Cooking	Pools	Other	Total	% of Annual Demand Forecast
2017	34.3	3.4	11.9	3.4	8.5	1.4	6.8	1.4	25.2	3.9	3.4	0.7	104.2	1.4%
2018	68.5	6.7	23.9	6.9	17.0	2.8	13.6	2.8	50.3	7.7	6.9	1.5	208.4	2.7%
2019	102.8	10.1	35.8	10.3	25.5	4.2	20.4	4.1	75.5	11.6	10.3	2.2	312.7	4.1%
2020	137.0	13.4	47.7	13.8	34.0	5.5	27.2	5.5	100.6	15.4	13.8	2.9	416.9	5.5%
2021	171.3	16.8	59.7	17.2	42.5	6.9	34.0	6.9	125.8	19.3	17.2	3.6	521.1	7.0%
2022	205.5	20.1	71.6	20.6	51.0	8.3	40.8	8.3	150.9	23.1	20.7	4.4	625.3	8.3%
2023	239.8	23.5	83.5	24.1	59.5	9.7	47.6	9.7	176.1	27.0	24.1	5.1	729.6	9.6%
2024	274.0	26.8	95.5	27.5	68.0	11.1	54.4	11.0	201.2	30.8	27.6	5.8	833.8	11.0%
2025	308.3	30.2	107.4	30.9	76.5	12.5	61.2	12.4	226.4	34.7	31.0	6.5	938.0	12.4%
2026	342.5	33.6	119.3	34.4	84.9	13.9	68.0	13.8	251.5	38.5	34.5	7.3	1,042.2	13.8%
2027	359.2	35.4	124.8	36.1	89.6	14.4	68.4	14.0	267.4	42.4	37.9	7.3	1,096.8	14.5%
2028	375.8	37.3	130.3	37.7	94.2	15.0	68.7	14.2	283.3	46.2	41.4	7.3	1,151.4	15.2%
2029	392.4	39.2	135.8	39.4	98.8	15.5	69.1	14.4	299.1	50.1	44.8	7.3	1,205.9	15.9%
2030	409.0	41.1	141.3	41.1	103.4	16.1	69.4	14.7	315.0	53.9	48.3	7.3	1,260.5	16.6%
2031	425.6	43.0	146.8	42.8	108.0	16.6	69.8	14.9	330.9	57.8	51.7	7.4	1,315.0	17.3%
2032	442.2	44.9	152.3	44.5	112.6	17.2	70.1	15.1	346.7	61.6	55.2	7.4	1,369.6	18.1%
2033	458.8	46.7	157.8	46.1	117.2	17.7	70.4	15.3	362.6	65.5	58.6	7.4	1,424.1	18.8%
2034	475.4	48.6	163.3	47.8	121.8	18.2	70.8	15.5	378.5	69.3	62.0	7.4	1,478.7	19.6%
2035	492.0	50.5	168.8	49.5	126.4	18.8	71.1	15.7	394.3	73.2	65.5	7.4	1,533.3	20.3%
2036	508.6	52.4	174.2	51.2	131.0	19.3	71.5	15.9	410.2	77.0	68.9	7.4	1,587.8	21.0%

7.2.5 Commercial Electric Savings Summary by Measure Group

TABLE 7-10 provides an end-use breakdown of the commercial electric savings potential estimates for technical and economic potential, and the achievable potential scenario. The table indicates how the savings potential decreases systematically from the technical potential scenario to the Achievable UCT potential scenario as additional limiting factors such as cost-effectiveness requirements and anticipated market adoption at given funding levels are introduced.

TABLE 7-10. LP COMMERCIAL SECTOR CUMULATIVE ELECTRIC SAVINGS POTENTIAL BY MEASURE BY 2036

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Compressed Air			
Compressed Air Audits & Leak Repair	114,376	114,376	73,838
Efficient Air Compressors	72,879	72,879	47,049
Compressed Air Replacement with Air Blowers	86,203	86,203	55,650
Air-Entraining Air Nozzles	38,324	38,324	24,741
Variable Displacement Air Compressor	27,987	27,987	18,068
Compressed Air Pressure Flow Controller replacing no flow controller	16,970	16,970	10,955
High Efficiency Air Dryers	12,815	12,815	8,273
Automatic Drains	8,292	8,292	5,353
Compressed Air Storage Tank	4,516	4,516	2,916
Receiver Capacity Addition	4,572	4,572	2,952
Air Compressor Outdoor Air Intake	608	608	392
Low Pressure Drop-Filters	412	412	266
Cycling Dryers	1,146	0	0
Cooking			
HE Steamer	178,203	178,203	116,267
HE Holding Cabinet	154,231	154,231	100,627
HE Combination Oven	25,425	25,425	16,588
Induction Cooktops	10,638	10,638	6,941
HE Convection Ovens	8,197	8,197	5,348
HE Griddle	17,906	0	0
HE Fryer	6,375	0	0
Lighting - Exterior			
Exterior HID replacement with CFLs	257,577	257,577	167,283
LED Pedestrian Signals	137,367	137,367	89,213
LED Auto Traffic Signals	137,367	137,367	89,213
Lighting Power Density - Exterior	38,418	38,418	24,956
Garage HID replacement with LEDs	143,982	143,982	93,509
Lighting Power Density - Parking Garage	7,526	7,526	4,892
Exterior Linear Fluorescent	41,798	41,798	27,147
Garage BiLevel Controls	45,083	45,083	29,281
Exterior HID replacement with LEDs	143,982	0	0
Exterior BiLevel Controls	37,069	0	0
LED Fuel Pump Canopy Fixture	1,235	0	0
Sports Field Lighting HiLo Control	20,103	0	0

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Lighting - Interior			
Central Lighting Control	746,458	746,458	484,808
Switching Controls for Multilevel Lighting (Non-HID)	406,021	406,021	263,701
LED Tube Lighting	318,886	318,886	207,112
Interior Non Highbay/Lowbay LED Fixtures	294,790	294,790	191,463
Daylight Sensor Controls	284,257	284,257	184,622
LED Specialty (replacing CFL)	220,343	220,343	143,112
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	218,634	218,634	141,992
Lamp & Ballast Retrofit (HPT8 Replacing T12)	167,210	167,210	108,595
T5 HP Retrofits	174,751	163,893	106,441
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	145,403	145,403	94,432
Occupancy Sensor	120,328	120,328	78,147
LED low bay lighting	97,742	97,742	63,480
Stairwell Bi-Level Control	96,228	96,228	62,498
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	85,672	70,174	45,575
LED Grow Light	43,869	43,869	28,493
CFL Screw-in	36,042	36,042	23,408
LED Specialty (replacing Incandescent)	34,988	34,988	22,724
LED High bay lighting	34,880	34,880	22,654
LED Screw In (replacing Incandescent)	31,813	31,813	20,661
CFL Screw in Specialty	29,405	29,405	19,097
CFL Reflector Flood	28,970	28,970	18,814
Occupancy Sensors for LED Refrigerator Lighting	28,615	28,615	18,584
Occupancy Sensor & Daylight Sensor	27,040	27,040	17,561
LED Downlight	26,864	26,864	17,448
CFL Fixture	26,146	26,146	16,981
Interior induction Lighting	20,535	20,535	13,337
LED Lighting in Refrigeration	14,893	14,893	9,673
High Intensity Fluorescent Fixture (replacing HID)	10,495	10,495	6,816
Illuminated Signs to LED	8,710	8,710	5,657
LED Exit Sign	6,720	6,720	4,364
HID Fixture Upgrade - Pulse Start Metal Halide	4,134	4,134	2,685
Daylight Sensor Controls - New Construction	745	745	511
Lighting Power Density - Interior	614	614	432
High Intensity Fluorescent Fixture (replacing HID) - New Construction	6	6	4
LED Screw In (replacing CFL)	22,839	0	0
Long Day Lighting Dairy	0	0	0
LED Troffer	152,071	0	0
Office Equipment			
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	806,404	806,404	520,610

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
PC Network Energy Management Controls replacing no central control	468,014	468,014	302,149
High Efficiency Hand Dryer	9,714	9,714	6,272
VFD for Process Fans -CRAC units	6,049	6,049	3,905
Computer Room Air Side Economizer	4,892	4,892	3,158
Computer Room Air Conditioner Economizer	4,881	4,881	3,151
Electrically Commutated Plug Fans in data centers	4,732	4,732	3,055
High Efficiency CRAC unit	4,240	4,240	2,737
Vendor Miser for Non-Refrig Equipment	7,098	3,458	2,232
Energy Star Compliant Refrigerator	3,092	3,092	1,996
Computer Room Hot Aisle Cold Aisle Configuration	1,057	0	0
Smart Strip plug outlet	185,563	0	0
Energy Star UPS	905	0	0
Other			
Engine Block Heater Timer	38,538	38,538	24,880
NEMA Premium Transformer, three-phase	48,473	48,473	20,863
High Efficiency Transformer, three-phase	48,473	48,473	20,863
High Efficiency Transformer, single-phase	48,276	48,276	20,779
NEMA Premium Transformer, single-phase	48,276	48,276	20,779
Parking Garage Exhaust Fan CO Control	28,903	28,903	18,660
Optimized Snow and Ice Melt Controls (electric)	55,398	0	0
Pools			
Heat Pump Pool Heater	25,494	25,494	16,459
High efficiency spas/hot tubs	1,836	1,836	1,186
Refrigeration			
Strip Curtains	577,267	577,267	381,328
ECM Case Motors	565,567	565,567	373,600
Door Gaskets - Cooler and Freezer	538,353	538,353	355,623
Vending Miser for Refrigerated Vending Machines	313,631	313,631	207,177
Anti Sweat Heater Controls	279,165	279,165	184,409
Reach-in Refrigerated display case door retrofit	127,675	127,675	84,339
Zero-Energy Doors	79,783	79,783	52,702
Walk-in Cooler Evaporator Motor Reduction	64,001	64,001	42,276
ENERGY STAR Commercial Glass Door Freezers	46,551	46,551	30,750
ENERGY STAR Commercial Solid Door Freezers	41,564	41,564	27,456
Floating Head Pressure Control	32,796	32,796	21,664
ENERGY STAR Commercial Glass Door Refrigerators	29,826	29,826	19,702
Refrigeration Suction Line Insulation	21,829	21,829	14,420
Refrigeration Savings due to Lighting Savings	13,314	13,314	8,795
ENERGY STAR Commercial Solid Door Refrigerators	31,878	13,226	8,736
Efficient Refrigeration Condenser	10,916	10,916	7,211
Discus and Scroll Compressors	7,845	7,845	5,182
Automatic High Speed Doors	6,000	6,000	3,963

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	5,993	5,993	3,959
Efficient low-temp compressor	2,450	2,450	1,618
Refrigerant charging correction	3,407	1,423	940
Night Covers	62,143	0	0
Evaporator Fan Motor Controls	37,563	0	0
Energy Star Ice Machines	58,737	0	0
Space Cooling - Chillers			
Chilled Hot Water Reset	147,184	147,184	91,179
EMS Pump Scheduling Controls	65,061	65,061	40,302
Efficient Chilled Water Pump	37,266	37,266	23,085
Water-Side Economizer	31,387	31,387	19,444
VAV System Conversion	23,691	23,691	14,676
Retrocommissioning	22,055	22,055	13,662
Air-Cooled Recip Chiller	20,344	20,344	12,602
Air-Cooled Screw Chiller	19,250	19,250	11,925
Roof Insulation	15,674	15,674	9,709
HVAC Occupancy Sensors	15,206	15,206	9,420
Ceiling Insulation	14,800	14,800	9,168
Water-Cooled Centrifugal Chiller > 300 ton	12,524	12,524	7,758
High Efficiency Pumps	12,270	12,270	7,601
Setback with Electric Heat	12,186	12,186	7,549
EMS install	12,167	12,167	7,537
Water-Cooled Centrifugal Chiller 150 - 300 ton	12,435	12,435	7,352
Web enabled EMS	10,220	10,220	6,331
Water-Cooled Screw Chiller > 300 ton	8,039	8,039	4,980
Water-Cooled Screw Chiller 150 - 300 ton	7,371	7,371	4,566
Water-Cooled Screw Chiller < 150 ton	5,891	5,891	3,649
Water-Cooled Chiller Average 10% above IECC standard	5,719	5,719	3,543
Wall Insulation	5,388	5,388	3,338
Building Operator Certification	4,804	4,804	2,976
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	4,641	4,641	2,875
Window Improvements	14,822	3,913	2,424
Water-Cooled Centrifugal Chiller < 150 ton	12,537	3,572	2,213
Motor Belt Replacement	2,713	2,713	1,681
Energy Efficient Windows	11,838	3,105	1,539
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	686	686	425
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	312	312	193
EMS Optimization	251	251	156
Integrated Building Design	143	143	63
Commissioning	21	21	14
Cool Roof	37,077	0	0

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Zoning	54,039	0	0
Chiller Tune Up	0	0	0
Improved Duct Sealing - Cooling Chiller	12,203	0	0
Space Cooling - Unitary and Split AC			
EMS Pump Scheduling Controls	110,025	110,025	68,155
Retrocommissioning	47,970	47,970	29,715
AC <65k	45,955	45,955	28,468
Roof Insulation	36,630	36,630	22,690
Window Improvements	56,954	36,199	22,423
Ceiling Insulation	35,874	35,874	22,222
HVAC Occupancy Sensors	33,944	33,944	21,027
AC 240k - 760k	24,384	24,384	15,105
Energy Efficient Windows	49,188	30,257	14,994
Setback with Electric Heat	20,610	20,610	12,767
Web enabled EMS	20,403	20,403	12,638
EMS install	19,640	19,640	12,166
AC 135k - 240k	33,190	18,728	11,601
Room A/C	15,984	15,984	9,901
AC >760k	22,010	12,420	7,694
Packaged Terminal Air Conditioner (PTAC) - Cooling	15,718	10,351	6,412
Building Operator Certification	10,112	10,112	6,264
Wall Insulation	9,822	9,822	6,084
Air Source Heat Pump - Cooling	4,612	4,612	2,857
DX Condenser Coil Cleaning	2,465	1,492	924
Ground Source Heat Pump - Cooling	9,442	1,334	826
Hotel Guest Room Occupancy Control System	996	996	589
Water Loop Heat Pump (WLHP) - Cooling	531	531	329
EMS Optimization	425	425	263
Integrated Building Design	466	466	198
Commissioning	73	73	44
Cool Roof	72,711	0	0
Zoning	173,785	0	0
AC 65k - 135k	54,310	0	0
Improved Duct Sealing - Cooling AC	31,690	0	0
WLHP System (Cooling) New Construction	63	0	0
Ductless (mini split) - Cooling	12,985	0	0
Programmable Thermostats	10,489	0	0
Space Heating			
Web enabled EMS with Electric Heat	89,884	89,884	55,679
EMS Pump Scheduling Controls	43,655	43,655	27,042
Retrocommissioning	31,887	31,887	19,753
Ceiling Insulation	19,342	19,342	11,981
HVAC Occupancy Sensors	16,557	16,557	10,257

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
VFD Pumps	11,952	11,952	7,403
Setback with Electric Heat	9,608	9,608	5,952
Web enabled EMS	9,510	9,510	5,891
EMS install	8,620	8,620	5,340
Roof Insulation	7,692	7,692	4,765
Building Operator Certification	4,711	4,711	2,919
Wall Insulation	3,318	3,318	2,055
Ground Source Heat Pump - Heating	15,583	1,384	857
Water Loop Heat Pump (WLHP) - Heating	817	817	483
Hotel Guest Room Occupancy Control System	644	644	381
EMS Optimization	214	214	132
Air Source Heat Pump - Heating	174	174	108
Integrated Building Design	136	136	61
Commissioning	23	23	15
Energy Efficient Windows	17,891	0	0
Ventilation			
Demand-Controlled Ventilation	812,878	812,878	524,795
Variable Speed Drive Control, 5 HP	270,359	270,359	174,542
Variable Speed Drive Control, 15 HP	270,080	270,080	174,362
Variable Speed Drive Control, 40 HP	269,801	269,801	174,182
High Volume Low Speed Fans	68,224	68,224	44,046
Engineered CKV hood	12,785	12,785	8,254
Economizer	410,908	0	0
High Speed Fans	16,369	0	0
Water Heating			
Low Flow Faucet Aerator	87,233	87,233	59,100
Efficient Hot Water Pump	20,740	20,740	14,051
ECM Circulator Pump	16,649	16,649	11,280
Solar Storage Water Heater	14,704	14,704	9,962
Heat Pump Storage Water Heater	1,824	1,824	1,235
Heat Pump Water Heater	11,878	11,878	8,047
Pre Rinse Sprayers (electric)	6,137	6,137	4,158
High Efficiency Electric Water Heater	1,814	1,814	1,229
HP Water Heater - Residential unit in Commercial Application	1,824	1,824	1,235
Low Flow Showerhead	2,320	2,320	1,572
Electric Tankless Water Heater	1,643	1,643	1,113
Tank Insulation (electric)	1,278	1,278	866
Hot Water (DHW) Pipe Insulation	1,258	1,258	853
ES Dishwasher, Low Temp, Elec Heat	935	935	634
ES Dishwasher, High Temp, Elec Heat, Elec Booster	801	801	543
ES Dishwasher, High Temp, Gas Heat, Elec Booster	739	739	501
ES Dishwasher, High Temp, Gas Heat, Gas Booster	428	428	290

Measure	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	404	404	273
ES Dishwasher, Low Temp, Gas Heat	154	154	104
HVAC Condenser Heater Recovery Water Heating	21	21	14
Process Cooling Condenser Heater Recovery Water Heating	21	21	14
Drain water Heat Recovery Water Heater	8	8	5
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	371	0	0
Total			
Total	15,002,164	12,949,132	8,345,812
Percent of Annual Sales Forecast	43.6%	37.6%	24.3%

7.3 ACHIEVABLE POTENTIAL BENEFITS & COSTS

TABLE 7-11 and TABLE 7-12 compare the NPV benefits and costs associated with the Achievable UCT Scenarios. This scenario compares the benefits and costs based on the UCT.

TABLE 7-11. 10-YEAR BENEFIT-COST RATIOS FOR ACHIEVABLE POTENTIAL SCENARIOS – COMMERCIAL

10-year	NPV Benefits	NPV Costs	B/C Ratio	Net Benefits
Achievable UCT	$3,923,642,260	$1,112,572,890	3.53	$2,811,069,370

TABLE 7-12. 20-YEAR BENEFIT-COST RATIOS FOR ACHIEVABLE POTENTIAL SCENARIOS– COMMERCIAL

20-year	NPV Benefits	NPV Costs	B/C Ratio	Net Benefits
Achievable UCT	$6,744,852,266	$1,672,193,984	4.03	$5,072,658,282

Annual budgets for the achievable potential scenario, broken down by incentive and administrative costs, is presented in TABLE 7-13 and TABLE 7-14 shows the revenue requirements as a percentage of forecasted sector sales.

TABLE 7-13. ANNUAL BUDGETS FOR ACHIEVABLE POTENTIAL UCT SCENARIOS– COMMERCIAL
(Millions of Dollars)

	Admin	Incentive	Total
2017	$21.02	$124.89	$145.90
2018	$21.75	$125.00	$146.74
2019	$22.61	$125.19	$147.81
2020	$23.40	$125.34	$148.74
2021	$27.69	$129.87	$157.56
2022	$29.75	$130.53	$160.28
2023	$31.02	$131.16	$162.18
2024	$32.71	$133.49	$166.19
2025	$38.47	$141.45	$179.92
2026	$40.37	$144.41	$184.78
2027	$29.07	$84.99	$114.05
2028	$29.81	$86.16	$115.98
2029	$41.15	$130.29	$171.44

	Admin	Incentive	Total
2030	$42.16	$131.41	$173.57
2031	$40.46	$129.41	$169.87
2032	$52.72	$169.62	$222.34
2033	$59.36	$178.40	$237.76
2034	$60.00	$176.29	$236.29
2035	$59.17	$184.46	$243.63
2036	$60.33	$184.40	$244.72

TABLE 7-14. UTILITY ENERGY EFFICIENCY BUDGETS PER SCENARIO AS A % OF SECTOR REVENUES

Year	Achievable UCT
2017	3.89%
2018	3.88%
2019	3.89%
2020	3.90%
2021	4.10%
2022	4.11%
2023	4.12%
2024	4.17%
2025	4.45%
2026	4.52%
2027	2.76%
2028	2.77%
2029	4.06%
2030	4.06%
2031	3.93%
2032	5.09%
2033	5.38%
2034	5.28%
2035	5.39%
2036	5.40%

8 Industrial Sector Electric Energy Efficiency Potential Estimates

This section provides electric energy efficiency potential estimates for the industrial sector in the Lower Peninsula service area. Estimates of technical, economic and achievable potential are provided in separate sections of this chapter.

8.1 ELECTRIC ENERGY EFFICIENCY MEASURES EXAMINED

For the industrial sector, there were 192 energy efficiency measures included in the energy savings potential analysis. TABLE 8-1 provides a brief description of the types of measures included for each end use in the industrial sector. The list of measures was developed based on a review of the latest MEMD, and measures found in other TRMs and industrial potential studies. For each measure, the analysis considered incremental costs, energy and demand savings, and measure useful measure lives.

TABLE 8-1. TYPES OF ELECTRIC MEASURES INCLUDED IN THE INDUSTRIAL SECTOR ANALYSIS

End Use Type	End Use Description	Measures Included
Computers & Office Equipment	Equipment Improvements	– Energy Star office equipment including computers, monitors, copiers, multi-function machines. – PC Network Energy Management Controls replacing no central control – Energy Efficient "Smart" Power Strip for PC/Monitor/Printer – Energy Star UPS – Energy Star office equipment including computers, monitors, copiers, multi-function machines. – PC Network Energy Management Controls replacing no central control
Water Heating	Water Heating Improvements	– Low Flow Faucet Aerator – Tank Insulation (electric) – Process Cooling Condenser Heat Recovery – HVAC Condenser Heater Recovery Water Heating – Heat Pump Water Heater – Efficient Hot Water Pump – Hot Water (DHW) Pipe Insulation – Drain Water Heat Recovery Water Heater – ECM Circulator Pump – Electric Tankless Water Heater
Ventilation	Ventilation Equipment	– Engineered CKV Hood – Variable Speed Drive Control, 15 HP – Variable Speed Drive Control, 5 HP – Variable Speed Drive Control, 40 HP – Destratification Fan (HVLS) – High Volume Low Speed Fans – Economizer – High Speed Fans

End Use Type	End Use Description	Measures Included
Space Cooling – Chillers	Cooling System Upgrades	– EMS Pump Scheduling – Wall Insulation – EMS install – Setback with Electric Heat – Web Enabled EMS – Efficient Chilled Water Pump – Chilled Hot Water Reset – EMS Optimization – Water Side Economizer – Chiller Tune Up – Water-Cooled Screw Chiller > 300 ton – Water-Cooled Centrifugal Chiller > 300 ton – Integrated Building Design – Retrocommissioning – Motor Belt Replacement – VAV System Conversion – Air-Cooled Recip Chiller – Air-Cooled Screw Chiller – High Efficiency Pumps – Ceiling Insulation – HVAC Occupancy Sensors – Programmable Thermostats – Economizer – Energy Efficient Windows – Roof Insulation – Zoning – Improved Duct Sealing – Window Improvements – Cool Roofing
Space Cooling – Unitary and Split AC	Cooling System Upgrades	– EMS Pump Scheduling – Wall Insulation – EMS install – Setback with Electric Heat – Web Enabled EMS – EMS Optimization – Integrated Building Design – Retrocommissioning – Room AC – Ground Source Heat Pump - Cooling – Water Loop Heat Pump (WLHP) - Cooling – Ceiling Insulation – DX Condenser Coil Cleaning – HVAC Occupancy Sensors – Economizer – Programmable Thermostats – Air Source Heat Pump - Cooling – Energy Efficient Windows

End Use Type	End Use Description	Measures Included
		– Packaged Terminal Air Conditioner (PTAC) - Cooling – AC 240K - 760 K – Roof Insulation – Zoning – Improved Duct Sealing – Window Improvements – Ductless (mini split) - Cooling – Cool Roofing
Lighting	Lighting Improvements	– Lighting Power Density - Parking Garage – CFL Screw-in – Lighting Power Density- Exterior – Lighting Power Density - Interior – CFL Screw in Specialty – LED Downlight – CFL Reflector Flood – LED Exit Sign – LED Screw In Replacing Incandescent – LED Specialty replacing incandescent – Stairwell Bi-Level Control – HID Fixture Upgrade - Pulse Start Metal Halide – CFL Fixture – Interior Induction Lighting – Long Day Lighting Dairy – High Intensity Fluorescent Fixture (replacing HID) – LED Grow Light – Daylight Sensor Controls – Central Lighting Control – Occupancy Sensor & Daylight Sensor – Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12) – Occupancy Sensor – LED Tube Lighting – Lamp & Ballast Retrofit (HPT8 Replacing T12) – LED High Bay Lighting – Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8) – Switching Controls for Multilevel Lighting (Non-HID) – Exterior Linear Fluorescent – Exterior HID Replaced with CFL – Garage Bi-level Controls – LED Specialty replacing CFL – Garage HID replacement with LED

End Use Type	End Use Description	Measures Included
		– Illuminated Signs to LED – Interior Non-Highbay/Lowbay LED Fixtures – LED Low Bay Lighting – Exterior Bi-level Controls – T5 HP replacing T12 – Lamp & Ballast Retrofit (HPT8 Replacing Standard T8) – LED Screw In Replacing CFL – Light Tube – 42W 8 lamp Hi Bay CFL – Exterior HID replaced with LED – LED Troffer
Space Heating	Heating System Improvements	– EMS Pump Scheduling – Wall Insulation – EMS install – Setback with Electric Heat – Web Enabled EMS – EMS Optimization – VFD Pump – Integrated Building Design – Retrocommissioning – Ground Source Heat Pump - Heating – Ceiling Insulation – Water Loop Heat Pump (WLHP) - Heating – Destratification Fan (HVLS) – HVAC Occupancy Sensors – Programmable Thermostats – Economizer – ECM motors on furnaces – Air Source Heat Pump - Heating – Energy Efficient Windows – Roof Insulation – Zoning – Improved Duct Sealing – Window Improvements – Ductless (mini split) - Heating – Cool Roofing
Other		– Engine Block Heater Timer – Parking Garage Exhaust Fan CO Control – High Efficiency Transformer, three-phase – NEMA Premium Transformer, three-phase – High Efficiency Transformer, single-phase – NEMA Premium Transformer, single-phase – Optimized Snow and Ice Melt Controls
Machine Drive	Machine Drive Improvements	– Advanced Lubricants – Compressed Air System Management

End Use Type	End Use Description	Measures Included
		– Compressed Air - Advanced Compressor Controls – Elec motors replacing pneumatic (comp air) – Compressed Air Audits and Leak Repair – Storage Tank Addition (comp air) – VFD for Process Fans – Automatic Drains, High efficiency nozzles and other (comp air) – VFD for Process Pumps – Pump System Efficiency Improvements – Motor System Optimization (Including ASD) – Electric Supply System Improvements – Sensors & Controls – Industrial Motor Management – Fan System Improvements – High Efficiency Pumps – Advanced Efficient Motors – High Efficiency Dryers (comp air) – Energy Information System
Process Cooling & Refrigeration	Process Cooling and Refrigeration Improvements	– Improved Refrigeration – Electric Supply System Improvements – Sensors & Controls – Energy Information System
Process Heating	Heating Improvements	– Electric Supply System Improvements – Sensors & Controls – Energy Information System
Industrial Other		– Barrel Insulation - Inj. Molding (plastics) – High Efficiency Welders – Pellet Dryer Insulation (plastics) – 3 Phase High Eff Battery Charger – Injection Molding Machine - efficient (plastics) – Fiber Laser Replacing CO2 laser (auto industry)
Agriculture		– Fan Thermostat Controller – VFD for Process Fans - Agriculture – Milk Pre-Cooler Heat Exchanger – VFD for Process Pumps - Agriculture – Low Pressure Sprinkler Nozzles – VFD for Process Pumps - Irrigation – Variable Speed Drives for Dairy Vacuum Pumps – Other Industrial -Low-Energy Livestock Waterer

End Use Type	End Use Description	Measures Included
		– Other Industrial -Dairy Refrigerator Tune-Up – Grain Storage Temperature and Moisture Management Controller – Greenhouse Environmental Controls – Variable Speed Drive with Heat Exchanger, Milk – Scroll Compressor with Heat Exchanger for Dairy Refrigeration

8.2 INDUSTRIAL SECTOR RESULTS

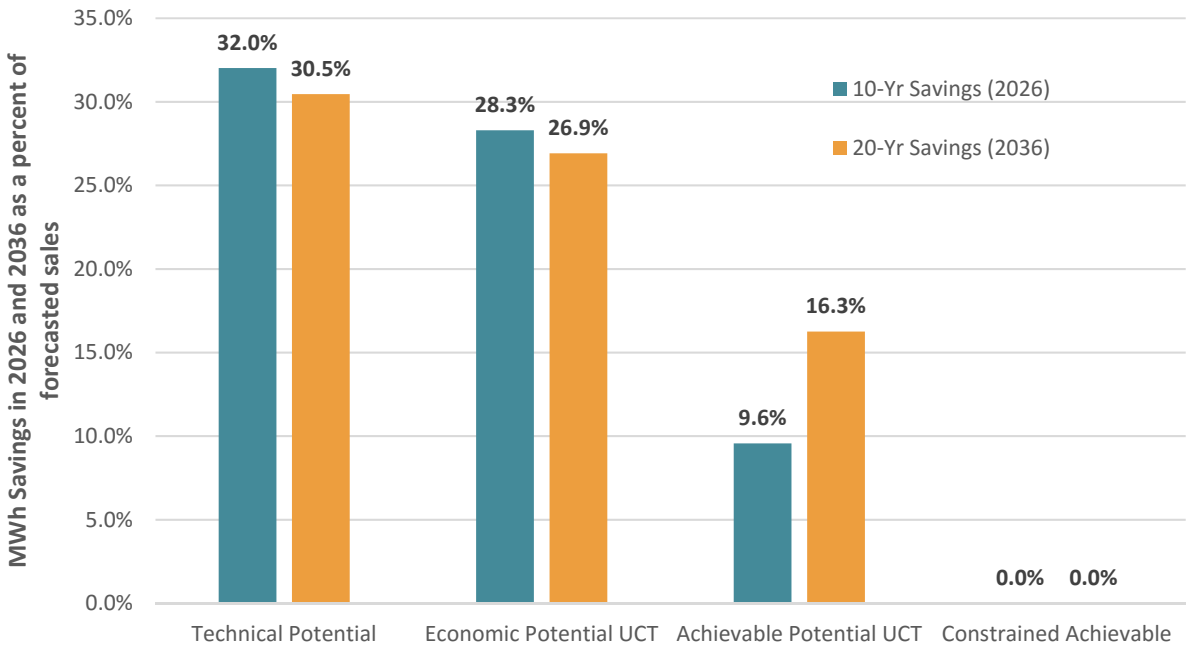
This section presents estimates for electric technical, economic, and achievable savings potential for the industrial sector. Each of the tables in the technical, economic and achievable sections present the respective potential for energy efficiency savings expressed as cumulative annual savings (MWh) and as a percentage of annual industrial kWh sales. Data is provided for 10 and 20-year horizons.

This energy efficiency potential study considers the impacts of the December 2007 Energy and Independence and Security Act (EISA) as an improving code standard for the industrial sector. EISA improves the baseline efficiency of compact fluorescent lamps (CFL), general service fluorescent lamps (GSFL), high intensity discharge (HID) lamps and ballasts and motors, all applicable in the industrial sector.

8.2.1 Summary of Findings

FIGURE 8-1 illustrates the estimated savings potential in the Lower Peninsula service area for each of the scenarios included in this study.

FIGURE 8-1. SUMMARY OF INDUSTRIAL ELECTRIC ENERGY EFFICIENCY POTENTIAL AS A % OF SALES FORECASTS



The potential estimates are expressed as cumulative annual 10-year and 20-year savings, as percentages of the respective 2026 and 2036 forecasts for industrial sector annual electricity sales. The technical

potential is 32.0% in 2026 and 30.5% in 2036. The 10-year and 20-year economic potential is: 28.3% and 26.9% based on the UCT screen, assuming an incentive level equal to 50% of the measure cost.

The 10-year and 20-year achievable potential savings are: 9.6% and 16.3% for the Achievable UCT. The Achievable UCT scenario assumes 50% incentives and includes measures that passed the UCT Test.

8.2.2 Technical Potential

Technical potential represents the quantification of savings that can be realized if energy-efficiency measures passing the qualitative screening are applied in all feasible instances, regardless of cost. TABLE 8-2 shows that the technical potential is 7.8 million MWh annually in the industrial sector during the 20-year period from 2017 to 2036 across the Lower Peninsula's service territory, representing 32.0% of 2026 forecast industrial sales and 30.5% of 2036 industrial sales. Machine Drive represents 35.4% of 20-yr savings, while lighting and cooling each contribute approximately 20% of savings. TABLE 8-3 shows the annual (summer) peak demand savings potential in 2026 and 2036. The twenty-year summer peak demand savings potential is 1,556 MW, which is 36.5% of the 10-year peak forecast and 34.9% of the 20-year peak forecast.

TABLE 8-2. INDUSTRIAL SECTOR TECHNICAL POTENTIAL SAVINGS BY END USE

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Machine Drive	2,775,668	35.4%	2,775,668	35.4%
Lighting	1,533,248	19.6%	1,533,248	19.6%
Space Cooling	1,779,763	22.7%	1,779,763	22.7%
Ventilation	445,914	5.7%	445,914	5.7%
Process Heating and Cooling	688,950	8.8%	688,950	8.8%
Space Heating	443,309	5.7%	443,309	5.7%
Other	31,348	0.4%	31,348	0.4%
Agriculture	89,153	1.1%	89,153	1.1%
Water Heating	37,114	0.5%	37,114	0.5%
Computers & Office Equipment	13,909	0.2%	13,909	0.2%
Total	**7,838,376**	**100.0%**	**7,838,376**	**100.0%**
% of Annual Sales Forecast	***32.0%***		***30.5%***	

TABLE 8-3. INDUSTRIAL SECTOR TECHNICAL POTENTIAL DEMAND SAVINGS

	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	1,556	36.5%	1,556	34.9%

8.2.3 Economic Potential

Economic potential is a subset of technical potential, which only accounts for measures that are cost-effective. Cost-effectiveness screening is based on the UCT Test. The UCT was used for this study because it is mandated in Michigan to be the primary cost-effectiveness test used when evaluating energy efficiency programs. 82% of all measures that were included in the industrial sector electric potential analysis passed the UCT Test.

TABLE 8-4 indicates that the economic potential based on the UCT screen is nearly 6.9 million MWh during the 20-year period from 2017 to 2036. This represents 28.3% and 26.9% of industrial sales across the respective 10-year and 20-year timeframes. Machine drive, lighting and process end uses make up a majority of the savings. TABLE 8-5 shows the economic demand savings potential in 2026 and 2036. The

ten and twenty-year summer peak demand savings potential is 1,343 MW, which is 31.5% and 30.2% of the 10-year and 20-year peak forecasts.

TABLE 8-4. INDUSTRIAL SECTOR ECONOMIC POTENTIAL (UCT) SAVINGS BY END USE

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Machine Drive	2,775,668	40.1%	2,775,668	40.1%
Lighting	1,314,485	19.0%	1,314,485	19.0%
Space Cooling	1,312,231	18.9%	1,312,231	18.9%
Ventilation	365,427	5.3%	365,427	5.3%
Process Heating and Cooling	686,625	9.9%	686,625	9.9%
Space Heating	306,551	4.4%	306,551	4.4%
Other	29,160	0.4%	29,160	0.4%
Agriculture	88,142	1.3%	88,142	1.3%
Water Heating	37,114	0.5%	37,114	0.5%
Computers & Office Equipment	11,193	0.2%	11,193	0.2%
Total	**6,926,596**	**100.0%**	**6,926,596**	**100.0%**
% of Annual Sales Forecast	***28.3%***		***26.9%***	

TABLE 8-5. INDUSTRIAL SECTOR ECONOMIC POTENTIAL (UCT) DEMAND SAVINGS

	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	1,343	31.5%	1,343	30.2%

8.2.4 Achievable Potential

Achievable potential is an estimate of energy savings that can feasibly be achieved given market barriers and equipment replacement cycles. The Achievable Potential scenario with UCT screening determines the achievable potential of all measures that passed the UCT economic screening assuming incentives equal to 50% of the measure cost. Unlike the economic potential, the industrial Achievable Potential takes into account the estimated market adoption of energy efficiency measures based on the incentive level and the natural replacement cycle of equipment.

8.2.4.1 UCT Achievable

TABLE 8-6 through TABLE 8-7 show the estimated savings for the Industrial Achievable UCT Potential Scenarios over 10 and 20-year time horizons. As noted above, the scenario assumes an incentive level approximately equal to 50% of the incremental measure cost and include an estimate 20-year market adoption rates based on incentive levels and equipment replacement cycles. The 10-year and 20-year Achievable UCT potential savings estimates are approximately 2.3 million MWh and 4.2 million MWh. This equates to 9.6% and 16.3% of sector sales in 2026 and 2036. The ten and twenty-year summer demand savings estimates are 429 MW and 738 MW, respectively, which is 10.1% and 16.6% of the peak forecast in 2026 and 2036.

TABLE 8-6. INDUSTRIAL ACHIEVABLE UCT POTENTIAL ELECTRIC ENERGY SAVINGS BY END USE

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Machine Drive	876,270	37.4%	1,752,541	41.9%
Lighting	500,031	21.4%	839,275	20.1%
Space Cooling	359,055	15.3%	638,569	15.3%

End Use	2026 Energy Savings (MWh)	% of 2026 Total	2036 Energy Savings (MWh)	% of 2036 Total
Ventilation	216,587	9.2%	226,364	5.4%
Process Heating and Cooling	230,958	9.9%	461,915	11.0%
Space Heating	97,728	4.2%	159,062	3.8%
Other	7,514	0.3%	13,657	0.3%
Agriculture	30,189	1.3%	60,378	1.4%
Water Heating	19,145	0.8%	23,753	0.6%
Computers & Office Equipment	4,208	0.2%	7,566	0.2%
total	**2,341,684**	**100.0%**	**4,183,081**	**100.0%**
% of Annual Sales Forecast	***9.6%***		***16.3%***	

TABLE 8-7. INDUSTRIAL ACHIEVABLE UCT POTENTIAL DEMAND SAVINGS

	2026 Demand Savings (MW)	% of 2026 Forecast Peak	2036 Demand Savings (MW)	% of 2036 Forecast Peak
Total System	429	10.1%	738	16.6%

FIGURE 8-2 shows the estimated 20-year cumulative annual efficiency savings potential broken out by end use across the entire industrial sector for the Achievable UCT scenario. The Machine Drive end use shows the largest potential for savings at 42% of total savings. Lighting is second at 20% of total savings.

FIGURE 8-2. INDUSTRIAL SECTOR 2036 ACHIEVABLE UCT POTENTIAL SAVINGS BY END USE

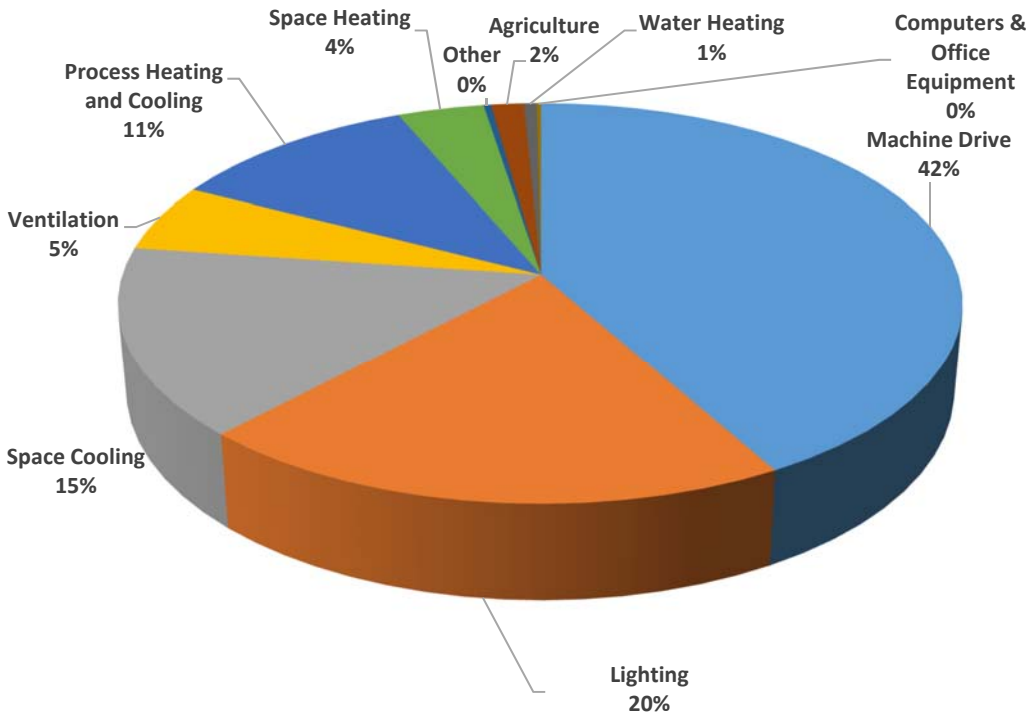
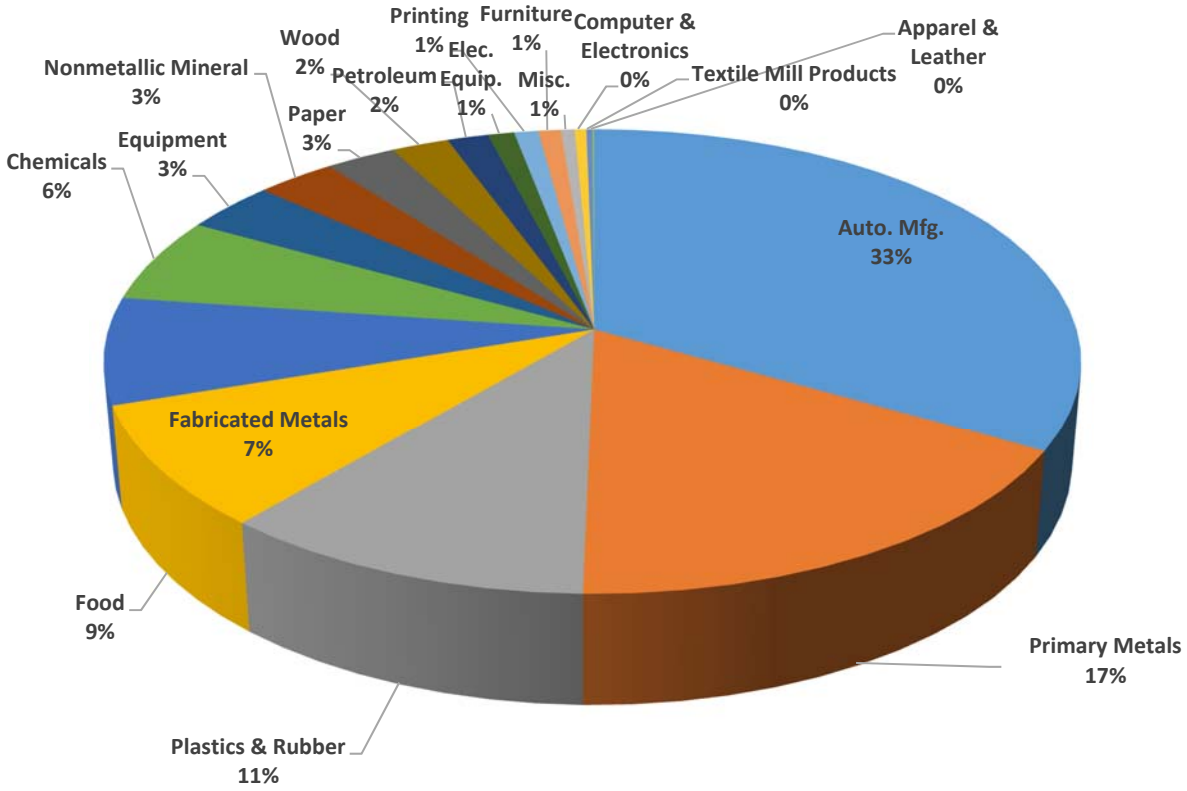


FIGURE 8-3 shows the breakdown of estimated savings in 2036 by industry type for the Achievable Potential scenario. The vast majority of savings come from the automobile manufacturing, plastics and rubber, food, primary metals, fabricated metals, and chemicals industries; with the other NAICS codes accounting for less than 20% of total savings.

FIGURE 8-3. INDUSTRIAL ACHIEVABLE POTENTIAL SAVINGS IN 2036 BY INDUSTRY



8.2.4.2 Annual Achievable Electric Savings Potential

TABLE 8-8 and TABLE 8-9 show cumulative energy and demand savings for each year across the 20-year horizon for the study, broken out by end use. The year by year associated incentive and administrative costs to achieve these savings are shown in Section 8.3.

Cumulative Annual and Incremental Annual savings as a percent of forecasted sales is found in Appendix F F. Cumulative Annual Savings is used to develop an overall program planning perspective and Incremental Annual Savings is commonly associated with program implementation, such as short-term implementation plans to obtain Program-Level Potential.

TABLE 8-8. CUMULATIVE ANNUAL INDUSTRIAL SECTOR ELECTRIC ENERGY SAVINGS (MWH) IN THE ACHIEVABLE UCT POTENTIAL SCENARIO BY END USE

	Machine Drive	Lighting	Space Cooling	Ventilation	Process Cooling & Heating	Space Heating	Other	Agriculture	Water Heat	Computers & Office Equipment	Total	% of Annual Sales Forecast
2017	87,627	50,003	35,931	21,659	23,096	9,773	751	3,019	1,914	421	234,194	0.91%
2018	175,254	100,006	71,862	43,317	46,192	19,546	1,503	6,038	3,829	842	468,388	1.82%
2019	262,881	150,009	107,794	64,976	69,287	29,318	2,254	9,057	5,743	1,262	702,583	2.73%
2020	350,508	200,012	143,718	86,635	92,383	39,091	3,006	12,076	7,658	1,683	936,770	3.64%
2021	438,135	250,016	179,643	108,294	115,479	48,864	3,757	15,094	9,572	2,104	1,170,958	4.55%
2022	525,762	300,019	215,568	129,952	138,575	58,637	4,508	18,113	11,487	2,525	1,405,145	5.46%
2023	613,389	350,022	251,492	151,611	161,670	68,409	5,260	21,132	13,401	2,946	1,639,333	6.37%
2024	701,016	400,025	287,346	173,270	184,766	78,182	6,011	24,151	15,316	3,366	1,873,450	7.28%
2025	788,643	450,028	323,200	194,929	207,862	87,955	6,763	27,170	17,230	3,787	2,107,567	8.19%
2026	876,270	500,031	359,055	216,587	230,958	97,728	7,514	30,189	19,145	4,208	2,341,684	9.10%
2027	963,897	533,956	387,006	217,565	254,053	103,861	8,128	33,208	19,605	4,544	2,525,824	9.81%
2028	1,051,524	567,880	414,957	218,543	277,149	109,995	8,743	36,227	20,066	4,880	2,709,964	10.53%
2029	1,139,151	601,804	442,909	219,520	300,245	116,128	9,357	39,246	20,527	5,215	2,894,103	11.25%
2030	1,226,779	635,729	470,860	220,498	323,341	122,262	9,971	42,265	20,988	5,551	3,078,243	11.96%
2031	1,314,406	669,653	498,812	221,476	346,437	128,395	10,585	45,283	21,449	5,887	3,262,383	12.68%
2032	1,402,033	703,578	526,763	222,453	369,532	134,528	11,200	48,302	21,910	6,223	3,446,522	13.39%
2033	1,489,660	737,502	554,715	223,431	392,628	140,662	11,814	51,321	22,371	6,559	3,630,662	14.11%
2034	1,577,287	771,427	582,666	224,409	415,724	146,795	12,428	54,340	22,832	6,895	3,814,802	14.82%
2035	1,664,914	805,351	610,618	225,386	438,820	152,929	13,043	57,359	23,292	7,230	3,998,941	15.54%
2036	1,752,541	839,275	638,569	226,364	461,915	159,062	13,657	60,378	23,753	7,566	4,183,081	16.25%

TABLE 8-9. CUMULATIVE ANNUAL INDUSTRIAL SECTOR ELECTRIC DEMAND SAVINGS (MW) IN THE ACHIEVABLE UCT POTENTIAL SCENARIO BY END USE

	Machine Drive	Lighting	Space Cooling	Ventilation	Process Cooling & Heating	Space Heating	Other	Agriculture	Water Heat	Computers & Office Equipment	Total	% of Annual Sales Forecast
2017	10.12	12.71	9.50	5.49	2.02	1.86	0.45	0.20	0.57	0.04	43	1.0%
2018	20.24	25.42	18.99	10.98	4.03	3.73	0.89	0.40	1.13	0.08	86	1.9%
2019	30.36	38.13	28.49	16.46	6.05	5.59	1.34	0.60	1.70	0.12	129	2.9%
2020	40.48	50.84	37.98	21.95	8.06	7.45	1.79	0.80	2.27	0.17	172	3.9%
2021	50.60	63.55	47.48	27.44	10.08	9.32	2.23	1.00	2.83	0.21	215	4.8%
2022	60.72	76.26	56.97	32.93	12.09	11.18	2.68	1.21	3.40	0.25	258	5.8%
2023	70.84	88.97	66.47	38.42	14.11	13.04	3.13	1.41	3.97	0.29	301	6.8%
2024	80.95	101.68	75.96	43.91	16.12	14.91	3.57	1.61	4.54	0.33	344	7.7%
2025	91.07	114.39	85.46	49.39	18.14	16.77	4.02	1.81	5.10	0.37	387	8.7%
2026	101.19	127.09	94.96	54.88	20.15	18.63	4.46	2.01	5.67	0.41	429	9.6%
2027	111.31	134.95	103.20	55.16	22.17	20.03	4.90	2.21	5.89	0.45	460	10.3%
2028	121.43	142.85	111.45	55.43	24.18	21.42	5.33	2.41	6.11	0.48	491	11.0%
2029	131.55	150.75	119.69	55.71	26.20	22.81	5.76	2.61	6.33	0.52	522	11.7%
2030	141.67	158.65	127.94	55.98	28.21	24.20	6.20	2.81	6.55	0.55	553	12.4%
2031	151.79	166.54	136.19	56.26	30.23	25.59	6.63	3.01	6.78	0.59	584	13.1%
2032	161.91	174.44	144.43	56.53	32.24	26.98	7.06	3.22	7.00	0.62	614	13.8%
2033	172.03	182.34	152.68	56.81	34.26	28.37	7.49	3.42	7.22	0.66	645	14.5%
2034	182.15	190.24	160.92	57.08	36.27	29.76	7.93	3.62	7.44	0.69	676	15.2%
2035	192.27	198.13	169.17	57.36	38.29	31.16	8.36	3.82	7.66	0.72	707	15.9%
2036	202.39	206.02	177.42	57.63	40.30	32.55	8.79	4.02	7.88	0.76	738	16.6%

8.2.5 Industrial Electric Savings Summary by Measure Group

TABLE 8-10 below provides an end-use breakdown of the industrial electric savings potential estimates for technical and economic potential, and each of the achievable potential scenarios. The table indicates how the savings potential decreases systematically from the technical potential scenario to the Achievable UCT potential scenario as additional limiting factors such as cost-effectiveness requirements and anticipated market adoption at given funding levels are introduced.

TABLE 8-10. LP INDUSTRIAL SECTOR CUMULATIVE ELECTRIC SAVINGS POTENTIAL BY MEASURE BY 2036

End Use	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Computers & Office Equipment			
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	9,334	9,334	6,323
PC Network Energy Management Controls replacing no central control	821	821	556
High Efficiency CRAC Unit	566	566	383
Energy Star Compliant Single Door Refrigerator	473	473	304
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	2,630	0	0
Energy Star UPS	86	0	0
Water Heating			
Low Flow Faucet Aerator	20,568	20,568	13,278
Tank Insulation (electric)	1,168	1,168	754
Process Cooling Condenser Heat Recovery	893	893	567
Heat Pump Water Heater	2,979	2,979	1,866
HVAC Condenser Heater Recovery Water Heating	6,691	6,691	4,320
Pre-rinse sprayers (electric)	0	0	0
Efficient Hot Water Pump	1,293	1,293	835
Hot Water (DHW) Pipe Insulation	19	19	12
High Efficiency Electric Water Heater	286	286	185
Solar Storage Water Heating	1,097	1,097	708
ECM Circulator Pump	641	641	414
Electric Tankless Water Heater	202	202	128
Drain Water Heat Recovery Water Heater	1,277	1,277	687
Ventilation			
Variable Speed Drive Control, 15 HP	28,774	19,352	19,352
Variable Speed Drive Control, 5 HP	28,774	19,352	19,352
Variable Speed Drive Control, 40 HP	28,774	19,352	19,352
Destratification Fan (HVLS)	16,480	11,386	11,386
Economizer	35,179	24,195	0
High Volume Low Speed Fans	57,238	39,546	39,546
High Speed Fans	5,917	4,088	0
Space Cooling - Chillers			
EMS Pump Scheduling	875	875	550
Wall Insulation	1,888	1,888	1,226
EMS install	8,421	8,421	5,469
Setback with Electric Heat	1,703	1,703	1,106
Web Enabled EMS	10,921	10,921	6,890
EMS Optimization	625	625	406

End Use	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Efficient Chilled Water Pump	768	768	499
Water Side Economizer	828	828	520
Chilled Hot Water Reset	2,008	2,008	1,304
Water-Cooled Centrifugal Chiller > 300 ton	2,516	2,516	1,554
Water-Cooled Screw Chiller > 300 ton	2,368	2,368	1,462
Integrated Building Design	68,857	68,857	28,659
Retrocommissioning	3,122	3,122	2,028
Chiller Tune Up	568	568	369
VAV System Conversion	338	338	220
Motor Belt Replacement	188	188	122
Air-Cooled Recip Chiller	12,549	12,549	7,748
Air-Cooled Screw Chiller	12,738	12,738	7,864
Ceiling Insulation	1,678	1,678	1,090
High Efficiency Pumps	236	236	153
Energy Efficient Windows	4,284	2,578	1,212
Economizer	19,661	0	0
HVAC Occupancy Sensors	8,845	8,845	5,612
Programmable Thermostats	2,525	0	0
Roof Insulation	126	126	82
Improved Duct Sealing	257	0	0
Window Improvements	46	0	0
Cool Roofing	9,307	0	0
Space Cooling – Unitary and Split AC			
EMS Pump Scheduling	8,266	8,266	4,955
Wall Insulation	17,826	17,826	11,043
EMS install	79,533	79,533	49,267
Setback with Electric Heat	16,086	16,086	9,965
Web Enabled EMS	103,146	103,146	62,062
EMS Optimization	5,902	5,902	3,656
Integrated Building Design	676,469	676,469	268,461
Retrocommissioning	30,512	30,512	18,900
Ceiling Insulation	19,655	19,655	12,175
Room AC	8,116	8,116	4,834
Water Loop Heat Pump (WLHP) - Cooling	5,625	5,625	3,385
Energy Efficient Windows	51,533	32,464	14,551
Economizer	185,685	0	0
HVAC Occupancy Sensors	105,587	105,587	63,699
Programmable Thermostats	23,848	0	0
Air Source Heat Pump - Cooling	14,486	14,486	8,680
Roof Insulation	1,563	1,563	968
AC 240K - 760 K	15,191	15,191	9,025
Improved Duct Sealing	3,039	0	0
Ground Source Heat Pump - Cooling	44,217	24,099	14,928
DX Condenser Coil Cleaning	4,924	2,960	1,834

End Use	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Window Improvements	536	0	0
Cool Roofing	103,082	0	0
Ductless (mini split) - Cooling	76,690	0	0
Lighting			
Lighting Power Density - Parking Garage	1,775	1,775	1,139
Lighting Power Density- Exterior	18,947	18,947	12,159
Lighting Power Density - Interior	7,289	7,289	4,601
LED Downlight	596	596	376
CFL Screw-in	7,311	7,311	4,770
LED Exit Sign	7,287	7,287	4,570
LED Screw In Replacing Incandescent	6,003	6,003	3,917
CFL Screw in Specialty	7,204	7,204	4,700
LED Specialty replacing incandescent	7,767	7,767	5,068
Stairwell Bi-Level Control	8,662	8,662	5,651
Long Day Lighting Dairy	15,505	15,505	9,735
HID Fixture Upgrade - Pulse Start Metal Halide	26,438	26,438	16,859
CFL Reflector Flood	835	835	545
Interior Induction Lighting	74,041	74,041	46,532
CFL Fixture	1,131	1,131	726
High Intensity Fluorescent Fixture (replacing HID)	114,088	114,088	73,219
LED Grow Light	65,814	65,814	42,557
Daylight Sensor Controls	171,530	171,530	111,910
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	29,430	29,430	18,108
LED Tube Lighting	71,075	71,075	44,352
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	19,617	19,617	12,070
Central Lighting Control	98,489	98,489	64,257
Lamp & Ballast Retrofit (HPT8 Replacing T12)	51,454	51,454	32,473
Occupancy Sensor & Daylight Sensor	52,179	27,970	18,248
LED High Bay Lighting	114,435	114,435	71,918
Occupancy Sensor	52,179	27,970	18,248
Exterior Linear Fluorescent	24,952	24,952	16,014
Exterior HID Replaced with CFL	7,801	7,801	5,006
Switching Controls for Multilevel Lighting (Non-HID)	63,431	63,431	41,384
Garage HID replacement with LED	0	0	0
Interior Non-Highbay/Lowbay LED Fixtures	95,065	95,065	59,323
LED Low Bay Lighting	50,635	50,635	31,597
Garage Bi-level Controls	8,362	8,362	5,430
LED Specialty replacing CFL	5,241	5,241	3,419
Illuminated Signs to LED	8,022	8,022	5,234
Exterior Bi-level Controls	21,418	0	0
T5 HP replacing T12	66,105	66,105	41,720
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	11,560	2,207	1,440
Light Tube	41,555	0	0
42W 8 lamp Hi Bay CFL	44,992	0	0

End Use	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Exterior HID replaced with LED	52,829	0	0
LED Troffer	198	0	0
Space Heating			
EMS Pump Scheduling	1,945	1,945	1,215
Wall Insulation	4,194	4,194	2,708
EMS install	18,714	18,714	12,081
Setback with Electric Heat	3,785	3,785	2,444
Web Enabled EMS	24,270	24,270	15,219
EMS Optimization	1,389	1,389	897
Integrated Building Design	157,968	157,968	65,314
VFD Pump	5,637	5,637	3,639
Retrocommissioning	7,088	7,088	4,576
Ceiling Insulation	4,415	4,415	2,850
Water Loop Heat Pump (WLHP) - Heating	1,235	1,235	768
Destratification Fan (HVLS)	27,226	27,226	17,577
Energy Efficient Windows	10,653	6,990	3,268
ECM motors on furnaces	1,486	0	0
Economizer	43,691	0	0
HVAC Occupancy Sensors	21,419	21,419	13,458
Programmable Thermostats	5,611	0	0
Air Source Heat Pump - Heating	1,898	1,898	1,185
Roof Insulation	318	318	205
Improved Duct Sealing	614	0	0
Ground Source Heat Pump - Heating	35,860	18,060	11,659
Window Improvements	101	0	0
Cool Roofing	17,204	0	0
Ductless (mini split) - Heating	46,587	0	0
Other			
Engine Block Heater Timer	1,896	1,896	1,229
Parking Garage Exhaust Fan CO Control	3,670	3,670	2,305
NEMA Premium Transformer, three-phase	6,352	6,352	2,727
High Efficiency Transformer, three-phase	6,262	6,262	2,687
High Efficiency Transformer, single-phase	5,810	5,810	2,492
NEMA Premium Transformer, single-phase	5,170	5,170	2,217
Optimized Snow and Ice Melt Controls	2,187	0	0
Machine Drive			
Advanced Lubricants	45,437	45,437	29,438
Compressed Air System Management	90,063	90,063	58,349
Compressed Air - Advanced Compressor Controls	47,690	47,690	30,524
Storage Tank Addition (comp air)	43,219	43,219	22,317
VFD for Process Pumps	403,051	403,051	254,922
Pump System Efficiency Improvements	298,774	298,774	188,334
Motor System Optimization (Including ASD)	717,303	717,303	458,230
Automatic Drains, High efficiency nozzles and other (comp air)	45,713	45,713	29,617

End Use	Technical Potential (MWh)	Economic UCT (MWh)	Achievable UCT (MWh)
Electric Supply System Improvements	225,901	225,901	143,538
High Efficiency Pumps	124,133	124,133	78,141
Compressed Air Audits and Leak Repair	169,645	169,645	109,908
High Efficiency Dryers (comp air)	40,138	40,138	25,917
Sensors & Controls	97,314	97,314	62,018
VFD for Process Fans	128,863	128,863	81,338
Industrial Motor Management	35,158	35,158	22,778
Elec motors replacing pneumatic (comp air)	110,578	110,578	71,641
Fan System Improvements	34,382	34,382	21,525
Advanced Efficient Motors	84,265	84,265	42,373
Energy Information System	34,041	34,041	21,634
Process Cooling & Refrigeration			
Improved Refrigeration	217,168	217,168	146,279
Electric Supply System Improvements	71,988	71,988	48,578
Sensors & Controls	73,043	73,043	49,377
Energy Information System	29,613	29,613	20,022
Process Heating			
Electric Supply System Improvements	108,624	108,624	72,650
Sensors & Controls	98,592	98,592	66,027
Energy Information System	34,448	34,448	23,040
Industrial Other			
Barrel Insulation - Inj. Molding (plastics)	7,105	7,105	4,835
High Efficiency Welders	438	438	298
3 Phase High Eff Battery Charger	16,458	16,458	10,973
Pellet Dryer Insulation (plastics)	5,818	5,818	3,959
Injection Molding Machine - efficient (plastics)	23,331	23,331	15,878
Fiber Laser Replacing CO2 laser (auto industry)	2,325	0	0
Agriculture			
Fan Thermostat Controller	46,351	46,351	31,544
Low Pressure Sprinkler Nozzles	5,885	5,885	4,005
Milk Pre-Cooler Heat Exchanger	6,060	6,060	4,124
VFD for Process Fans - Agriculture	5,754	5,754	3,916
Variable Speed Drives for Dairy Vacuum Pumps	6,355	6,355	4,325
Grain Storage Temperature and Moisture Management Controller	6,153	6,153	4,183
VFD for Process Pumps - Agriculture	5,207	5,207	3,544
Other Industrial -Low-Energy Livestock Waterer	3,647	3,647	2,482
Greenhouse Environmental Controls	391	346	236
VFD for Process Pumps - Irrigation	2,356	2,356	1,603
Other Industrial -Dairy Refrigerator Tune-Up	612	29	416
Variable Speed Drive with Heat Exchanger, Milk	319	0	0
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	65	0	0
Total	**7,838,376**	**6,926,596**	**4,183,044**
% of Annual Sales Forecast	**30.5%**	**26.9%**	**16.3%**

8.3 ACHIEVABLE POTENTIAL BENEFITS & COSTS

TABLE 8-11 and TABLE 8-12 show the NPV benefits and costs associated with the Achievable UCT Scenario. This scenario compared the benefits and costs based the UCT.

TABLE 8-11. 10-YEAR BENEFIT-COST RATIOS FOR ACHIEVABLE POTENTIAL SCENARIOS – INDUSTRIAL SECTOR ONLY

10-year	NPV Benefits	NPV Costs	B/C Ratio	Net Benefits
Achievable UCT	$1,254,441,469	$319,354,220	3.90	$935,087,250

TABLE 8-12. 20-YEAR BENEFIT-COST RATIOS FOR ACHIEVABLE POTENTIAL SCENARIOS– INDUSTRIAL SECTOR ONLY

20-year	NPV Benefits	NPV Costs	B/C Ratio	Net Benefits
Achievable UCT	$2,201,173,491	$511,127,050	4.31	$1,690,046,441

Year by year budgets, broken out by incentive and administrative costs, are depicted in TABLE 8-13 and TABLE 8-14 shows the revenue requirements as a percentage of forecasted sector sales.

TABLE 8-13. ANNUAL PROGRAM BUDGETS ASSOCIATED WITH THE ACHIEVABLE UCT SCENARIO (IN MILLIONS)

ACHIEVABLE UCT	Incentives	Admin.	Total Costs
2017	$33.15	$9.03	$42.18
2018	$33.19	$9.60	$42.79
2019	$33.23	$10.21	$43.44
2020	$33.32	$10.83	$44.14
2021	$33.36	$11.48	$44.84
2022	$33.45	$12.26	$45.71
2023	$33.55	$12.96	$46.51
2024	$33.65	$13.71	$47.37
2025	$33.70	$14.46	$48.16
2026	$33.91	$15.29	$49.20
2027	$29.25	$14.67	$43.91
2028	$29.80	$15.55	$45.35
2029	$34.84	$17.52	$52.36
2030	$34.95	$18.40	$53.35
2031	$35.06	$19.36	$54.42
2032	$45.77	$27.29	$73.06
2033	$47.53	$28.72	$76.25
2034	$47.57	$29.83	$77.40
2035	$50.97	$31.47	$82.44
2036	$50.96	$32.64	$83.60

TABLE 8-14. REVENUE REQUIREMENTS PER SCENARIO AS A % OF SECTOR SALES

Year	Achievable UCT
2017	3.26%
2018	3.23%
2019	3.25%
2020	3.22%
2021	3.17%
2022	3.10%
2023	3.12%

Year	Achievable UCT
2024	3.13%
2025	3.14%
2026	3.16%
2027	2.70%
2028	2.76%
2029	3.23%
2030	3.23%
2031	3.24%
2032	4.37%
2033	4.49%
2034	4.47%
2035	4.69%
2036	4.68%

9 Scenario Analysis

In addition to the development of the statewide base case, sensitivity analyses were performed surrounding several key assumptions in the study. GDS, DTE Energy, Consumers Energy, the Michigan PSC, and stakeholders discussed multiple options as possibilities for the sensitivity analysis. After considering opportunities for combining uncertainties into broader categories, the following three sensitivity scenarios below were selected for analysis:

- Increased Incentives
- Optimistic Conditions
- Carbon Price Adjustment

The remainder of this chapter describes the sensitivity selections in further detail, followed by a summary of results compared to the reference case.

9.1 100% INCREMENTAL COST INCENTIVE SCENARIO

For this scenario, GDS revised the base case achievable potential for the Consumers Energy and DTE Energy service areas using the assumption that the programs pay 100% of incremental costs41 for all measures/bundles of measures that would still pass the Utility Cost Test (UCT) at the higher incentive level (i.e., if the programs paid incentives equal to 100% of incremental cost, rather than using the 50% of incremental cost assumption.) Measures that failed the UCT at the 100% of incremental cost were retained at the 50% of incremental cost level. As with the base case scenario, all low-income measures with a UCT ratio greater than or equal to 0.5 are retained in this scenario.

For measures that were cost-effective at incentives equal to 100% of the assumed incremental measure cost, the long-term market adoption rates were increased relative to the assumed base case. Maximum adoption rates at 100% incentives ranged from 75%-85% in the residential sector depending on end-use (compared to 40%-70% in the base case). Similarly, In the commercial and industrial sectors, the maximum adoption rates increased from the base case of 40%-70% to 59%-80%, when incentive levels of 100% were adopted.

9.2 HIGH ASSUMPTIONS SCENARIO

The high assumptions scenario builds off the increased incentives scenario, but includes other favorable assumptions that would result in additional measures and higher market adoptions relative to the base case. This scenario is consistent with the National Action for Energy Efficiency's definition of maximum achievable potential.42 The complete list of assumptions related to this scenario is provided in TABLE 9-1 below.

TABLE 9-1. CUMULATIVE ANNUAL MWH SAVINGS OF SENSITIVITY SCENARIOS ON THE LOWER PENINSULA

Category	Assumption
Incremental Cost	Where cost-effective, change the incentive payment to 100% of measure incremental cost. As in the increased incentive scenario, measures that failed the UCT at the 100% of incremental cost were retained at the 50% of incremental cost level.
Avoided Cost - Energy	Avoided energy cost were assumed to be 50% higher than base case avoided costs. This avoided cost percentage change would ramp up to the 50% target increase over the initial 5-year years of the forecast period to recognize more certainty in the near term with a greater chance of avoided cost volatility over the long term. After year 5, the percentage increase in energy avoided costs will be maintained at the target percent increase of 50%. The mark-ups were applied to both DTE and Consumers base case avoided energy cost.

41 For low-income measures and other retrofit measures, the utilities are assumed to pay 100% of the full measure cost.
42 Guide for Conducting Energy Efficiency Potential Studies. National Action Plan for Energy Efficiency. 2007. Pg. 2-4.

Category	Assumption
Avoided Cost - Capacity	In addition to avoided energy costs, avoided capacity costs were also increased relative to the base case. For avoided capacity, the increase reflected new entry cost of capacity in high IRP planning scenarios. The increased capacity value is based upon the 100% CONE value to be based on MISO's September 2015 forecast of CONE.[43] MISO's September 2015 forecast for 100% of CONE was $99.18. This is 33% higher than the base case cost of capacity used for CMS Energy, and 200% higher than the base case cost of capacity for DTE Energy. Capacity costs were assumed to increase annually using a 2.4% rate of inflation. GDS used the same avoided capacity cost for both DTE and Consumers for Scenario #2.
Low-Income	Consistent with the base case, incentives for LI measures were retained at 100% of the measure cost. However, in the optimistic conditions scenario all low-income measures were included in the estimate of achievable potential, regardless of UCT ratio.
Optimistic Market Penetration	GDS applied an adder on all market penetration rates to reflect "market lift" due to the addition of enhanced initiatives and optimistic market conditions. The market penetration added was based on market research already completed by Ameren Illinois.[44] In the residential sector, GDS applied a 26% multiplier to the initial year adoption rate and the maximum adoption rates used in Scenario 1, with a maximum adoption rate cap of 90%. All measures that were cost-effective at 100% incentives (and all low-income measures) had a long-term maximum adoption rate of 90%. All measures that were only cost-effective at 50% incentives saw maximum adoption rates increase to 50%-85% (compared to 40%-70% in the base case) because of the adder. In the commercial and industrial sectors, GDS applied a 32% multiplier to the initial year adoption rate and the maximum adoption rates used in Scenario 1, with a maximum adoption rate cap of 90%. As in the residential sector, all measures that were cost-effective at 100% incentives had a long-term maximum adoption rate of 90%. All measures that were only cost-effective at 50% incentives saw maximum adoption rates increase to 82%-90% (compared to 59%-68% in the base case) because of the adder.
Lighting Technologies	GDS re-examined the cost-effectiveness of nonresidential LED measures that did not pass year economic screening in 2017. Three LED measures did not pass the UCT in the first year: LED Troffers, LED Fuel Pump Canopy Fixture and Exterior HID replacement with LEDs. Based upon feedback and sources provided by the National Resource Defense Council (NRDC), GDS updated both price and savings estimates for these three measures to reflect more aggressive reductions in LED cost and improvements in lighting efficacy. Measure prices were updated based on estimates provided by NRDC, and a cost reduction trend (from the Energy Savings Forecast of Solid-State Lighting in General Illumination Applications Prepared for the U.S. Department of Energy Solid-State Lighting Program)[45] was incorporated into the benefit cost test. GDS also updated kWh savings to current 2017 MEMD estimates. An efficacy improvement rate was applied to the estimated savings, which increased savings percentages over the life of the measures. Because of these updated assumption values, all three measures passed cost-effective screening and were introduced in the analyses' second year.

9.3 CARBON PRICE SCENARIO

In the Carbon Price Scenario, GDS increased electric avoided costs in the base case potential studies to reflect the monetary value of reductions in carbon emissions from power plants. Typically, such reductions in carbon emissions are valued with a price per ton of carbon reduced or a price per kWh generated.

[43] MISO's September 2015 forecast was used, as this was the same vintage forecast used to develop the base case avoided capacity cost assumptions for CMS Energy.

[44] Ameren Illinois DSM Market Potential Study; Volume 2-Market Research Report. Applied Energy Group. 2016. Table 5-2 and Table 9-2. The adder reflects lift from improved program design features, improved customer financial situations, and improved customer awareness/education.

[45] Energy Savings Forecast of Solid-State Lighting in General Illumination Applications. US DOE. September 2016.

The carbon price adjustment assumed that the cost of carbon was $12.80 per metric ton based on the average 2016 price from the California Carbon Dashboard.[46] GDS assumed that the cost of carbon would increase annually (using linear growth) to reach $40 ($2016 real dollars) per metric ton by 2036 and $67.20 by 2056.

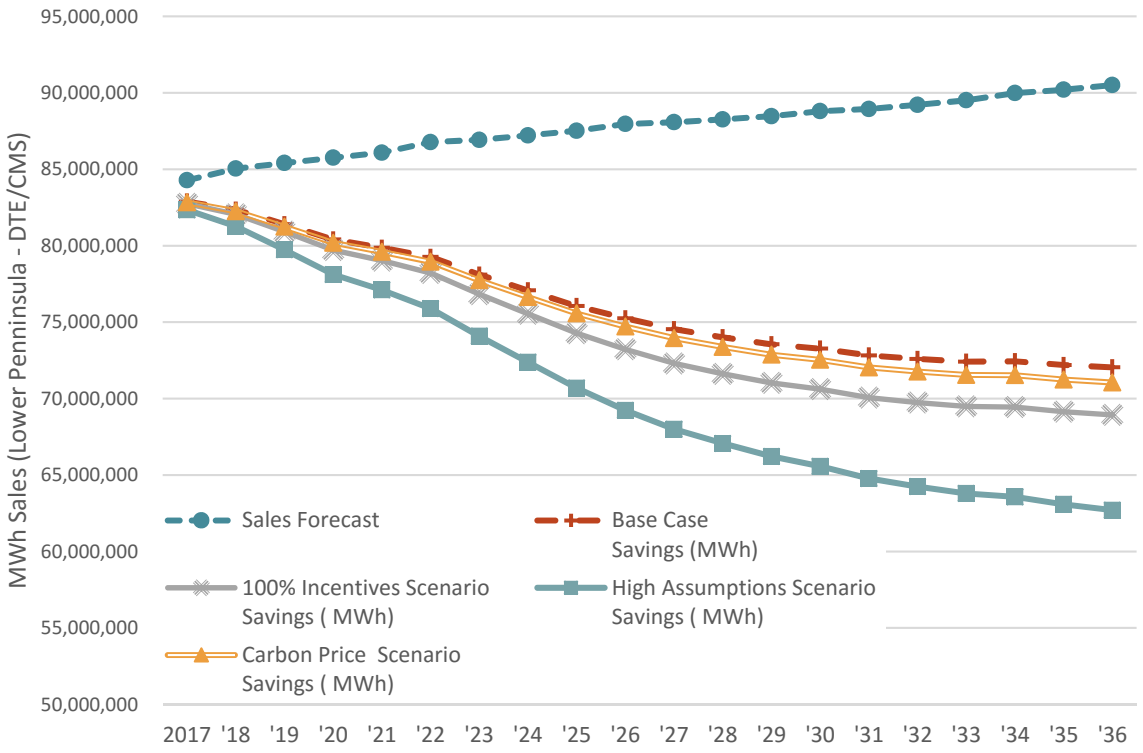
GDS then converted these assumed costs of carbon into a nominal value per avoided kWh using DTE Energy and Consumers suppled emission factors that consider utility-specific current and future generation mix. Overall, the carbon price scenario raised electric energy avoided costs between 23% and 32% in the first year of the analysis for DTE, and between 30% and 42% in the first year for Consumers Energy. By 2056, avoided cost were up to 91% higher for DTE Energy and up to 65% higher for Consumers Energy.[47]

9.4 RESULTS SUMMARY

FIGURE 9-1 shows the cumulative annual impacts of the base case and three sensitivity scenarios relative to the combined sales forecast for the Lower Peninsula. All three scenarios were designed to reduce barriers to market adoption and/or increase the number of eligible, cost-effective measures. Although the carbon price scenario increased electric energy avoided costs significantly, the overall impact on the number of cost-effective measures that were introduced into the analysis and the resulting increase to savings (5% relative to the base case) was minor.

The 100% of incremental cost incentive scenario did not change the measure mix used the base case, but did result in increased market acceptance over the 20-year period and a 17% increase in cumulative savings relative to the base case. Last the high assumptions scenario impacted both the measure mix and market acceptance trends, leading to a 51% increase in savings by 2036.

FIGURE 9-1. CUMULATIVE ANNUAL IMPACTS OF SENSITIVITY SCENARIOS ON THE LOWER PENINSULA SALES FORECAST



[46] http://calcarbondash.org/
[47] Detailed avoided cost tables for the Carbon Price scenario are provided in the appendices.

TABLE 9-2 provides the cumulative annual savings in MWh, and as a percent of the combined DTE Energy and Consumers Energy sales forecast, for 2017 through 2036. In the initial year savings (as a % of forecast sales) ranges from 1.7% to 2.3% between the base case and three sensitivity scenarios. By 2036, the final year in the analysis timeframe, savings range between 20.4% and 30.7% of forecast sales. More detailed tables of the scenario results of energy savings and summer peak demand savings relative to the base case are available in Appendix H.

TABLE 9-2. CUMULATIVE ANNUAL MWH SAVINGS OF SENSITIVITY SCENARIOS ON THE LOWER PENINSULA

Year	Base Case		100% Incentives Scenario		High Assumptions Scenario		Carbon Price Scenario	
	MWh Savings	% of Sales	MWh Savings	% of Sales	MWh Savings	% of Sales	MWh Savings	% of Sales
2017	1,391,028	1.7%	1,532,109	1.8%	1,932,599	2.3%	1,444,575	1.7%
2018	2,682,902	3.2%	2,986,467	3.5%	3,768,876	4.4%	2,790,123	3.3%
2019	4,003,165	4.7%	4,490,301	5.3%	5,674,931	6.6%	4,164,224	4.9%
2020	5,351,144	6.2%	6,042,348	7.0%	7,637,831	8.9%	5,566,202	6.5%
2021	6,215,155	7.2%	7,054,179	8.2%	8,971,964	10.4%	6,483,908	7.5%
2022	7,504,319	8.6%	8,557,403	9.9%	10,884,551	12.5%	7,826,871	9.0%
2023	8,811,273	10.1%	10,092,954	11.6%	12,835,900	14.8%	9,187,576	10.6%
2024	10,140,200	11.6%	11,664,380	13.4%	14,830,174	17.0%	10,570,518	12.1%
2025	11,462,574	13.1%	13,240,114	15.1%	16,829,445	19.2%	11,946,767	13.7%
2026	12,709,772	14.4%	14,736,486	16.8%	18,730,855	21.3%	13,248,145	15.1%
2027	13,535,931	15.4%	15,774,761	17.9%	20,078,758	22.8%	14,122,332	16.0%
2028	14,250,320	16.1%	16,640,348	18.9%	21,194,836	24.0%	14,885,623	16.9%
2029	14,914,909	16.9%	17,440,578	19.7%	22,246,052	25.1%	15,599,590	17.6%
2030	15,528,081	17.5%	18,177,175	20.5%	23,229,014	26.2%	16,262,276	18.3%
2031	16,114,423	18.1%	18,873,893	21.2%	24,165,146	27.2%	16,898,407	19.0%
2032	16,619,226	18.6%	19,470,370	21.8%	24,967,839	28.0%	17,445,374	19.6%
2033	17,091,592	19.1%	20,019,945	22.4%	25,712,342	28.7%	17,959,505	20.1%
2034	17,538,467	19.5%	20,529,747	22.8%	26,407,338	29.3%	18,447,789	20.5%
2035	18,007,229	20.0%	21,059,207	23.3%	27,116,971	30.1%	18,957,935	21.0%
2036	18,462,268	20.4%	21,568,920	23.8%	27,799,901	30.7%	19,453,914	21.5%

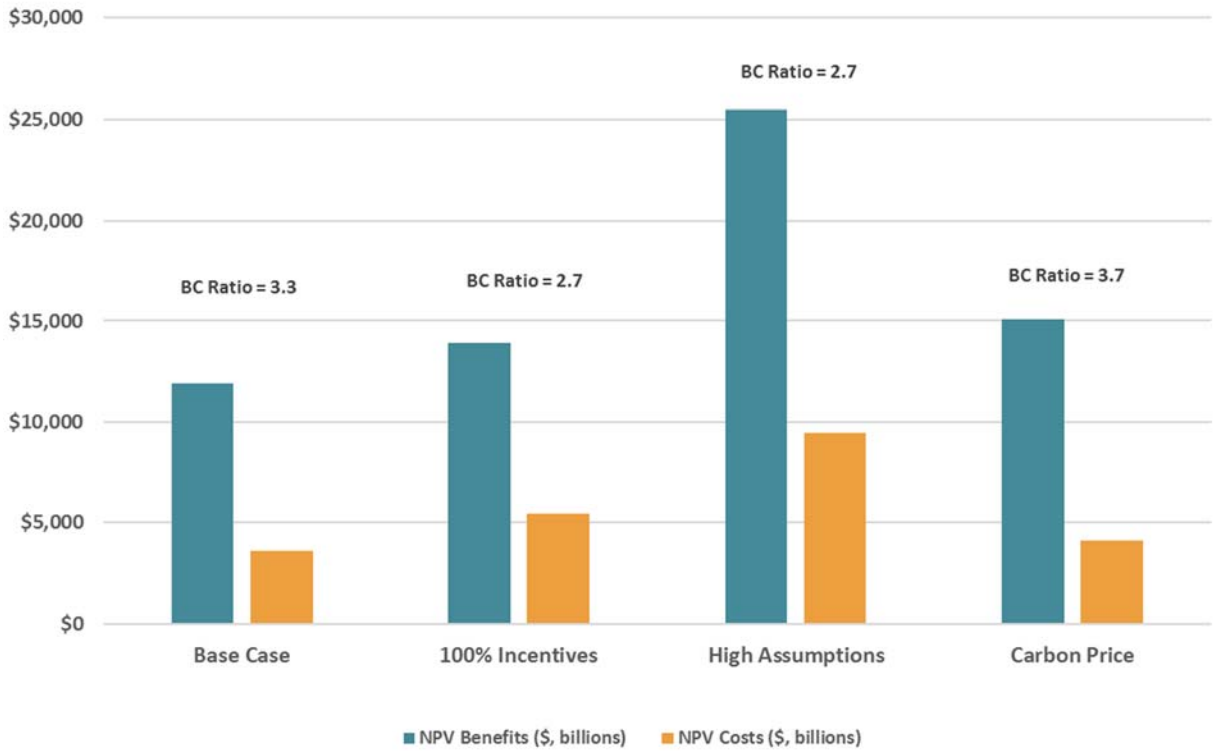
TABLE 9-3 provides the statewide budgets for the Lower Peninsula base case and three sensitivity scenarios. The average annual costs over the 2017-2036 analysis timeframe in the base case (50% incentives) scenario is approximately $380 million dollars. In the 100% incentives scenario, average annual spending is estimated to increase to nearly $560 million per year. In the high assumptions scenario, the increase in incentives, low-income measures, and long-term market adoption rates result in average annual budgets of nearly $985 million. Conversely, the carbon price scenario did not alter the 50% incentive assumption and budget increases are the result of additional cost-effective measures only. The average annual spending in the carbon price scenario is approximately $428 million per year.

TABLE 9-3. ANNUAL STATEWIDE BUDGETS OF SENSITIVITY SCENARIOS FOR THE LOWER PENINSULA

Year	Base Case	100% Incentives	High Assumptions	Carbon Price
2017	$306,786,943	$434,378,082	$767,535,296	$342,865,081
2018	$313,993,810	$450,280,380	$796,406,585	$351,218,199
2019	$318,905,123	$462,669,137	$829,679,235	$357,268,480
2020	$322,050,668	$471,641,957	$844,797,060	$361,582,229
2021	$333,561,920	$494,753,212	$878,921,594	$374,245,175
2022	$345,750,089	$516,021,199	$910,405,667	$387,674,582
2023	$357,219,818	$536,411,443	$940,675,531	$400,342,677
2024	$370,629,670	$558,615,968	$976,381,636	$415,319,393
2025	$397,122,010	$601,802,304	$1,036,938,421	$442,998,140
2026	$406,490,550	$624,779,634	$1,061,207,442	$453,656,631
2027	$325,099,893	$512,329,807	$895,299,498	$369,707,785
2028	$310,208,910	$473,261,225	$840,067,241	$356,033,630
2029	$366,680,366	$559,116,811	$974,538,792	$418,583,516
2030	$368,711,034	$560,722,350	$985,279,301	$425,050,834
2031	$364,776,777	$552,256,693	$976,136,939	$422,246,962
2032	$447,049,311	$669,787,282	$1,148,432,011	$507,624,469
2033	$470,078,349	$703,140,660	$1,191,559,255	$531,363,823
2034	$470,788,595	$703,796,704	$1,191,299,430	$531,797,240
2035	$502,618,025	$764,004,217	$1,260,186,920	$564,406,027
2036	$489,251,470	$726,676,501	$1,209,267,477	$551,243,417

Lastly, FIGURE 9-2 provides the NPV benefit and NPV costs associated with the base case and three sensitivity scenarios. All cases are cost effective, with a UCT ratio between 2.7 and 3.3. The 100% Incentives and High Assumptions scenarios have lower BC ratios than the Base Case and Carbon Price scenarios. This is because of the 100% incentives assumptions associated with the 100% Incentives and High Assumptions scenario. However, the High Assumptions scenario also yields the greatest NPV savings of nearly $16 billion. The Carbon Price scenario yields the highest BC ratio, at nearly 4-to-1.

FIGURE 9-2. NPV BENEFITS AND NPV COST FOR THE BASE CASE AND SCENARIOS FOR THE LOWER PENINSULA



APPENDIX A ● Residential Measure Detail

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
1001	Lighting	Standard CFL (Replacing EISA Bulb)	SF	NLI	ROB	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing Standard Halogen/Incandescent Bulb	21.29	$0.002	0.012
1002	Lighting	Specialty CFL (Replacing Specialty Incandescent)	SF	NLI	ROB	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	12.32	$0.004	0.013
1003	Lighting	Standard LED (Replacing EISA Bulb)	SF	NLI	ROB	41.28	71%	29.11	0.038	0.038	0.000	0%	-0.051	15	$6.04	$3.89	$0.00	$0.00	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.79	$0.012	0.019
1004	Lighting	Specialty LED (Replacing Specialty Incandescent)	SF	NLI	ROB	57.57	79%	45.40	0.059	0.059	0.000	0%	-0.080	15	$8.10	$5.54	$0.00	$0.00	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.57	$0.010	0.017
1005	Lighting	Standard CFL (Replacing CFL)	SF	NLI	ROB	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing CFL	21.29	$0.002	0.012
1006	Lighting	Specialty CFL (Replacing Specialty CFL)	SF	NLI	ROB	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty CFL Bulb	12.32	$0.004	0.013
1007	Lighting	Standard LED (Replacing CFL)	SF	NLI	ROB	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.20	$4.61	$0.00	$0.00	Standard LED Replacing Standard CFL Bulb	0.44	$0.130	0.137
1008	Lighting	Specialty LED (Replacing Specialty CFL)	SF	NLI	ROB	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.77	$13.97	$0.00	$0.00	Specialty LED Replacing Specialty CFL Bulb	0.39	$0.144	0.151
1009	Lighting	Reflector CFL (Replacing EISA Bulb)	SF	NLI	ROB	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.80	$0.008	0.017
1010	Lighting	Reflector LED (Replacing EISA Bulb)	SF	NLI	ROB	60.00	82%	49.09	0.064	0.064	0.000	0%	-0.087	15	$19.37	$10.80	$0.00	$0.00	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.52	$0.023	0.029
1011	Lighting	Reflector CFL (Replacing CFL)	SF	NLI	ROB	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Reflector CFL Bulb	6.80	$0.008	0.017
1012	Lighting	Reflector LED (Replacing CFL Bulb)	SF	NLI	ROB	15.52	30%	4.62	0.006	0.006	0.000	0%	-0.008	15	$15.42	$20.82	$0.00	$0.00	Reflector LED Replacing Reflector CFL Bulb	0.30	$0.191	0.198
1013	Lighting	T8 Replacing T12 Linear Fluorescent Bulb	SF	NLI	RETRO	70.10	29%	20.57	0.025	0.025	0.000	0%	0.000	8	$106.76	$0.00	$0.00	$0.00	T8 Linear Tube Fluorescent Replacing T12 LTF	0.13	$0.446	0.456
1014	Lighting	Residential Occupancy Sensors	SF	NLI	RETRO	53.27	30%	15.98	0.044	0.044	0.000	0%	0.000	10	$30.00	$0.00	$0.00	$0.00	Residential Occupancy Sensors	0.55	$0.138	0.146
1015	Lighting	LED Nightlights	SF	NLI	RETRO	25.55	86%	21.90	0.006	0.006	0.000	0%	0.000	12	$5.00	$0.00	$0.00	$0.00	LED Nightlights Replacing Incandescent Nightlights	3.20	$0.015	0.022
1016	Lighting	DI Standard CFL (Replacing EISA Bulb)	SF	LI	DI	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$2.34	$1.29	$0.00	$0.00	Standard CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	3.82	$0.014	0.023
1017	Lighting	DI Specialty CFL (Replacing Specialty Incandescent)	SF	LI	DI	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$3.83	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	3.75	$0.014	0.023
1018	Lighting	DI Standard LED (Replacing EISA Bulb)	SF	LI	DI	41.28	71%	29.11	0.038	0.038	0.000	0%	-0.051	15	$7.54	$3.89	$0.00	$0.00	Standard LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.92	$0.030	0.036
1019	Lighting	DI Specialty LED (Replacing Specialty Incandescent)	SF	LI	DI	57.57	79%	45.40	0.059	0.059	0.000	0%	-0.080	15	$9.60	$5.54	$0.00	$0.00	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	2.35	$0.024	0.031
1020	Lighting	DI Standard CFL (Replacing CFL)	SF	LI	DI	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$2.34	$1.29	$0.00	$0.00	Standard CFL Replacing Standard CFL Bulb (DIRECT INSTALL)	3.82	$0.014	0.023
1021	Lighting	DI Specialty CFL (Replacing Specialty CFL)	SF	LI	DI	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$3.83	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty CFL Bulb (DIRECT INSTALL)	3.75	$0.014	0.023
1022	Lighting	DI Standard LED (Replacing CFL)	SF	LI	DI	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$7.54	$4.61	$0.00	$0.00	Standard LED Replacing Standard CFL Bulb (DIRECT INSTALL)	0.15	$0.378	0.384
1023	Lighting	DI Specialty LED (Replacing Specialty CFL)	SF	LI	DI	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$9.60	$13.97	$0.00	$0.00	Specialty LED Replacing Specialty CFL Bulb (DIRECT INSTALL)	0.12	$0.481	0.488
1024	Lighting	DI Reflector CFL (Replacing EISA Bulb)	SF	LI	DI	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$6.25	$7.91	$0.00	$0.00	Reflector CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	2.15	$0.024	0.034
1025	Lighting	DI Reflector LED (Replacing EISA Bulb)	SF	LI	DI	60.00	82%	49.09	0.064	0.064	0.000	0%	-0.087	15	$21.67	$10.80	$0.00	$0.00	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.13	$0.050	0.057
1026	Lighting	DI Reflector CFL (Replacing CFL Bulb)	SF	LI	DI	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$6.25	$7.91	$0.00	$0.00	Reflector CFL Replacing Reflecor CFL Bulb (DIRECT INSTALL)	2.15	$0.024	0.034
1027	Lighting	DI Reflector LED (Replacing CFL Bulb)	SF	LI	DI	60.00	74%	44.48	0.058	0.058	0.000	0%	-0.079	15	$21.67	$20.82	$0.00	$0.00	Reflector LED Replacing Reflector CFL Bulb (DIRECT INSTALL)	1.02	$0.056	0.062
1028	Lighting	DI T8 Replacing T12 Linear Fluorescent Bulb	SF	LI	DI	70.10	29%	20.57	0.025	0.025	0.000	0%	0.000	8	$106.76	$0.00	$0.00	$0.00	T8 Linear Tube Fluorescent Replacing T12 LTF (DIRECT INSTALL)	0.06	$0.891	0.901
1029	Lighting	DI LED Nightlights	SF	LI	DI	25.55	86%	21.90	0.006	0.006	0.000	0%	0.000	12	$5.00	$0.00	$0.00	$0.00	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)	1.60	$0.030	0.037
1030	Lighting	Standard CFL (Replacing EISA Bulb)	SF	ALL	NC	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing Standard Halogen/Incandescent Bulb	21.29	$0.002	0.012
1031	Lighting	Specialty CFL (Replacing Specialty Incandescent)	SF	ALL	NC	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	12.32	$0.004	0.013
1032	Lighting	Standard LED (Replacing EISA Bulb)	SF	ALL	NC	41.28	71%	29.11	0.038	0.038	0.000	0%	-0.051	15	$6.04	$3.89	$0.00	$0.00	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.79	$0.012	0.019
1033	Lighting	Specialty LED (Replacing Specialty Incandescent)	SF	ALL	NC	57.57	79%	45.40	0.059	0.059	0.000	0%	-0.080	15	$8.10	$5.54	$0.00	$0.00	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.57	$0.010	0.017
1034	Lighting	Standard CFL (Replacing CFL)	SF	ALL	NC	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing CFL	21.29	$0.002	0.012
1035	Lighting	Specialty CFL (Replacing Specialty CFL)	SF	ALL	NC	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty CFL Bulb	12.32	$0.004	0.013
1036	Lighting	Standard LED (Replacing CFL)	SF	ALL	NC	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.20	$4.61	$0.00	$0.00	Standard LED Replacing Standard CFL Bulb	0.44	$0.130	0.137
1037	Lighting	Specialty LED (Replacing Specialty CFL)	SF	ALL	NC	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.77	$13.97	$0.00	$0.00	Specialty LED Replacing Specialty CFL Bulb	0.39	$0.144	0.151
1038	Lighting	Reflector CFL (Replacing EISA Bulb)	SF	ALL	NC	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.80	$0.008	0.017
1039	Lighting	Reflector LED (Replacing EISA Bulb)	SF	ALL	NC	60.00	82%	49.09	0.064	0.064	0.000	0%	-0.087	15	$19.37	$10.80	$0.00	$0.00	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.52	$0.023	0.029
1040	Lighting	Reflector CFL (Replacing CFL)	SF	ALL	NC	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Reflector CFL Bulb	6.80	$0.008	0.017
1041	Lighting	Reflector LED (Replacing CFL Bulb)	SF	ALL	NC	15.52	30%	4.62	0.006	0.006	0.000	0%	-0.008	15	$15.42	$20.82	$0.00	$0.00	Reflector LED Replacing Reflector CFL Bulb	0.30	$0.191	0.198
1042	Lighting	Residential Occupancy Sensors	SF	ALL	NC	53.27	30%	15.98	0.044	0.044	0.000	0%	0.000	10	$30.00	$0.00	$0.00	$0.00	Residential Occupancy Sensors	0.55	$0.138	0.146
1043	Lighting	Standard CFL (Replacing EISA Bulb)	MF	NLI	ROB	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing Standard Halogen/Incandescent Bulb	21.29	$0.002	0.012
1044	Lighting	Specialty CFL (Replacing Specialty Incandescent)	MF	NLI	ROB	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	12.32	$0.004	0.013
1045	Lighting	Standard LED (Replacing EISA Bulb)	MF	NLI	ROB	41.28	71%	29.11	0.038	0.038	0.000	0%	-0.051	15	$6.04	$3.89	$0.00	$0.00	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.79	$0.012	0.019
1046	Lighting	Specialty LED (Replacing Specialty Incandescent)	MF	NLI	ROB	57.57	79%	45.40	0.059	0.059	0.000	0%	-0.080	15	$8.10	$5.54	$0.00	$0.00	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.57	$0.010	0.017
1047	Lighting	Standard CFL (Replacing CFL)	MF	NLI	ROB	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing CFL	21.29	$0.002	0.012
1048	Lighting	Specialty CFL (Replacing Specialty CFL)	MF	NLI	ROB	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty CFL Bulb	12.32	$0.004	0.013
1049	Lighting	Standard LED (Replacing CFL)	MF	NLI	ROB	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.20	$4.61	$0.00	$0.00	Standard LED Replacing Standard CFL Bulb	0.44	$0.130	0.137
1050	Lighting	Specialty LED (Replacing Specialty CFL)	MF	NLI	ROB	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.77	$13.97	$0.00	$0.00	Specialty LED Replacing Specialty CFL Bulb	0.39	$0.144	0.151
1051	Lighting	Reflector CFL (Replacing EISA Bulb)	MF	NLI	ROB	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.80	$0.008	0.017
1052	Lighting	Reflector LED (Replacing EISA Bulb)	MF	NLI	ROB	60.00	82%	49.09	0.064	0.064	0.000	0%	-0.087	15	$19.37	$10.80	$0.00	$0.00	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.52	$0.023	0.029
1053	Lighting	Reflector CFL (Replacing CFL)	MF	NLI	ROB	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Reflector CFL Bulb	6.80	$0.008	0.017
1054	Lighting	Reflector LED (Replacing CFL Bulb)	MF	NLI	ROB	15.52	30%	4.62	0.006	0.006	0.000	0%	-0.008	15	$15.42	$20.82	$0.00	$0.00	Reflector LED Replacing Reflector CFL Bulb	0.30	$0.191	0.198
1055	Lighting	T8 Replacing T12 Linear Fluorescent Bulb	MF	NLI	RETRO	70.10	29%	20.57	0.025	0.025	0.000	0%	0.000	8	$106.76	$0.00	$0.00	$0.00	T8 Linear Tube Fluorescent Replacing T12 LTF	0.13	$0.446	0.456
1056	Lighting	Residential Occupancy Sensors	MF	NLI	RETRO	53.27	30%	15.98	0.044	0.044	0.000	0%	0.000	10	$30.00	$0.00	$0.00	$0.00	Residential Occupancy Sensors	0.55	$0.138	0.146
1057	Lighting	LED Nightlights	MF	NLI	RETRO	25.55	86%	21.90	0.006	0.006	0.000	0%	0.000	12	$5.00	$0.00	$0.00	$0.00	LED Nightlights Replacing Incandescent Nightlights	3.20	$0.015	0.022
1058	Lighting	DI Standard CFL (Replacing EISA Bulb)	MF	LI	DI	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$2.34	$1.29	$0.00	$0.00	Standard CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	3.82	$0.014	0.023
1059	Lighting	DI Specialty CFL (Replacing Specialty Incandescent)	MF	LI	DI	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$3.83	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	3.75	$0.014	0.023
1060	Lighting	DI Standard LED (Replacing EISA Bulb)	MF	LI	DI	41.28	71%	29.11	0.038	0.038	0.000	0%	-0.051	15	$7.54	$3.89	$0.00	$0.00	Standard LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.92	$0.030	0.036
1061	Lighting	DI Specialty LED (Replacing Specialty Incandescent)	MF	LI	DI	57.57	79%	45.40	0.059	0.059	0.000	0%	-0.080	15	$9.60	$5.54	$0.00	$0.00	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	2.35	$0.024	0.031
1062	Lighting	DI Standard CFL (Replacing CFL)	MF	LI	DI	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$2.34	$1.29	$0.00	$0.00	Standard CFL Replacing Standard CFL Bulb (DIRECT INSTALL)	3.82	$0.014	0.023
1063	Lighting	DI Specialty CFL (Replacing Specialty CFL)	MF	LI	DI	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$3.83	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty CFL Bulb (DIRECT INSTALL)	3.75	$0.014	0.023
1064	Lighting	DI Standard LED (Replacing CFL)	MF	LI	DI	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$7.54	$4.61	$0.00	$0.00	Standard LED Replacing Standard CFL Bulb (DIRECT INSTALL)	0.15	$0.378	0.384

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
1065	Lighting	DI Specialty LED (Replacing Specialty CFL)	MF	LI	DI	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$9.60	$13.97	$0.00	$0.00	Specialty LED Replacing Specialty CFL Bulb (DIRECT INSTALL)	0.12	$0.481	0.488
1066	Lighting	DI Reflector CFL (Replacing EISA Bulb)	MF	LI	DI	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$6.25	$7.91	$0.00	$0.00	Reflector CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	2.15	$0.024	0.034
1067	Lighting	DI Reflector LED (Replacing EISA Bulb)	MF	LI	DI	60.00	82%	49.09	0.064	0.064	0.000	0%	-0.087	15	$21.67	$10.80	$0.00	$0.00	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.13	$0.050	0.057
1068	Lighting	DI Reflector CFL (Replacing CFL Bulb)	MF	LI	DI	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$6.25	$7.91	$0.00	$0.00	Reflector CFL Replacing Reflecor CFL Bulb (DIRECT INSTALL)	2.15	$0.024	0.034
1069	Lighting	DI Reflector LED (Replacing CFL Bulb)	MF	LI	DI	60.00	74%	44.48	0.058	0.058	0.000	0%	-0.079	15	$21.67	$20.82	$0.00	$0.00	Reflector LED Replacing Reflector CFL Bulb (DIRECT INSTALL)	1.02	$0.056	0.062
1070	Lighting	DI T8 Replacing T12 Linear Fluorescent Bulb	MF	LI	DI	70.10	29%	20.57	0.025	0.025	0.000	0%	0.000	8	$106.76	$0.00	$0.00	$0.00	T8 Linear Tube Fluorescent Replacing T12 LTF (DIRECT INSTALL)	0.06	$0.891	0.901
1071	Lighting	DI LED Nightlights	MF	LI	DI	25.55	86%	21.90	0.006	0.006	0.000	0%	0.000	12	$5.00	$0.00	$0.00	$0.00	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)	1.60	$0.030	0.037
1072	Lighting	Standard CFL (Replacing EISA Bulb)	MF	ALL	NC	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing Standard Halogen/Incandescent Bulb	21.29	$0.002	0.012
1073	Lighting	Specialty CFL (Replacing Specialty Incandescent)	MF	ALL	NC	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	12.32	$0.004	0.013
1074	Lighting	Standard LED (Replacing EISA Bulb)	MF	ALL	NC	41.28	71%	29.11	0.038	0.038	0.000	0%	-0.051	15	$6.04	$3.89	$0.00	$0.00	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.79	$0.012	0.019
1075	Lighting	Specialty LED (Replacing Specialty Incandescent)	MF	ALL	NC	57.57	79%	45.40	0.059	0.059	0.000	0%	-0.080	15	$8.10	$5.54	$0.00	$0.00	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.57	$0.010	0.017
1076	Lighting	Standard CFL (Replacing CFL)	MF	ALL	NC	41.28	65%	26.82	0.035	0.035	0.000	0%	-0.047	9	$0.84	$1.29	$0.00	$0.00	Standard CFL Replacing CFL	21.29	$0.002	0.012
1077	Lighting	Specialty CFL (Replacing Specialty CFL)	MF	ALL	NC	57.57	75%	43.12	0.056	0.056	0.000	0%	-0.076	9	$2.33	$4.21	$0.00	$0.00	Specialty CFL Replacing Specialty CFL Bulb	12.32	$0.004	0.013
1078	Lighting	Standard LED (Replacing CFL)	MF	ALL	NC	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.20	$4.61	$0.00	$0.00	Standard LED Replacing Standard CFL Bulb	0.44	$0.130	0.137
1079	Lighting	Specialty LED (Replacing Specialty CFL)	MF	ALL	NC	14.45	16%	2.28	0.003	0.003	0.000	0%	-0.004	15	$5.77	$13.97	$0.00	$0.00	Specialty LED Replacing Specialty CFL Bulb	0.39	$0.144	0.151
1080	Lighting	Reflector CFL (Replacing EISA Bulb)	MF	ALL	NC	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.80	$0.008	0.017
1081	Lighting	Reflector LED (Replacing EISA Bulb)	MF	ALL	NC	60.00	82%	49.09	0.064	0.064	0.000	0%	-0.087	15	$19.37	$10.80	$0.00	$0.00	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.52	$0.023	0.029
1082	Lighting	Reflector CFL (Replacing CFL)	MF	ALL	NC	54.55	74%	40.28	0.052	0.052	0.000	0%	-0.071	9	$3.95	$7.91	$0.00	$0.00	Reflector CFL Replacing Reflector CFL Bulb	6.80	$0.008	0.017
1083	Lighting	Reflector LED (Replacing CFL Bulb)	MF	ALL	NC	15.52	30%	4.62	0.006	0.006	0.000	0%	-0.008	15	$15.42	$20.82	$0.00	$0.00	Reflector LED Replacing Reflector CFL Bulb	0.30	$0.191	0.198
1084	Lighting	Residential Occupancy Sensors	MF	ALL	NC	53.27	30%	15.98	0.044	0.044	0.000	0%	0.000	10	$30.00	$0.00	$0.00	$0.00	Residential Occupancy Sensors	0.55	$0.138	0.146
2001	Appliances	Refrigerators ENERGY STAR	SF	NLI	ROB	493.99	10%	47.69	0.008	0.008	0.000	-	0.000	16	$28.59	$0.00	$0.00	$0.00	Installation of high efficiency replacement refrigerators	2.19	$0.033	0.040
2002	Appliances	Refrigerator recycling	SF	NLI	RECYCLE	1135.00	100%	1135.00	0.131	0.131	0.000	0%	0.000	8	$78.00	$0.00	$0.00	$0.00	Removal and recylcing of non-primary refrigerators	9.92	$0.006	0.016
2003	Appliances	Refrigerators ENERGY STAR	SF	LI	DI	493.99	10%	47.69	0.008	0.008	0.000	0%	0.000	16	$451.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement refrigerators	0.07	$1.045	1.051
2004	Appliances	Refrigerator recycling	SF	LI	DI	1135.00	100%	1135.00	0.131	0.131	0.000	0%	0.000	8	$78.00	$0.00	$0.00	$0.00	Removal and recylcing of non-primary refrigerators	4.96	$0.012	0.022
2005	Appliances	Freezers ENERGY STAR	SF	All	ROB	346.52	10%	34.66	0.006	0.006	0.000	0%	0.000	21	$9.90	$0.00	$0.00	$0.00	Installation of high efficiency replacement freezers	5.54	$0.014	0.020
2006	Appliances	Freezer recycling	SF	All	RECYCLE	944.00	100%	944.00	0.116	0.116	0.000	0%	0.000	8	$78.00	$0.00	$0.00	$0.00	Removal and recylcing of non-primary freezers	8.43	$0.007	0.017
2007	Appliances	Room AC recycling	SF	All	RECYCLE	113.00	100%	113.00	0.107	0.107	0.000	0%	0.000	8	$49.00	$0.00	$0.00	$0.00	Removal and recycling of room air conditioners (non-primary or secondary)	4.31	$0.037	0.047
2008	Appliances	ENERGY STAR Dishwasher - elec water heater	SF	All	ROB	307.00	12%	37.00	0.064	0.064	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	13.32	$0.020	0.028
2009	Appliances	ENERGY STAR Dishwasher - gas water heater	SF	All	ROB	135.08	12%	16.28	0.050	0.050	0.782	12%	0.094	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	10.09	$0.043	0.052
2010	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	SF	All	ROB	241.66	35%	84.00	0.012	0.012	1.361	27%	0.369	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.16	$0.023	0.031
2011	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	SF	All	ROB	598.10	29%	175.00	0.025	0.025	0.000	0%	0.000	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.38	$0.014	0.022
2012	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	SF	All	ROB	42.29	39%	16.65	0.002	0.002	2.041	29%	0.598	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.19	$0.041	0.049
2013	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	SF	All	ROB	398.73	27%	108.20	0.015	0.015	0.825	35%	0.285	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.50	$0.019	0.027
2014	Appliances	ENERGY STAR Electric Clothes Dryers	SF	All	ROB	768.92	21%	160.44	0.567	0.567	0.000	0%	0.000	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement electric clothes dryers	1.20	$0.056	0.063
2015	Appliances	ENERGY STAR Gas Clothes Dryers	SF	All	ROB	134.72	18%	24.78	0.088	0.088	2.414	18%	0.444	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement gas clothes dryers	0.37	$0.182	0.189
2016	Appliances	ENERGY STAR Dehumidifier	SF	All	ROB	624.22	27%	168.71	0.103	0.103	0.000	0%	0.000	12	$50.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement dehumidifier	6.48	$0.019	0.027
2017	Appliances	Dehumidifier recycling	SF	All	RECYCLE	138.50	100%	138.50	0.035	0.035	0.000	0%	0.000	8	$49.00	$0.00	$0.00	$0.00	Retirement of secondary dehumidifiers	2.42	$0.030	0.040
2018	Appliances	Refrigerators ENERGY STAR	SF	All	NC	493.99	10%	47.69	0.008	0.008	0.000	0%	0.000	16	$28.59	$0.00	$0.00	$0.00	Installation of high efficiency replacement refrigerators	2.19	$0.033	0.040
2019	Appliances	Freezers ENERGY STAR	SF	All	NC	346.52	10%	34.66	0.006	0.006	0.000	0%	0.000	21	$9.90	$0.00	$0.00	$0.00	Installation of high efficiency replacement freezers	5.54	$0.014	0.020
2020	Appliances	ENERGY STAR Dishwasher - elec water heater	SF	All	NC	307.00	12%	37.00	0.064	0.064	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	13.32	$0.020	0.028
2021	Appliances	ENERGY STAR Dishwasher - gas water heater	SF	All	NC	135.08	12%	16.28	0.050	0.050	0.782	12%	0.094	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	10.09	$0.043	0.052
2022	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	SF	All	NC	241.66	35%	84.00	0.012	0.012	1.361	27%	0.369	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.16	$0.023	0.031
2023	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	SF	All	NC	598.10	29%	175.00	0.025	0.025	0.000	0%	0.000	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.38	$0.014	0.022
2024	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	SF	All	NC	42.29	39%	16.65	0.002	0.002	2.041	29%	0.598	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.19	$0.041	0.049
2025	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	SF	All	NC	398.73	27%	108.20	0.015	0.015	0.825	35%	0.285	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.50	$0.019	0.027
2026	Appliances	ENERGY STAR Electric Clothes Dryers	SF	All	NC	768.92	21%	160.44	0.567	0.567	0.000	0%	0.000	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement electric clothes dryers	1.20	$0.056	0.063
2027	Appliances	ENERGY STAR Gas Clothes Dryers	SF	All	NC	134.72	18%	24.78	0.088	0.088	2.414	18%	0.444	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement gas clothes dryers	0.37	$0.182	0.189
2028	Appliances	ENERGY STAR Dehumidifier	SF	All	NC	624.22	27%	168.71	0.103	0.103	0.000	0%	0.000	12	$50.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement dehumidifier	6.48	$0.019	0.027
2029	Appliances	Refrigerators ENERGY STAR	MF	NLI	ROB	493.99	10%	47.69	0.008	0.008	0.000	0%	0.000	16	$451.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement refrigerators	0.14	$0.522	0.529
2030	Appliances	Refrigerator recycling	MF	NLI	RECYCLE	1135.00	100%	1135.00	0.131	0.131	0.000	0%	0.000	8	$78.00	$0.00	$0.00	$0.00	Removal and recylcing of non-primary refrigerators	9.92	$0.006	0.016
2031	Appliances	Refrigerators ENERGY STAR	MF	LI	DI	493.99	10%	47.69	0.008	0.008	0.000	0%	0.000	16	$451.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement refrigerators	0.07	$1.045	1.051
2032	Appliances	Refrigerator recycling	MF	LI	DI	1135.00	100%	1135.00	0.131	0.131	0.000	0%	0.000	8	$78.00	$0.00	$0.00	$0.00	Removal and recylcing of non-primary refrigerators	4.96	$0.012	0.022
2033	Appliances	Freezers ENERGY STAR	MF	All	ROB	346.52	10%	34.66	0.006	0.006	0.000	0%	0.000	21	$9.90	$0.00	$0.00	$0.00	Installation of high efficiency replacement freezers	5.54	$0.014	0.020
2034	Appliances	Freezer recycling	MF	All	RECYCLE	944.00	100%	944.00	0.116	0.116	0.000	0%	0.000	8	$78.00	$0.00	$0.00	$0.00	Removal and recylcing of non-primary freezers	8.43	$0.007	0.017
2035	Appliances	Room AC recycling	MF	All	RECYCLE	113.00	100%	113.00	0.107	0.107	0.000	0%	0.000	8	$49.00	$0.00	$0.00	$0.00	Removal and recycling of room air conditioners (non-primary or secondary)	4.31	$0.037	0.047
2036	Appliances	ENERGY STAR Dishwasher - elec water heater	MF	All	ROB	307.00	12%	37.00	0.064	0.064	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	13.32	$0.020	0.028
2037	Appliances	ENERGY STAR Dishwasher - gas water heater	MF	All	ROB	135.08	12%	16.28	0.050	0.050	0.782	12%	0.094	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	10.09	$0.043	0.052
2038	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	MF	All	ROB	241.66	35%	84.00	0.012	0.012	1.361	27%	0.369	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.16	$0.023	0.031

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
2039	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	MF	All	ROB	598.10	29%	175.00	0.025	0.025	0.000	0%	0.000	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.38	$0.014	0.022
2040	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	MF	All	ROB	42.29	39%	16.65	0.002	0.002	2.041	29%	0.598	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.19	$0.041	0.049
2041	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	MF	All	ROB	398.73	27%	108.20	0.015	0.015	0.825	35%	0.285	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.50	$0.019	0.027
2042	Appliances	ENERGY STAR Electric Clothes Dryers	MF	All	ROB	768.92	21%	160.44	0.567	0.567	0.000	0%	0.000	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement electric clothes dryers	1.20	$0.056	0.063
2043	Appliances	ENERGY STAR Gas Clothes Dryers	MF	All	ROB	134.72	18%	24.78	0.088	0.088	2.414	18%	0.444	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement gas clothes dryers	0.37	$0.182	0.189
2044	Appliances	ENERGY STAR Dehumidifier	MF	All	ROB	624.22	27%	168.71	0.103	0.103	0.000	0%	0.000	12	$50.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement dehumidifier	6.48	$0.019	0.027
2045	Appliances	Dehumidifier recycling	MF	All	RECYCLE	138.50	100%	138.50	0.035	0.035	0.000	0%	0.000	8	$49.00	$0.00	$0.00	$0.00	Retirement of secondary dehumidifiers	2.42	$0.030	0.040
2046	Appliances	Refrigerators ENERGY STAR	MF	All	NC	493.99	10%	47.69	0.008	0.008	0.000	0%	0.000	16	$28.59	$0.00	$0.00	$0.00	Installation of high efficiency replacement refrigerators	2.19	$0.033	0.040
2047	Appliances	Freezers ENERGY STAR	MF	All	NC	346.52	10%	34.66	0.006	0.006	0.000	0%	0.000	21	$9.90	$0.00	$0.00	$0.00	Installation of high efficiency replacement freezers	5.54	$0.014	0.020
2048	Appliances	ENERGY STAR Dishwasher - elec water heater	MF	All	NC	307.00	12%	37.00	0.064	0.064	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	13.32	$0.020	0.028
2049	Appliances	ENERGY STAR Dishwasher - gas water heater	MF	All	NC	135.08	12%	16.28	0.050	0.050	0.782	12%	0.094	10	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	10.09	$0.043	0.052
2050	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	MF	All	NC	241.66	35%	84.00	0.012	0.012	1.361	27%	0.369	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.16	$0.023	0.031
2051	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	MF	All	NC	598.10	29%	175.00	0.025	0.025	0.000	0%	0.000	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.38	$0.014	0.022
2052	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	MF	All	NC	42.29	39%	16.65	0.002	0.002	2.041	29%	0.598	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.19	$0.041	0.049
2053	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	MF	All	NC	398.73	27%	108.20	0.015	0.015	0.825	35%	0.285	11	$36.57	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.50	$0.019	0.027
2054	Appliances	ENERGY STAR Electric Clothes Dryers	MF	All	NC	768.92	21%	160.44	0.567	0.567	0.000	0%	0.000	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement electric clothes dryers	1.20	$0.056	0.063
2055	Appliances	ENERGY STAR Gas Clothes Dryers	MF	All	NC	134.72	18%	24.78	0.088	0.088	2.414	18%	0.444	14	$152.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement gas clothes dryers	0.37	$0.182	0.189
2056	Appliances	ENERGY STAR Dehumidifier	MF	All	NC	624.22	27%	168.71	0.103	0.103	0.000	0%	0.000	12	$50.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement dehumidifier	6.48	$0.019	0.027
3001	Electronics	Smart Strip plug outlet	SF	All	RETRO	-	-	24.00	0.017	0.017	0.000	0%	0.000	5	$40.00	$0.00	$0.00	$0.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.39	$0.207	0.221
3002	Electronics	Advanced Power Strip Tier 2	SF	All	RETRO	602.08	51%	307.10	0.035	0.035	0.000	0%	0.000	8	$70.00	$0.00	$0.00	$0.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.77	$0.020	0.030
3003	Electronics	ENERGY STAR 6.0 TV (31-40")	SF	All	ROB	170.63	41%	70.30	0.039	0.039	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (under 40" diameter category)	4.38	$0.015	0.028
3004	Electronics	ENERGY STAR 6.0 TV (over 60")	SF	All	ROB	452.64	57%	255.80	0.140	0.140	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (over 40" diameter category)	15.92	$0.004	0.017
3005	Electronics	Efficient Set Top Box	SF	All	ROB	274.80	58%	160.60	0.018	0.018	0.000	0%	0.000	4	$5.00	$0.00	$0.00	$0.00	Installation of efficient set top box in place of standard efficiency unit	9.94	$0.005	0.022
3006	Electronics	ENERGY STAR Display	SF	All	ROB	66.20	61%	40.20	0.020	0.020	0.000	0%	0.000	5	$10.00	$0.00	$0.00	$0.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.77	$0.031	0.045
3007	Electronics	ENERGY STAR PC	SF	All	ROB	238.50	32%	77.00	0.023	0.023	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.63	$0.016	0.033
3008	Electronics	ENERGY STAR Laptop	SF	All	ROB	50.30	72%	35.97	0.004	0.004	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.39	$0.033	0.051
3009	Electronics	Smart Strip plug outlet	SF	All	NC	-	-	24.00	0.017	0.017	0.000	0%	0.000	5	$40.00	$0.00	$0.00	$0.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.39	$0.207	0.221
3010	Electronics	Advanced Power Strip Tier 2	SF	All	NC	602.08	51%	307.10	0.035	0.035	0.000	0%	0.000	8	$70.00	$0.00	$0.00	$0.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.77	$0.020	0.030
3011	Electronics	ENERGY STAR 6.0 TV (31-40")	SF	All	NC	170.63	41%	70.30	0.039	0.039	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (under 40" diameter category)	4.38	$0.015	0.028
3012	Electronics	ENERGY STAR 6.0 TV (over 60")	SF	All	NC	452.64	57%	255.80	0.140	0.140	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (over 40" diameter category)	15.92	$0.004	0.017
3013	Electronics	Efficient Set Top Box	SF	All	NC	274.80	58%	160.60	0.018	0.018	0.000	0%	0.000	4	$5.00	$0.00	$0.00	$0.00	Installation of efficient set top box in place of standard efficiency unit	9.94	$0.005	0.022
3014	Electronics	ENERGY STAR Display	SF	All	NC	66.20	61%	40.20	0.020	0.020	0.000	0%	0.000	5	$10.00	$0.00	$0.00	$0.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.77	$0.031	0.045
3015	Electronics	ENERGY STAR PC	SF	All	NC	238.50	32%	77.00	0.023	0.023	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.63	$0.016	0.033
3016	Electronics	ENERGY STAR Laptop	SF	All	NC	50.30	72%	35.97	0.004	0.004	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.39	$0.033	0.051
3017	Electronics	Smart Strip plug outlet	MF	All	RETRO	-	-	24.00	0.017	0.017	0.000	0%	0.000	5	$40.00	$0.00	$0.00	$0.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.39	$0.207	0.221
3018	Electronics	Advanced Power Strip Tier 2	MF	All	RETRO	602.08	51%	307.10	0.035	0.035	0.000	0%	0.000	8	$70.00	$0.00	$0.00	$0.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.77	$0.020	0.030
3019	Electronics	ENERGY STAR 6.0 TV (31-40")	MF	All	ROB	170.63	41%	70.30	0.039	0.039	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (under 40" diameter category)	4.38	$0.015	0.028
3020	Electronics	ENERGY STAR 6.0 TV (over 60")	MF	All	ROB	452.64	57%	255.80	0.140	0.140	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (over 40" diameter category)	15.92	$0.004	0.017
3021	Electronics	Efficient Set Top Box	MF	All	ROB	274.80	58%	160.60	0.018	0.018	0.000	0%	0.000	4	$5.00	$0.00	$0.00	$0.00	Installation of efficient set top box in place of standard efficiency unit	9.94	$0.005	0.022
3022	Electronics	ENERGY STAR Display	MF	All	ROB	66.20	61%	40.20	0.020	0.020	0.000	0%	0.000	5	$10.00	$0.00	$0.00	$0.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.77	$0.031	0.045
3023	Electronics	ENERGY STAR PC	MF	All	ROB	238.50	32%	77.00	0.023	0.023	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.63	$0.016	0.033
3024	Electronics	ENERGY STAR Laptop	MF	All	ROB	50.30	72%	35.97	0.004	0.004	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.39	$0.033	0.051
3025	Electronics	Smart Strip plug outlet	MF	All	NC	-	-	24.00	0.017	0.017	0.000	0%	0.000	5	$40.00	$0.00	$0.00	$0.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.39	$0.207	0.221
3026	Electronics	Advanced Power Strip Tier 2	MF	All	NC	602.08	51%	307.10	0.035	0.035	0.000	0%	0.000	8	$70.00	$0.00	$0.00	$0.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.77	$0.020	0.030
3027	Electronics	ENERGY STAR 6.0 TV (31-40")	MF	All	NC	170.63	41%	70.30	0.039	0.039	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (under 40" diameter category)	4.38	$0.015	0.028
3028	Electronics	ENERGY STAR 6.0 TV (over 60")	MF	All	NC	452.64	57%	255.80	0.140	0.140	0.000	0%	0.000	6	$10.00	$0.00	$0.00	$0.00	Installation of high efficiency replacement televisions (over 40" diameter category)	15.92	$0.004	0.017
3029	Electronics	Efficient Set Top Box	MF	All	NC	274.80	58%	160.60	0.018	0.018	0.000	0%	0.000	4	$5.00	$0.00	$0.00	$0.00	Installation of efficient set top box in place of standard efficiency unit	9.94	$0.005	0.022

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
3030	Electronics	ENERGY STAR Display	MF	All	NC	66.20	61%	40.20	0.020	0.020	0.000	0%	0.000	5	$10.00	$0.00	$0.00	$0.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.77	$0.031	0.045
3031	Electronics	ENERGY STAR PC	MF	All	NC	238.50	32%	77.00	0.023	0.023	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.63	$0.016	0.033
3032	Electronics	ENERGY STAR Laptop	MF	All	NC	50.30	72%	35.97	0.004	0.004	0.000	0%	0.000	4	$8.00	$0.00	$0.00	$0.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.39	$0.033	0.051
4001	Water Heating	Pipe Wrap - gas water heater	SF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.00		
4002	Water Heating	Pipe Wrap - electric water heater	SF	NLI	RETRO	385.00	67%	257.00	0.029	0.029	0.000	0%	0.000	20	$65.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	5.33	$0.013	0.018
4003	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	SF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	0.00		
4004	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	SF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	0.00		
4005	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	SF	NLI	RETRO	834.39	40%	333.76	0.038	0.038	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	7.39	$0.008	0.016
4006	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	SF	NLI	RETRO	834.39	60%	500.64	0.057	0.057	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	11.08	$0.005	0.014
4007	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	SF	NLI	RETRO	876.84	55%	478.28	0.055	0.055	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	38.10	$0.001	0.010
4008	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	SF	NLI	RETRO	125.04	55%	68.20	0.008	0.008	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.43	$0.010	0.019
4009	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	SF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	0.00		
4010	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	SF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.00		
4011	Water Heating	Pipe Wrap - gas water heater	SF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.00		
4012	Water Heating	Pipe Wrap - electric water heater	SF	LI	DI	385.00	67%	257.00	0.029	0.029	0.000	0%	0.000	20	$65.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	2.67	$0.025	0.031
4013	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	SF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	0.00		
4014	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	SF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	0.00		
4015	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	SF	LI	DI	834.39	40%	333.76	0.038	0.038	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	3.69	$0.015	0.024
4016	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	SF	LI	DI	834.39	60%	500.64	0.057	0.057	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	5.54	$0.010	0.019
4017	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	SF	LI	DI	876.84	55%	478.28	0.055	0.055	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	19.05	$0.003	0.011
4018	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	SF	LI	DI	125.04	55%	68.20	0.008	0.008	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	2.72	$0.020	0.029
4019	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	SF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	0.00		
4020	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	SF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.00		
4021	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	SF	All	RETRO	-	-	542.23	0.043	0.043	0.000	0%	0.000	10	$48.70	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.97	$0.007	0.015
4022	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	SF	All	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4023	Water Heating	Shower Start 2.0 gpm gas water heater	SF	All	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.00		
4024	Water Heating	Shower Start 2.0 gpm electric water heater	SF	All	RETRO	87.36	94%	82.12	0.009	0.009	0.000	0%	0.000	10	$38.20	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.63	$0.034	0.043
4025	Water Heating	Heat Pump Water Heaters, <= 55 gallons	SF	All	ROB	3696.00	52%	1913.00	0.218	0.218	0.000	0%	0.000	13	$1,100.00	$0.00	$0.00	$0.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.62	$0.036	0.043
4026	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	SF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4027	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	SF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4028	Water Heating	Instant Gas Water Heater	SF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.00		
4029	Water Heating	Solar Domestic Hot Water - electric water heater	SF	All	ROB	3696.00	56%	2059.00	0.600	0.600	0.000	0%	0.000	20	$4,500.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with electric water heating	0.74	$0.108	0.114
4030	Water Heating	Solar Domestic Hot Water - gas water heater	SF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with gas water heating	0.00		
4031	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	SF	All	RETRO	3696.00	6%	208.00	0.034	0.034	0.000	0%	0.000	20	$1,022.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with electric water heating	0.27	$0.244	0.250
4032	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	SF	All	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with gas water heating	0.00		
4033	Water Heating	Pipe Wrap - gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.00		
4034	Water Heating	Pipe Wrap - electric water heater	SF	All	NC	385.00	67%	257.00	0.029	0.029	0.000	0%	0.000	20	$65.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	5.33	$0.013	0.018
4035	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	0.00		
4036	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	0.00		
4037	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	SF	All	NC	834.39	40%	333.76	0.038	0.038	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	7.39	$0.008	0.016
4038	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	SF	All	NC	834.39	60%	500.64	0.057	0.057	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	11.08	$0.005	0.014
4039	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	SF	All	NC	876.84	55%	478.28	0.055	0.055	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	38.10	$0.001	0.010

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
4040	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	SF	All	NC	125.04	55%	68.20	0.008	0.008	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.43	$0.010	0.019
4041	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	0.00		
4042	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.00		
4043	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	SF	All	NC	-	-	542.23	0.043	0.043	0.000	0%	0.000	10	$48.70	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.97	$0.007	0.015
4044	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4045	Water Heating	Shower Start 2.0 gpm gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.00		
4046	Water Heating	Shower Start 2.0 gpm electric water heater	SF	All	NC	87.36	94%	82.12	0.009	0.009	0.000	0%	0.000	10	$38.20	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.63	$0.034	0.043
4047	Water Heating	Heat Pump Water Heaters, <= 55 gallons	SF	All	NC	3696.00	52%	1913.00	0.218	0.218	0.000	0%	0.000	13	$1,100.00	$0.00	$0.00	$0.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.62	$0.036	0.043
4048	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4049	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4050	Water Heating	Instant Gas Water Heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.00		
4051	Water Heating	Solar Domestic Hot Water - electric water heater	SF	All	NC	3696.00	56%	2059.00	0.600	0.600	0.000	0%	0.000	20	$4,500.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with electric water heating	0.74	$0.108	0.114
4052	Water Heating	Solar Domestic Hot Water - gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with gas water heating	0.00		
4053	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	SF	All	NC	3696.00	6%	208.00	0.034	0.034	0.000	0%	0.000	20	$1,022.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with electric water heating	0.27	$0.244	0.250
4054	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	SF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with gas water heating	0.00		
4055	Water Heating	Pipe Wrap - gas water heater	MF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.00		
4056	Water Heating	Pipe Wrap - electric water heater	MF	NLI	RETRO	385.00	67%	257.00	0.029	0.029	0.000	0%	0.000	20	$65.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	5.33	$0.013	0.018
4057	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	MF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	0.00		
4058	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	MF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	0.00		
4059	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	MF	NLI	RETRO	815.59	40%	326.23	0.037	0.037	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	7.22	$0.008	0.016
4060	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	MF	NLI	RETRO	815.59	60%	489.35	0.056	0.056	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	10.83	$0.005	0.014
4061	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	MF	NLI	RETRO	634.23	55%	345.95	0.039	0.039	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	27.56	$0.002	0.011
4062	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	MF	NLI	RETRO	129.02	55%	70.38	0.008	0.008	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.61	$0.010	0.018
4063	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	MF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	0.00		
4064	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	MF	NLI	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.00		
4065	Water Heating	Pipe Wrap - gas water heater	MF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.00		
4066	Water Heating	Pipe Wrap - electric water heater	MF	LI	DI	385.00	67%	257.00	0.029	0.029	0.000	0%	0.000	20	$65.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	2.67	$0.025	0.031
4067	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	MF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	0.00		
4068	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	MF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	0.00		
4069	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	MF	LI	DI	815.59	40%	326.23	0.037	0.037	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	3.61	$0.015	0.024
4070	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	MF	LI	DI	815.59	60%	489.35	0.056	0.056	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	5.41	$0.010	0.019
4071	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	MF	LI	DI	634.23	55%	345.95	0.039	0.039	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	13.78	$0.004	0.013
4072	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	MF	LI	DI	129.02	55%	70.38	0.008	0.008	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	2.80	$0.020	0.028
4073	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	MF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	0.00		
4074	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	MF	LI	DI	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.00		
4075	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	MF	All	RETRO	-	-	530.01	0.042	0.042	0.000	0%	0.000	10	$48.70	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.79	$0.007	0.015
4076	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	MF	All	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4077	Water Heating	Shower Start 2.0 gpm gas water heater	MF	All	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.00		
4078	Water Heating	Shower Start 2.0 gpm electric water heater	MF	All	RETRO	85.39	94%	80.27	0.009	0.009	0.000	0%	0.000	10	$38.20	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.59	$0.035	0.043
4079	Water Heating	Heat Pump Water Heaters, <= 55 gallons	MF	All	ROB	3111.00	52%	1610.00	0.184	0.184	0.000	0%	0.000	13	$1,100.00	$0.00	$0.00	$0.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.36	$0.042	0.050
4080	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	MF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4081	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	MF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4082	Water Heating	Instant Gas Water Heater	MF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.00		

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
4083	Water Heating	Solar Domestic Hot Water - electric water heater	MF	All	ROB	3111.00	66%	2059.00	0.600	0.600	0.000	0%	0.000	20	$4,500.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with electric water heating	0.74	$0.108	0.114
4084	Water Heating	Solar Domestic Hot Water - gas water heater	MF	All	ROB	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with gas water heating	0.00		
4085	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	MF	All	RETRO	3111.00	4%	134.93	0.022	0.022	0.000	0%	0.000	20	$1,022.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with electric water heating	0.18	$0.376	0.382
4086	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	MF	All	RETRO	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with gas water heating	0.00		
4087	Water Heating	Pipe Wrap - gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.00		
4088	Water Heating	Pipe Wrap - electric water heater	MF	All	NC	385.00	67%	257.00	0.029	0.029	0.000	0%	0.000	20	$65.00	$0.00	$0.00	$0.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	5.33	$0.013	0.018
4089	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	0.00		
4090	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	0.00		
4091	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	MF	All	NC	815.59	40%	326.23	0.037	0.037	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	7.22	$0.008	0.016
4092	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	MF	All	NC	815.59	60%	489.35	0.056	0.056	0.000	0%	0.000	10	$34.20	$0.00	$0.00	$0.00	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	10.83	$0.005	0.014
4093	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	MF	All	NC	634.23	55%	345.95	0.039	0.039	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	27.56	$0.002	0.011
4094	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	MF	All	NC	129.02	55%	70.38	0.008	0.008	0.000	0%	0.000	10	$9.50	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.61	$0.010	0.018
4095	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	0.00		
4096	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.00		
4097	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	MF	All	NC	-	-	530.01	0.042	0.042	0.000	0%	0.000	10	$48.70	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.79	$0.007	0.015
4098	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4099	Water Heating	Shower Start 2.0 gpm gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.00		
4100	Water Heating	Shower Start 2.0 gpm electric water heater	MF	All	NC	85.39	94%	80.27	0.009	0.009	0.000	0%	0.000	10	$38.20	$0.00	$0.00	$0.00	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.59	$0.035	0.043
4101	Water Heating	Heat Pump Water Heaters, <= 55 gallons	MF	All	NC	3111.00	52%	1610.00	0.184	0.184	0.000	0%	0.000	13	$1,100.00	$0.00	$0.00	$0.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.36	$0.042	0.050
4102	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4103	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.00		
4104	Water Heating	Instant Gas Water Heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.00		
4105	Water Heating	Solar Domestic Hot Water - electric water heater	MF	All	NC	3111.00	66%	2059.00	0.600	0.600	0.000	0%	0.000	20	$4,500.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with electric water heating	0.74	$0.108	0.114
4106	Water Heating	Solar Domestic Hot Water - gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a solar domestic water heater in homes with gas water heating	0.00		
4107	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	MF	All	NC	3111.00	4%	134.93	0.022	0.022	0.000	0%	0.000	20	$1,022.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with electric water heating	0.18	$0.376	0.382
4108	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	MF	All	NC	0.00	0%	0.00	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing a gravity film heat exchanger in homes with gas water heating	0.00		
5001	HVAC Shell	Infiltration reduction - 30%	SF	NLI	RETRO	-	-	59.57	0.063	0.100	-	-	8.113	13	$202.68	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	3.30	$0.056	0.063
5002	HVAC Shell	Infiltration reduction - 50%	SF	NLI	RETRO	-	-	100.49	0.111	0.176	-	-	13.507	13	$202.68	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	5.56	$0.034	0.042
5003	HVAC Shell	Crawlspace Wall Insulation	SF	NLI	RETRO	-	-	-44.60	-0.027	-0.027	-	-	3.205	25	$552.11	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and central AC	0.29	$0.000	0.005
5004	HVAC Shell	Basement Wall Insulation	SF	NLI	RETRO	-	-	-40.32	-0.059	-0.064	-	-	9.620	25	$1,104.21	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.60	$0.000	0.005
5005	HVAC Shell	Floor Insulation	SF	NLI	RETRO	-	-	-68.68	-0.030	-0.030	-	-	5.824	25	$874.23	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and central AC	0.42	$0.000	0.005
5006	HVAC Shell	Wall Insulation	SF	NLI	RETRO	-	-	102.14	0.078	0.088	-	-	11.496	25	$3,041.11	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and central AC	0.48	$0.354	0.359
5007	HVAC Shell	R-38 Roof Insulation	SF	NLI	RETRO	-	-	41.70	0.045	0.053	-	-	4.651	20	$1,656.22	$0.00	$0.00	$0.00	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and central AC	0.33	$0.617	0.623
5008	HVAC Shell	R-60 Roof Insulation	SF	NLI	RETRO	-	-	57.89	0.064	0.074	-	-	6.549	20	$3,573.96	$0.00	$0.00	$0.00	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and central AC	0.22	$0.959	0.964
5009	HVAC Shell	Infiltration reduction - 30%	SF	NLI	RETRO	-	-	35.81	0.000	0.000	-	-	8.387	13	$202.68	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with gas heating and no central AC	2.63	$0.017	0.024
5010	HVAC Shell	Infiltration reduction - 50%	SF	NLI	RETRO	-	-	59.62	0.000	0.000	-	-	13.983	13	$202.68	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	4.38	$0.010	0.017
5011	HVAC Shell	Crawlspace Wall Insulation	SF	NLI	RETRO	-	-	12.33	0.000	0.000	-	-	4.246	25	$552.11	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and no central AC	0.74	$0.068	0.074
5012	HVAC Shell	Basement Wall Insulation	SF	NLI	RETRO	-	-	36.24	0.000	0.000	-	-	10.171	25	$1,104.21	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.90	$0.057	0.062
5013	HVAC Shell	Floor Insulation	SF	NLI	RETRO	-	-	23.14	0.000	0.000	-	-	4.863	25	$874.23	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and no central AC	0.55	$0.092	0.098
5014	HVAC Shell	Wall Insulation	SF	NLI	RETRO	-	-	47.98	0.000	0.000	-	-	11.794	25	$3,041.11	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and no central AC	0.38	$0.134	0.139
5015	HVAC Shell	R-38 Roof Insulation	SF	NLI	RETRO	-	-	19.49	0.000	0.000	-	-	5.117	20	$1,656.22	$0.00	$0.00	$0.00	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and no central AC	0.26	$0.183	0.189
5016	HVAC Shell	R-60 Roof Insulation	SF	NLI	RETRO	-	-	27.31	0.000	0.000	-	-	7.062	20	$3,573.96	$0.00	$0.00	$0.00	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and no central AC	0.17	$0.286	0.291
5017	HVAC Shell	Infiltration reduction - 30%	SF	NLI	RETRO	-	-	1850.36	0.100	0.063	-	-	0.000	13	$202.68	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with electric heating and central AC	8.05	$0.007	0.014
5018	HVAC Shell	Infiltration reduction - 50%	SF	NLI	RETRO	-	-	3072.98	0.111	0.176	-	-	0.000	13	$202.68	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	12.80	$0.004	0.011

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
5019	HVAC Shell	Crawlspace Wall Insulation	SF	NLI	RETRO	-	-	652.89	-0.027	-0.027	-	-	0.000	25	$552.11	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and electric heating and central AC	1.24	$0.038	0.044
5020	HVAC Shell	Basement Wall Insulation	SF	NLI	RETRO	-	-	2065.31	-0.059	-0.064	-	-	0.000	25	$1,104.21	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	2.03	$0.024	0.030
5021	HVAC Shell	Floor Insulation	SF	NLI	RETRO	-	-	1222.96	-0.030	-0.030	-	-	0.000	25	$874.23	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and electric heating and central AC	1.54	$0.032	0.038
5022	HVAC Shell	Wall Insulation	SF	NLI	RETRO	-	-	2632.01	0.078	0.088	-	-	0.000	25	$3,041.11	$0.00	$0.00	$0.00	Installing wall insulation in homes with electric heating and central AC	1.11	$0.053	0.058
5023	HVAC Shell	R-38 Roof Insulation	SF	NLI	RETRO	-	-	1056.63	0.045	0.053	-	-	0.005	20	$1,656.22	$0.00	$0.00	$0.00	Installing R-38 roof insulation in homes with poor attic insulation and electric heating and central AC	0.74	$0.078	0.083
5024	HVAC Shell	R-60 Roof Insulation	SF	NLI	RETRO	-	-	1486.29	0.064	0.074	-	-	0.005	20	$3,573.96	$0.00	$0.00	$0.00	Installing R-60 roof insulation in homes with mediocre attic insulation and electric heating and central AC	0.48	$0.119	0.125
5025	HVAC Shell	Infiltration reduction - 50%	SF	LI	DI	-	-	100.49	0.111	0.176	-	-	13.507	13	$202.68	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	2.78	$0.069	0.076
5026	HVAC Shell	Crawlspace Wall Insulation	SF	LI	DI	-	-	-44.60	-0.027	-0.027	-	-	3.205	25	$552.11	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and central AC	0.14	$0.000	0.005
5027	HVAC Shell	Basement Wall Insulation	SF	LI	DI	-	-	-40.32	-0.059	-0.064	-	-	9.620	25	$1,104.21	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.30	$0.000	0.005
5028	HVAC Shell	Floor Insulation	SF	LI	DI	-	-	-68.68	-0.030	-0.030	-	-	5.824	25	$874.23	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and central AC	0.21	$0.000	0.005
5029	HVAC Shell	Wall Insulation	SF	LI	DI	-	-	102.14	0.078	0.088	-	-	11.496	25	$3,041.11	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and central AC	0.24	$0.708	0.713
5030	HVAC Shell	R-38 Roof Insulation	SF	LI	DI	-	-	41.70	0.045	0.053	-	-	4.651	20	$1,656.22	$0.00	$0.00	$0.00	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and central AC	0.17	$1.234	1.239
5031	HVAC Shell	R-60 Roof Insulation	SF	LI	DI	-	-	57.89	0.064	0.074	-	-	6.549	20	$3,573.96	$0.00	$0.00	$0.00	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and central AC	0.11	$1.917	1.923
5032	HVAC Shell	Infiltration reduction - 50%	SF	LI	DI	-	-	59.62	0.000	0.000	-	-	13.983	13	$202.68	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	2.19	$0.021	0.028
5033	HVAC Shell	Crawlspace Wall Insulation	SF	LI	DI	-	-	12.33	0.000	0.000	-	-	4.246	25	$552.11	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and no central AC	0.37	$0.137	0.142
5034	HVAC Shell	Basement Wall Insulation	SF	LI	DI	-	-	36.24	0.000	0.000	-	-	10.171	25	$1,104.21	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.45	$0.113	0.118
5035	HVAC Shell	Floor Insulation	SF	LI	DI	-	-	23.14	0.000	0.000	-	-	4.863	25	$874.23	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and no central AC	0.27	$0.185	0.190
5036	HVAC Shell	Wall Insulation	SF	LI	DI	-	-	47.98	0.000	0.000	-	-	11.794	25	$3,041.11	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and no central AC	0.19	$0.267	0.272
5037	HVAC Shell	R-38 Roof Insulation	SF	LI	DI	-	-	19.49	0.000	0.000	-	-	5.117	20	$1,656.22	$0.00	$0.00	$0.00	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and no central AC	0.13	$0.366	0.371
5038	HVAC Shell	R-60 Roof Insulation	SF	LI	DI	-	-	27.31	0.000	0.000	-	-	7.062	20	$3,573.96	$0.00	$0.00	$0.00	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and no central AC	0.08	$0.571	0.577
5039	HVAC Shell	Infiltration reduction - 50%	SF	LI	DI	-	-	3072.98	0.111	0.176	-	-	0.000	13	$202.68	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	6.40	$0.008	0.015
5040	HVAC Shell	Crawlspace Wall Insulation	SF	LI	DI	-	-	652.89	-0.027	-0.027	-	-	0.000	25	$552.11	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and electric heating and central AC	0.62	$0.077	0.082
5041	HVAC Shell	Basement Wall Insulation	SF	LI	DI	-	-	2065.31	-0.059	-0.064	-	-	0.000	25	$1,104.21	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	1.02	$0.049	0.054
5042	HVAC Shell	Floor Insulation	SF	LI	DI	-	-	1222.96	-0.030	-0.030	-	-	0.000	25	$874.23	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and electric heating and central AC	0.77	$0.065	0.070
5043	HVAC Shell	Wall Insulation	SF	LI	DI	-	-	2632.01	0.078	0.088	-	-	0.000	25	$3,041.11	$0.00	$0.00	$0.00	Installing wall insulation in homes with electric heating and central AC	0.55	$0.105	0.110
5044	HVAC Shell	R-38 Roof Insulation	SF	LI	DI	-	-	1056.63	0.045	0.053	-	-	0.005	20	$1,656.22	$0.00	$0.00	$0.00	Installing R-38 roof insulation in homes with poor attic insulation and electric heating and central AC	0.37	$0.155	0.161
5045	HVAC Shell	R-60 Roof Insulation	SF	LI	DI	-	-	1486.29	0.064	0.074	-	-	0.005	20	$3,573.96	$0.00	$0.00	$0.00	Installing R-60 roof insulation in homes with mediocre attic insulation and electric heating and central AC	0.24	$0.239	0.244
5046	HVAC Shell	Duct Insulation	SF	All	RETRO	-	-	-3.66	0.021	0.023	-	-	2.520	20	$405.36	$0.00	$0.00	$0.00	Adding duct insulation in homes with gas heating and central AC	0.65	-$1.182	-1.176
5047	HVAC Shell	Duct location	SF	All	RETRO	-	-	69.27	0.070	0.081	-	-	8.927	30	$1,266.75	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	1.00	$0.216	0.221
5048	HVAC Shell	Duct sealing 15% leakage base	SF	All	RETRO	-	-	18.88	0.025	0.033	-	-	1.025	18	$364.52	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	0.45	$0.524	0.530
5049	HVAC Shell	Duct sealing 30% leakage base	SF	All	RETRO	-	-	55.91	0.064	0.081	-	-	2.627	18	$364.52	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	1.17	$0.180	0.186
5050	HVAC Shell	Door weatherstripping	SF	All	RETRO	-	-	6.95	0.000	0.000	-	-	0.472	5	$86.00	$0.00	$0.00	$0.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.18	$0.237	0.252
5051	HVAC Shell	R0 to R19 kneewalls	SF	All	RETRO	-	-	72.29	0.077	0.086	-	-	7.516	20	$172.53	$0.00	$0.00	$0.00	Installing R19 kneewall insulation in homes with no kneewall insulation in homes with gas heating and central AC	5.28	$0.039	0.044
5052	HVAC Shell	R6 to R19 kneewalls	SF	All	RETRO	-	-	23.91	0.025	0.028	-	-	3.056	20	$162.53	$0.00	$0.00	$0.00	Installing R19 kneewall insulation in homes with R6 kneewall insulation in homes with gas heating and central AC	2.12	$0.093	0.099
5053	HVAC Shell	Rim Joist Insulation	SF	All	RETRO	-	-	35.01	0.024	0.028	-	-	3.805	25	$191.84	$0.00	$0.00	$0.00	Installing rim joist insulation in homes with gas heating and central AC	2.49	$0.064	0.069
5054	HVAC Shell	Window Film	SF	All	RETRO	-	-	372.22	0.335	0.390	-	-	-9.140	10	$389.69	$0.00	$0.00	$0.00	Installing window film on inefficient existing windows in homes with gas heating and central AC	0.91	$0.077	0.085
5055	HVAC Shell	Window Replacement	SF	All	ROB	-	-	317.96	0.332	0.374	-	-	13.421	25	$1,085.93	$0.00	$0.00	$0.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and central AC	2.52	$0.084	0.089
5056	HVAC Shell	Original double hung window with low U storm	SF	All	RETRO	-	-	738.72	0.742	0.863	-	-	28.169	25	$3,800.25	$0.00	$0.00	$0.00	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and central AC	1.57	$0.131	0.136
5057	HVAC Shell	Duct Insulation	SF	All	RETRO	-	-	-15.74	0.000	0.000	-	-	2.524	20	$405.36	$0.00	$0.00	$0.00	Adding duct insulation in homes with gas heating and no central AC	0.47	$0.000	0.006
5058	HVAC Shell	Duct location	SF	All	RETRO	-	-	11.41	0.000	0.000	-	-	10.457	30	$1,266.75	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and no central AC	0.86	$0.062	0.067
5059	HVAC Shell	Duct sealing 15% leakage base	SF	All	RETRO	-	-	5.16	0.000	0.000	-	-	1.031	18	$364.52	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with gas heating and no central AC	0.23	$0.207	0.213
5060	HVAC Shell	Duct sealing 30% leakage base	SF	All	RETRO	-	-	16.43	0.000	0.000	-	-	2.626	18	$364.52	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with gas heating and no central AC	0.59	$0.080	0.086
5061	HVAC Shell	R0 to R19 kneewalls	SF	All	RETRO	-	-	31.41	0.000	0.000	-	-	7.761	20	$172.53	$0.00	$0.00	$0.00	Installing R19 kneewall insulation in homes with no kneewall insulation in homes with gas heating and no central AC	3.85	$0.013	0.018
5062	HVAC Shell	R6 to R19 kneewalls	SF	All	RETRO	-	-	11.52	0.000	0.000	-	-	3.104	20	$162.53	$0.00	$0.00	$0.00	Installing R19 kneewall insulation in homes with R6 kneewall insulation in homes with gas heating and no central AC	1.63	$0.030	0.035
5063	HVAC Shell	Rim Joist Insulation	SF	All	RETRO	-	-	0.00	0.000	0.000	-	-	3.881	25	$191.84	$0.00	$0.00	$0.00	Installing rim joist insulation in homes with gas heating and no central AC	1.89		
5064	HVAC Shell	Window Film	SF	All	RETRO	-	-	-42.27	0.000	0.000	-	-	-9.169	10	$389.69	$0.00	$0.00	$0.00	Installing window film on inefficient existing windows in homes with gas heating and no central AC	-1.22	-$0.676	-0.668

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
5065	HVAC Shell	Window Replacement	SF	All	ROB	-	-	57.10	0.000	0.000	-	-	13.750	25	$1,085.93	$0.00	$0.00	$0.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and no central AC	1.24	$0.041	0.046
5066	HVAC Shell	Original double hung window with low U storm	SF	All	RETRO	-	-	160.41	0.000	0.000	-	-	28.158	25	$3,800.25	$0.00	$0.00	$0.00	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and no central AC	0.74	$0.069	0.074
5067	HVAC Shell	HW pipe insulation	SF	All	RETRO	-	-	0.00	0.000	0.000	-	-	0.000	11	$1,404.58	$0.00	$0.00	$0.00	Installing hot water pipe insulation on boiler pipes in homes with boilers	0.00		
5068	HVAC Shell	Steam pipe insulation	SF	All	RETRO	-	-	0.00	0.000	0.000	-	-	0.000	11	$1,404.58	$0.00	$0.00	$0.00	Installing steam pipe insulation on boiler pipes in homes with boilers	0.00		
5069	HVAC Shell	Duct Insulation	SF	All	RETRO	-	-	598.17	0.021	0.023	-	-	0.000	20	$405.36	$0.00	$0.00	$0.00	Adding duct insulation in homes with electric heating and central AC	1.67	$0.034	0.039
5070	HVAC Shell	Duct location	SF	All	RETRO	-	-	2433.90	0.082	0.094	-	-	0.000	30	$1,266.75	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with electric heating and central AC	2.76	$0.022	0.027
5071	HVAC Shell	Duct sealing 15% leakage base	SF	All	RETRO	-	-	265.53	0.025	0.033	-	-	0.000	18	$364.52	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with electric heating and central AC	0.88	$0.071	0.078
5072	HVAC Shell	Duct sealing 30% leakage base	SF	All	RETRO	-	-	687.29	0.064	0.081	-	-	0.000	18	$364.52	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with electric heating and central AC	2.28	$0.028	0.034
5073	HVAC Shell	R0 to R19 kneewalls	SF	All	RETRO	-	-	1756.71	0.078	0.087	-	-	0.002	20	$172.53	$0.00	$0.00	$0.00	Installing R19 kneewall insulation in homes with no kneewall insulation in homes with electric heating and central AC	11.79	$0.005	0.011
5074	HVAC Shell	R6 to R19 kneewalls	SF	All	RETRO	-	-	569.84	0.025	0.028	-	-	0.590	20	$162.53	$0.00	$0.00	$0.00	Installing R19 kneewall insulation in homes with R6 kneewall insulation in homes with electric heating and central AC	4.34	$0.013	0.019
5075	HVAC Shell	Rim Joist Insulation	SF	All	RETRO	-	-	878.21	0.024	0.028	-	-	0.000	25	$191.84	$0.00	$0.00	$0.00	Installing rim joist insulation in homes with electric heating and central AC	5.83	$0.010	0.015
5076	HVAC Shell	Window Film	SF	All	RETRO	-	-	-1568.09	0.335	0.390	-	-	-0.024	10	$389.69	$0.00	$0.00	$0.00	Installing window film on inefficient existing windows in homes with electric heating and central AC	-1.05	-$0.018	-0.010
5077	HVAC Shell	Window Replacement	SF	All	ROB	-	-	3297.79	0.332	0.374	-	-	0.000	25	$1,085.93	$0.00	$0.00	$0.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with electric heating and central AC	4.60	$0.015	0.020
5078	HVAC Shell	Original double hung window with low U storm	SF	All	RETRO	-	-	7013.57	0.742	0.863	-	-	0.000	25	$3,800.25	$0.00	$0.00	$0.00	Retrofitting inefficient windows with efficient alternatives in homes with electric heating and central AC	2.83	$0.025	0.030
5079	HVAC Shell	Infiltration reduction - 30%	SF	All	NC	-	-	28.69	0.018	0.029	-	-	4.232	13	$33.78	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	9.34	$0.014	0.021
5080	HVAC Shell	Infiltration reduction - 50%	SF	All	NC	-	-	47.46	0.030	0.048	-	-	7.055	13	$33.78	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	15.57	$0.008	0.016
5081	HVAC Shell	Duct Insulation	SF	All	NC	-	-	2.76	0.024	0.026	-	-	1.870	20	$168.90	$0.00	$0.00	$0.00	Adding duct insulation in homes with gas heating and central AC	1.33	$0.976	0.981
5082	HVAC Shell	Duct location	SF	All	NC	-	-	53.72	0.047	0.054	-	-	7.423	30	$1,266.75	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	0.79	$0.244	0.249
5083	HVAC Shell	Duct sealing 15% leakage base	SF	All	NC	-	-	9.519	0.014	0.019	-	-	0.380	18	$56.30	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	1.36	$0.192	0.198
5084	HVAC Shell	Duct sealing 30% leakage base	SF	All	NC	-	-	26.729	0.034	0.041	-	-	1.015	18	$56.30	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	3.46	$0.066	0.072
5085	HVAC Shell	Door weatherstripping	SF	All	NC	-	-	0.000	0.000	0.000	-	-	0.000	5	$26.00	$0.00	$0.00	$0.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.00		
5086	HVAC Shell	Basement Wall Insulation	SF	All	NC	-	-	-2.885	-0.014	-0.025	-	-	4.006	25	$437.37	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.74	$0.000	0.005
5087	HVAC Shell	Floor Insulation	SF	All	NC	-	-	-6.530	-0.002	-0.002	-	-	0.721	25	$346.27	$0.00	$0.00	$0.00	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and central AC	0.16	$0.000	0.005
5088	HVAC Shell	Crawlspace Wall Insulation	SF	All	NC	-	-	-2.334	0.000	0.000	-	-	0.073	25	$218.68	$0.00	$0.00	$0.00	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and central AC	0.02	$0.000	0.005
5089	HVAC Shell	Wall Insulation	SF	All	NC	-	-	33.810	0.014	0.027	-	-	3.370	25	$349.57	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and central AC	1.15	$0.102	0.107
5090	HVAC Shell	Window Film	SF	All	NC	-	-	99.380	0.057	0.066	-	-	-2.151	10	$227.74	$0.00	$0.00	$0.00	Installing window film on windows in homes with gas heating and central AC	0.23	$0.168	0.177
5091	HVAC Shell	Window Replacement	SF	All	NC	-	-	75.528	0.002	0.103	-	-	1.429	25	$1,085.93	$0.00	$0.00	$0.00	Installing efficient windows in homes with gas heating and central AC	0.21	$0.274	0.279
5092	HVAC Shell	Infiltration reduction - 30%	MF	NLI	RETRO	-	-	33.415	0.049	0.072	-	-	4.383	13	$111.36	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	3.53	$0.067	0.075
5093	HVAC Shell	Infiltration reduction - 50%	MF	NLI	RETRO	-	-	56.672	0.082	0.123	-	-	7.330	13	$111.36	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	5.92	$0.040	0.047
5094	HVAC Shell	Basement Wall Insulation	MF	NLI	RETRO	-	-	-22.788	-0.025	-0.033	-	-	5.093	25	$640.44	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.57	$0.000	0.005
5095	HVAC Shell	Wall Insulation	MF	NLI	RETRO	-	-	43.987	0.034	0.043	-	-	6.726	25	$1,670.90	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and central AC	0.48	$0.359	0.364
5096	HVAC Shell	Roof Insulation	MF	NLI	RETRO	-	-	52.178	0.042	0.043	-	-	4.599	25	$702.45	$0.00	$0.00	$0.00	Installing roof insulation in homes with gas heating and central AC	0.90	$0.196	0.201
5097	HVAC Shell	Infiltration reduction - 30%	MF	NLI	RETRO	-	-	17.742	0.000	0.000	-	-	4.244	13	$111.36	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with gas heating and no central AC	2.42	$0.019	0.026
5098	HVAC Shell	Infiltration reduction - 50%	MF	NLI	RETRO	-	-	29.200	0.000	0.000	-	-	7.098	13	$111.36	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	4.04	$0.011	0.018
5099	HVAC Shell	Basement Wall Insulation	MF	NLI	RETRO	-	-	19.210	0.000	0.000	-	-	5.389	25	$640.44	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.82	$0.062	0.067
5100	HVAC Shell	Wall Insulation	MF	NLI	RETRO	-	-	25.927	0.000	0.000	-	-	6.157	25	$1,670.90	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and no central AC	0.36	$0.140	0.146
5101	HVAC Shell	Roof Insulation	MF	NLI	RETRO	-	-	17.731	0.000	0.000	-	-	4.638	25	$702.45	$0.00	$0.00	$0.00	Installing roof insulation in homes with gas heating and no central AC	0.65	$0.079	0.084
5102	HVAC Shell	Infiltration reduction - 30%	MF	NLI	RETRO	-	-	928.818	0.049	0.074	-	-	0.000	13	$111.36	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with electric heating and central AC	7.34	$0.007	0.015
5103	HVAC Shell	Infiltration reduction - 50%	MF	NLI	RETRO	-	-	1547.467	0.083	0.124	-	-	0.000	13	$111.36	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	12.25	$0.004	0.012
5104	HVAC Shell	Basement Wall Insulation	MF	NLI	RETRO	-	-	1044.730	-0.025	-0.033	-	-	0.000	25	$640.44	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	1.80	$0.028	0.033
5105	HVAC Shell	Wall Insulation	MF	NLI	RETRO	-	-	1407.665	0.035	0.044	-	-	0.000	25	$1,670.90	$0.00	$0.00	$0.00	Installing wall insulation in homes with electric heating and central AC	1.06	$0.054	0.059
5106	HVAC Shell	Roof Insulation	MF	NLI	RETRO	-	-	1006.409	0.038	0.048	-	-	0.000	25	$702.45	$0.00	$0.00	$0.00	Installing roof insulation in homes with electric heating and central AC	1.87	$0.032	0.037
5107	HVAC Shell	Infiltration reduction - 50%	MF	LI	DI	-	-	56.672	0.082	0.123	-	-	7.330	13	$111.36	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	2.96	$0.080	0.087
5108	HVAC Shell	Basement Wall Insulation	MF	LI	DI	-	-	-22.788	-0.025	-0.033	-	-	5.093	25	$640.44	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.29	$0.000	0.005
5109	HVAC Shell	Wall Insulation	MF	LI	DI	-	-	43.987	0.034	0.043	-	-	6.726	25	$1,670.90	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and central AC	0.24	$0.718	0.723
5110	HVAC Shell	Roof Insulation	MF	LI	DI	-	-	52.178	0.042	0.043	-	-	4.599	25	$702.45	$0.00	$0.00	$0.00	Installing roof insulation in homes with gas heating and central AC	0.45	$0.391	0.397
5111	HVAC Shell	Infiltration reduction - 50%	MF	LI	DI	-	-	29.200	0.000	0.000	-	-	7.098	13	$111.36	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	2.02	$0.022	0.030
5112	HVAC Shell	Basement Wall Insulation	MF	LI	DI	-	-	19.210	0.000	0.000	-	-	5.389	25	$640.44	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.41	$0.124	0.129

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
5113	HVAC Shell	Wall Insulation	MF	LI	DI	-	-	25.927	0.000	0.000	-	-	6.157	25	$1,670.90	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and no central AC	0.18	$0.281	0.286
5114	HVAC Shell	Roof Insulation	MF	LI	DI	-	-	17.731	0.000	0.000	-	-	4.638	25	$702.45	$0.00	$0.00	$0.00	Installing roof insulation in homes with gas heating and no central AC	0.32	$0.157	0.163
5115	HVAC Shell	Infiltration reduction - 50%	MF	LI	DI	-	-	1547.467	0.083	0.124	-	-	0.000	13	$111.36	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	6.13	$0.009	0.016
5116	HVAC Shell	Basement Wall Insulation	MF	LI	DI	-	-	1044.730	-0.025	-0.033	-	-	0.000	25	$640.44	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	0.90	$0.056	0.061
5117	HVAC Shell	Wall Insulation	MF	LI	DI	-	-	1407.665	0.035	0.044	-	-	0.000	25	$1,670.90	$0.00	$0.00	$0.00	Installing wall insulation in homes with electric heating and central AC	0.53	$0.108	0.113
5118	HVAC Shell	Roof Insulation	MF	LI	DI	-	-	1006.409	0.038	0.048	-	-	0.000	25	$702.45	$0.00	$0.00	$0.00	Installing roof insulation in homes with electric heating and central AC	0.94	$0.063	0.069
5119	HVAC Shell	Duct Insulation	MF	All	RETRO	-	-	40.741	0.069	0.076	-	-	2.855	20	$222.72	$0.00	$0.00	$0.00	Adding duct insulation in homes with gas heating and central AC	2.13	$0.138	0.144
5120	HVAC Shell	Duct location	MF	All	RETRO	-	-	81.515	0.136	0.162	-	-	5.754	30	$696.00	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	1.73	$0.186	0.191
5121	HVAC Shell	Duct sealing 15% leakage base	MF	All	RETRO	-	-	15.232	0.016	0.018	-	-	0.897	18	$200.28	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	0.63	$0.313	0.319
5122	HVAC Shell	Duct sealing 30% leakage base	MF	All	RETRO	-	-	41.101	0.044	0.050	-	-	2.391	18	$200.28	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	1.70	$0.118	0.124
5123	HVAC Shell	Door weatherstripping	MF	All	RETRO	-	-	4.497	0.002	0.003	-	-	0.268	5	$43.00	$0.00	$0.00	$0.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.26	$0.408	0.422
5124	HVAC Shell	Window Film	MF	All	RETRO	-	-	453.925	0.460	0.475	-	-	-9.957	10	$214.11	$0.00	$0.00	$0.00	Installing window film on inefficient existing windows in homes with gas heating and central AC	2.69	$0.035	0.043
5125	HVAC Shell	Window Replacement	MF	All	ROB	-	-	159.225	0.157	0.175	-	-	6.847	25	$596.65	$0.00	$0.00	$0.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and central AC	2.26	$0.090	0.095
5126	HVAC Shell	Original double hung window with low U storm	MF	All	RETRO	-	-	721.366	0.698	0.776	-	-	53.349	25	$2,088.00	$0.00	$0.00	$0.00	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and central AC	3.91	$0.051	0.056
5127	HVAC Shell	Duct Insulation	MF	All	RETRO	-	-	0.168	0.000	0.000	-	-	2.855	20	$222.72	$0.00	$0.00	$0.00	Adding duct insulation in homes with gas heating and no central AC	1.05	$0.046	0.052
5128	HVAC Shell	Duct location	MF	All	RETRO	-	-	6.266	0.000	0.000	-	-	5.755	30	$696.00	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and no central AC	0.86	$0.062	0.067
5129	HVAC Shell	Duct sealing 15% leakage base	MF	All	RETRO	-	-	4.273	0.000	0.000	-	-	0.897	18	$200.28	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with gas heating and no central AC	0.36	$0.131	0.137
5130	HVAC Shell	Duct sealing 30% leakage base	MF	All	RETRO	-	-	11.800	0.000	0.000	-	-	2.391	18	$200.28	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with gas heating and no central AC	0.96	$0.049	0.055
5131	HVAC Shell	Window Film	MF	All	RETRO	-	-	-42.322	0.000	0.000	-	-	-9.957	10	$214.11	$0.00	$0.00	$0.00	Installing window film on inefficient existing windows in homes with gas heating and no central AC	-2.40	-$0.371	-0.363
5132	HVAC Shell	Window Replacement	MF	All	ROB	-	-	27.397	0.000	0.000	-	-	6.605	25	$596.65	$0.00	$0.00	$0.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and no central AC	1.09	$0.047	0.052
5133	HVAC Shell	Original double hung window with low U storm	MF	All	RETRO	-	-	301.267	0.016	0.018	-	-	53.346	25	$2,088.00	$0.00	$0.00	$0.00	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and no central AC	2.58	$0.023	0.028
5134	HVAC Shell	Duct Insulation	MF	All	RETRO	-	-	687.864	0.069	0.076	-	-	0.000	20	$222.72	$0.00	$0.00	$0.00	Adding duct insulation in homes with electric heating and central AC	4.07	$0.016	0.022
5135	HVAC Shell	Duct location	MF	All	RETRO	-	-	1380.144	0.136	0.162	-	-	0.000	30	$696.00	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with electric heating and central AC	3.32	$0.022	0.027
5136	HVAC Shell	Duct sealing 15% leakage base	MF	All	RETRO	-	-	218.837	0.016	0.018	-	-	0.000	18	$200.28	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with electric heating and central AC	1.27	$0.048	0.054
5137	HVAC Shell	Duct sealing 30% leakage base	MF	All	RETRO	-	-	585.103	0.044	0.050	-	-	0.000	18	$200.28	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with electric heating and central AC	3.40	$0.018	0.024
5138	HVAC Shell	Window Film	MF	All	RETRO	-	-	-1459.184	0.457	0.478	-	-	0.000	10	$214.11	$0.00	$0.00	$0.00	Installing window film on inefficient existing windows in homes with electric heating and central AC	-0.63	-$0.011	-0.002
5139	HVAC Shell	Window Replacement	MF	All	ROB	-	-	1867.908	0.203	0.229	-	-	0.000	25	$596.65	$0.00	$0.00	$0.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with electric heating and central AC	4.82	$0.015	0.020
5140	HVAC Shell	Original double hung window with low U storm	MF	All	RETRO	-	-	9753.798	0.698	0.776	-	-	0.000	25	$2,088.00	$0.00	$0.00	$0.00	Retrofitting inefficient windows with efficient alternatives in homes with electric heating and central AC	6.63	$0.010	0.015
5141	HVAC Shell	Infiltration reduction - 30%	MF	All	NC	-	-	20.020	0.030	0.039	-	-	2.769	13	$18.56	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	13.20	$0.018	0.025
5142	HVAC Shell	Infiltration reduction - 50%	MF	All	NC	-	-	33.871	0.051	0.066	-	-	4.647	13	$18.56	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	22.28	$0.011	0.018
5143	HVAC Shell	Airtight Can Lights	MF	All	NC	-	-	14.141	0.020	0.027	-	-	1.946	15	$150.00	$0.00	$0.00	$0.00	Installing air can lights to reduce infiltration in homes with gas heating and central AC	1.26	$0.188	0.195
5144	HVAC Shell	Duct Insulation	MF	All	NC	-	-	52.013	0.082	0.092	-	-	2.537	20	$92.80	$0.00	$0.00	$0.00	Adding duct insulation in homes with gas heating and central AC	5.34	$0.051	0.057
5145	HVAC Shell	Duct location	MF	All	NC	-	-	83.456	0.135	0.164	-	-	4.251	30	$696.00	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	1.50	$0.208	0.213
5146	HVAC Shell	Duct sealing 15% leakage base	MF	All	NC	-	-	10.916	0.012	0.014	-	-	0.549	18	$30.93	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	2.77	$0.075	0.081
5147	HVAC Shell	Duct sealing 30% leakage base	MF	All	NC	-	-	29.999	0.034	0.037	-	-	1.463	18	$30.93	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	7.46	$0.028	0.034
5148	HVAC Shell	Door weatherstripping	MF	All	NC	-	-	5.997	0.002	0.003	-	-	0.273	5	$13.00	$0.00	$0.00	$0.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.88	$0.096	0.111
5149	HVAC Shell	Basement Wall Insulation	MF	All	NC	-	-	-1.673	-0.011	-0.015	-	-	2.324	25	$253.67	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.71	$0.000	0.005
5150	HVAC Shell	Wall Insulation	MF	All	NC	-	-	13.688	0.010	0.014	-	-	2.200	25	$192.06	$0.00	$0.00	$0.00	Installing wall insulation in homes with gas heating and central AC	1.33	$0.125	0.130
5151	HVAC Shell	Roof Insulation	MF	All	NC	-	-	17.858	0.012	0.012	-	-	1.771	25	$524.16	$0.00	$0.00	$0.00	Installing roof insulation in homes with gas heating and central AC	0.43	$0.352	0.358
5152	HVAC Shell	Cool roof	MF	All	NC	-	-	69.871	0.078	0.078	-	-	-0.516	20	$92.80	$0.00	$0.00	$0.00	Installing a cool roof in homes with gas heating and central AC	2.75	$0.066	0.072
5153	HVAC Shell	Window Film	MF	All	NC	-	-	113.672	0.104	0.106	-	-	-2.496	10	$125.13	$0.00	$0.00	$0.00	Installing window film on windows in homes with gas heating and central AC	1.00	$0.081	0.089
5154	HVAC Shell	Window Replacement	MF	All	NC	-	-	35.716	0.033	0.034	-	-	0.902	25	$596.65	$0.00	$0.00	$0.00	Installing efficient windows in homes with gas heating and central AC	0.40	$0.488	0.494
5155	HVAC Shell	Infiltration reduction - 30%	MF	All	NC	-	-	364.551	0.021	0.023	-	-	0.000	13	$18.56	$0.00	$0.00	$0.00	Air sealing (30% infiltration reduction) in homes with electric heating and central AC	17.51	$0.003	0.010
5156	HVAC Shell	Infiltration reduction - 50%	MF	All	NC	-	-	608.134	0.034	0.037	-	-	0.000	13	$18.56	$0.00	$0.00	$0.00	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	29.00	$0.002	0.009
5157	HVAC Shell	Airtight Can Lights	MF	All	NC	-	-	256.684	0.015	0.018	-	-	0.000	15	$150.00	$0.00	$0.00	$0.00	Installing air can lights to reduce infiltration in homes with electric heating and central AC	1.69	$0.033	0.040
5158	HVAC Shell	Duct Insulation	MF	All	NC	-	-	641.263	0.092	0.108	-	-	0.000	20	$92.80	$0.00	$0.00	$0.00	Adding duct insulation in homes with electric heating and central AC	9.98	$0.007	0.013
5159	HVAC Shell	Duct location	MF	All	NC	-	-	1002.488	0.136	0.160	-	-	0.000	30	$696.00	$0.00	$0.00	$0.00	Moving ductwork from unconditioned space to conditioned space in homes with electric heating and central AC	2.60	$0.030	0.035
5160	HVAC Shell	Duct sealing 15% leakage base	MF	All	NC	-	-	97.221	0.009	0.011	-	-	0.000	18	$30.93	$0.00	$0.00	$0.00	Duct sealing (15% leakage reduction) in homes with electric heating and central AC	3.84	$0.017	0.023

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
5161	HVAC Shell	Duct sealing 30% leakage base	MF	All	NC	-	-	259.324	0.027	0.030	-	-	0.000	18	$30.93	$0.00	$0.00	$0.00	Duct sealing (30% leakage reduction) in homes with electric heating and central AC	10.41	$0.006	0.012
5162	HVAC Shell	Basement Wall Insulation	MF	All	NC	-	-	273.272	-0.001	-0.001	-	-	0.000	25	$253.67	$0.00	$0.00	$0.00	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	1.26	$0.042	0.047
5163	HVAC Shell	Wall Insulation	MF	All	NC	-	-	298.740	0.012	0.015	-	-	0.000	25	$192.06	$0.00	$0.00	$0.00	Installing wall insulation in homes with electric heating and central AC	2.04	$0.029	0.034
5164	HVAC Shell	Roof Insulation	MF	All	NC	-	-	232.327	0.014	0.016	-	-	0.000	25	$524.16	$0.00	$0.00	$0.00	Installing roof insulation in homes with electric heating and central AC	0.61	$0.103	0.108
5165	HVAC Shell	Cool roof	MF	All	NC	-	-	-13.642	0.066	0.066	-	-	0.000	20	$92.80	$0.00	$0.00	$0.00	Installing a cool roof in homes with electric heating and central AC	1.88	-$0.337	-0.332
5166	HVAC Shell	Window Film	MF	All	NC	-	-	-133.124	0.115	0.119	-	-	0.000	10	$125.13	$0.00	$0.00	$0.00	Installing window film on windows in homes with electric heating and central AC	0.90	-$0.069	-0.060
5167	HVAC Shell	Window Replacement	MF	All	NC	-	-	169.767	0.037	0.039	-	-	0.000	25	$596.65	$0.00	$0.00	$0.00	Installing efficient windows in homes with electric heating and central AC	0.54	$0.160	0.165
6001	HVAC Equipment	Furnace/AC - SEER 16	SF	NLI	ROB	2271.376	0.231	524.164	0.456	0.456	87.300	-2%	-2.114	15	$1,381.90	$0.00	$0.00	$0.00	Installation of 16 SEER air conditioner - baseline is 13 SEER AC	1.01	$0.151	0.157
6002	HVAC Equipment	Furnace/AC - SEER 21	SF	NLI	ROB	2271.376	0.298	677.825	0.648	0.648	87.300	-3%	-2.289	15	$2,211.04	$0.00	$0.00	$0.00	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.89	$0.186	0.193
6003	HVAC Equipment	RCA 10% improvement	SF	NLI	RETRO	2952.789	0.029	86.282	0.150	0.150	0.000	0%	0.000	5	$139.00	$0.00	$0.00	$0.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	1.21	$0.200	0.214
6004	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	SF	NLI	ROB	1216.000	0.454	552.521	0.000	0.000	87.300	27%	23.135	15	$1,427.65	$0.00	$0.00	$0.00	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.42	$0.034	0.041
6005	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	SF	NLI	ROB	1216.000	0.454	552.521	0.000	0.000	87.300	35%	30.835	15	$1,608.58	$0.00	$0.00	$0.00	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.58	$0.031	0.037
6006	HVAC Equipment	O&M Tune-up - furnace only	SF	NLI	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	5% increase in furnace efficiency - in homes with gas furnaces	0.00		
6007	HVAC Equipment	Boiler 95% plus AFUE	SF	NLI	ROB	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6008	HVAC Equipment	Boiler 92% plus AFUE	SF	NLI	ROB	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6009	HVAC Equipment	Boiler Tune-up	SF	NLI	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Increasing boiler efficiency by 5% - in homes with gas boilers	0.00		
6010	HVAC Equipment	Furnace/AC - SEER 16	SF	LI	DI	2271.376	0.231	524.164	0.456	0.456	87.300	-2%	-2.114	15	$3,997.96	$0.00	$0.00	$0.00	Installation of 16 SEER air conditioner - baseline is 13 SEER AC	0.17	$0.872	0.879
6011	HVAC Equipment	RCA 10% improvement	SF	LI	DI	2952.789	0.029	86.282	0.150	0.150	0.000	0%	0.000	5	$139.00	$0.00	$0.00	$0.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	0.60	$0.400	0.414
6012	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	SF	LI	DI	1216.000	0.454	552.521	0.000	0.000	87.300	27%	23.135	15	$2,705.46	$0.00	$0.00	$0.00	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.37	$0.130	0.137
6013	HVAC Equipment	O&M Tune-up - furnace only	SF	LI	DI	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	5% increase in furnace efficiency - in homes with gas furnaces	0.00		
6014	HVAC Equipment	Boiler 92% plus AFUE	SF	LI	DI	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6015	HVAC Equipment	Boiler Tune-up	SF	LI	DI	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Increasing boiler efficiency by 5% - in homes with gas boilers	0.00		
6016	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	SF	All	ROB	6695.450	0.217	1451.405	0.508	0.508	0.000	0%	0.000	15	$1,827.63	$0.00	$0.00	$0.00	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.33	$0.072	0.079
6017	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	SF	All	ROB	6695.450	0.325	2177.107	0.762	0.762	0.000	0%	0.000	15	$3,198.36	$0.00	$0.00	$0.00	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.14	$0.084	0.091
6018	HVAC Equipment	GSHP - EER 19 ASHP SEER 14 Base	SF	All	ROB	6695.450	0.986	6600.822	0.311	0.311	0.000	0%	0.000	15	$20,313.66	$0.00	$0.00	$0.00	Installation of EER 19 GSHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.31	$0.176	0.183
6019	HVAC Equipment	SEER21 Minisplit Heat pump	SF	All	ROB	6695.450	0.730	4889.236	0.541	0.541	0.000	0%	0.000	15	$2,111.74	$0.00	$0.00	$0.00	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	2.57	$0.025	0.031
6020	HVAC Equipment	SEER21 Minisplit Heat pump	SF	All	RETRO	28324.706	0.400	11329.882	-0.948	-0.948	0.000	0%	0.000	15	$4,334.05	$0.00	$0.00	$0.00	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is electic furnace / central air conditioning	1.71	$0.022	0.029
6021	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	SF	All	ROB	6695.450	0.219	1468.769	0.508	0.508	87.300	4%	3.311	15	$1,189.14	$0.00	$0.00	$0.00	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	2.24	$0.042	0.049
6022	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	SF	All	ROB	6695.450	0.329	2203.153	0.762	0.762	87.300	6%	4.967	15	$2,125.65	$0.00	$0.00	$0.00	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.88	$0.051	0.057
6023	HVAC Equipment	Programmable Thermostats Tier 1	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 1 programmable thermostat in homes with gas heating and central AC	0.00		
6024	HVAC Equipment	Programmable Thermostats Tier 2	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 2 programmable thermostat in homes with gas heating and central AC	0.00		
6025	HVAC Equipment	Programmable Thermostats Tier 3	SF	All	RETRO	1165.045	0.090	104.854	0.000	0.000	87.300	10%	8.475	10	$400.00	$0.00	$0.00	$0.00	Installation of Tier 3 programmable thermostat in homes with gas heating and central AC	1.20	$0.036	0.045
6026	HVAC Equipment	Programmable Thermostats Tier 1	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 1 programmable thermostat in homes with gas heating and no AC	0.00		
6027	HVAC Equipment	Programmable Thermostats Tier 2	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 2 programmable thermostat in homes with gas heating and no AC	0.00		
6028	HVAC Equipment	Programmable Thermostats Tier 3	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	87.300	10%	8.618	10	$400.00	$0.00	$0.00	$0.00	Installation of Tier 3 programmable thermostat in homes with gas heating and no AC	1.06		
6029	HVAC Equipment	Programmable Thermostats Tier 1	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 1 programmable thermostat in homes with electric heating and central AC	0.00		
6030	HVAC Equipment	Programmable Thermostats Tier 2	SF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 2 programmable thermostat in homes with electric heating and central AC	0.00		
6031	HVAC Equipment	Programmable Thermostats Tier 3	SF	All	RETRO	18359.145	0.070	1285.140	0.000	0.000	0.000	0%	0.000	10	$400.00	$0.00	$0.00	$0.00	Installation of Tier 3 programmable thermostat in homes with electric heating and central AC	2.01	$0.023	0.031
6032	HVAC Equipment	Smartphone Behavior Application	SF	All	RETRO	2514.050	0.011	26.398	0.000	0.000	83.002	1%	0.872	1	$5.00	$0.00	$0.00	$0.00	Use of smartphone application to deliver behavioral savings	1.45	$0.027	0.089
6033	HVAC Equipment	Smartphone Behavior Application	SF	All	RETRO			0.000	0.000	0.000	0.000	0%	0.000	1	$5.00	$0.00	$0.00	$0.00	Use of smartphone application to deliver behavioral savings	0.00		
6034	HVAC Equipment	Smartphone Behavior Application	SF	All	RETRO			0.000	0.000	0.000	0.000	0%	0.000	1	$5.00	$0.00	$0.00	$0.00	Use of smartphone application to deliver behavioral savings	0.00		
6035	HVAC Equipment	ENERGY STAR Room AC	SF	All	ROB	471.193	0.092	43.193	0.067	0.067	0.000	0%	0.000	15	$75.00	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement room AC instead of a standard units	2.60	$0.099	0.106
6036	HVAC Equipment	ECM Furnace Fan	SF	All	RETRO	1216.000	0.603	733.000	0.073	0.073	0.000	0%	0.000	10	$788.00	$0.00	$0.00	$0.00	Installation of efficient fan motor in homes with furnaces	0.72	$0.079	0.087
6037	HVAC Equipment	Hot water temperature reset	SF	All	RETRO	0.000	0.000	-3.653	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Retrofitting of existing boiler with temperature reset controls	-0.22	-$0.201	-0.192
6038	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	SF	All	NC	5311.246	0.205	1087.267	0.348	0.348	0.000	-	0.000	15	$1,827.63	$0.00	$0.00	$0.00	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.95	$0.096	0.103
6039	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	SF	All	NC	5311.246	0.307	1630.901	0.523	0.523	0.000	-	0.000	15	$3,198.36	$0.00	$0.00	$0.00	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.82	$0.112	0.119
6040	HVAC Equipment	GSHP - EER 19 ASHP SEER 14 Base	SF	All	NC	5311.246	1.238	6575.407	0.400	0.400	0.000	-	0.000	15	$20,313.66	$0.00	$0.00	$0.00	Installation of EER 19 GSHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.32	$0.177	0.183
6041	HVAC Equipment	SEER21 Minisplit Heat pump	SF	All	NC	5311.246	0.377	2003.311	0.449	0.449	0.000	-	0.000	15	$2,111.74	$0.00	$0.00	$0.00	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.31	$0.060	0.067
6042	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	SF	All	NC	5311.246	0.206	1092.821	0.348	0.348	87.300	-	1.801	15	$1,189.14	$0.00	$0.00	$0.00	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.57	$0.058	0.065

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
6043	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	SF	All	NC	5311.246	0.309	1639.231	0.523	0.523	87.300	-	2.701	15	$2,125.65	$0.00	$0.00	$0.00	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.32	$0.069	0.076
6044	HVAC Equipment	Furnace/AC - SEER 16	SF	All	NC	1159.585	0.231	267.597	0.189	0.189	87.300	-	-1.591	15	$829.14	$0.00	$0.00	$0.00	Installation of 16 SEER air conditioner - baseline is 13 SEER AC	0.70	$0.177	0.184
6045	HVAC Equipment	Furnace/AC - SEER 21	SF	All	NC	1159.585	0.361	418.219	0.431	0.431	87.300	-	-1.705	15	$2,211.04	$0.00	$0.00	$0.00	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.57	$0.302	0.309
6046	HVAC Equipment	ENERGY STAR Room AC	SF	All	NC	471.193	0.092	43.193	0.067	0.067	0.000	0%	0.000	15	$75.00	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement room AC instead of a standard units	2.60	$0.099	0.106
6047	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	SF	All	NC	1216.000	0.458	557.410	0.000	0.000	87.300	-	15.391	15	$1,427.65	$0.00	$0.00	$0.00	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.06	$0.046	0.053
6048	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	SF	All	NC	1216.000	0.458	557.410	0.000	0.000	87.300	-	20.057	15	$1,608.58	$0.00	$0.00	$0.00	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.13	$0.043	0.050
6049	HVAC Equipment	ECM Furnace Fan	SF	All	NC	1216.000	0.603	733.000	0.073	0.073	0.000	0%	0.000	10	$788.00	$0.00	$0.00	$0.00	Installation of efficient fan motor in homes with furnaces	0.72	$0.079	0.087
6050	HVAC Equipment	Boiler 92% plus AFUE	SF	All	NC	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6051	HVAC Equipment	Boiler 95% plus AFUE	SF	All	NC	0.000	0.000	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6052	HVAC Equipment	Furnace/AC - SEER 16	MF	NLI	ROB	1114.690	-	257.236	0.176	0.176	56.745	-	-6.674	15	$829.14	$0.00	$0.00	$0.00	Installation of 16 SEER air conditioner - baseline is 13 SEER AC	0.24	$0.184	0.191
6053	HVAC Equipment	Furnace/AC - SEER 21	MF	NLI	ROB	1114.690	-	501.895	0.541	0.541	56.745	-	-7.160	15	$2,211.04	$0.00	$0.00	$0.00	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.56	$0.252	0.259
6054	HVAC Equipment	RCA 10% improvement	MF	NLI	RETRO	1449.097	-	76.892	0.129	0.129	0.000	-	0.000	5	$139.00	$0.00	$0.00	$0.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	1.05	$0.224	0.239
6055	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	MF	NLI	ROB	1216.000	-	332.153	0.102	0.102	56.745	-	16.471	15	$1,427.65	$0.00	$0.00	$0.00	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.14	$0.079	0.085
6056	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	MF	NLI	ROB	1216.000	-	332.153	0.102	0.102	56.745	-	21.465	15	$1,608.58	$0.00	$0.00	$0.00	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.22	$0.073	0.080
6057	HVAC Equipment	O&M Tune-up - furnace only	MF	NLI	RETRO	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	5% increase in furnace efficiency - in homes with gas furnaces	0.00		
6058	HVAC Equipment	Boiler 92% plus AFUE	MF	NLI	ROB	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6059	HVAC Equipment	Boiler 95% plus AFUE	MF	NLI	ROB	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6060	HVAC Equipment	Boiler Tune-up	MF	NLI	RETRO	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Increasing boiler efficiency by 5% - in homes with gas boilers	0.00		
6061	HVAC Equipment	Furnace/AC - SEER 16	MF	LI	DI	1114.690	-	257.236	0.176	0.176	56.745	-	-6.674	15	$3,445.20	$0.00	$0.00	$0.00	Installation of 16 SEER air conditioner - baseline is 13 SEER AC	0.03	$1.531	1.538
6062	HVAC Equipment	RCA 10% improvement	MF	LI	DI	1449.097	-	76.892	0.129	0.129	0.000	-	0.000	5	$139.00	$0.00	$0.00	$0.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	0.52	$0.449	0.463
6063	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	MF	LI	DI	1216.000	-	332.153	0.102	0.102	56.745	-	16.471	15	$2,705.46	$0.00	$0.00	$0.00	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.30	$0.298	0.304
6064	HVAC Equipment	O&M Tune-up - furnace only	MF	LI	DI	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	5% increase in furnace efficiency - in homes with gas furnaces	0.00		
6065	HVAC Equipment	Boiler 92% plus AFUE	MF	LI	DI	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6066	HVAC Equipment	Boiler Tune-up	MF	LI	DI	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Increasing boiler efficiency by 5% - in homes with gas boilers	0.00		
6067	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	MF	All	ROB	6796.262	-	1351.244	0.494	0.494	0.000	-	0.000	15	$1,827.63	$0.00	$0.00	$0.00	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.26	$0.077	0.084
6068	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	MF	All	ROB	6796.262	-	2026.866	0.740	0.740	0.000	-	0.000	15	$3,198.36	$0.00	$0.00	$0.00	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.08	$0.090	0.097
6069	HVAC Equipment	SEER21 Minisplit Heat pump	MF	All	ROB	6796.262	-	1338.402	0.148	0.148	0.000	-	0.000	15	$1,052.13	$0.00	$0.00	$0.00	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.41	$0.045	0.052
6070	HVAC Equipment	SEER21 Minisplit Heat pump	MF	All	RETRO	14112.132	-	5644.853	-0.472	-0.472	0.000	-	0.000	15	$2,159.34	$0.00	$0.00	$0.00	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is electic furnace / central air conditioning	1.71	$0.022	0.029
6071	HVAC Equipment	PTHP 9.1 EER	MF	All	ROB	6796.262	-	286.328	0.123	0.123	0.000	-	0.000	15	$169.21	$0.00	$0.00	$0.00	Installation of 9.3 EER packaged terminal heat pump (PTHP) - in homes with PTHPs	3.15	$0.034	0.040
6072	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	MF	All	ROB	6796.262	-	1336.400	0.494	0.494	56.745	-	2.650	15	$1,189.14	$0.00	$0.00	$0.00	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	2.08	$0.047	0.054
6073	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	MF	All	ROB	6796.262	-	2004.599	0.740	0.740	56.745	-	3.976	15	$2,125.65	$0.00	$0.00	$0.00	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.74	$0.056	0.063
6074	HVAC Equipment	Programmable Thermostats Tier 1	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 1 programmable thermostat in homes with gas heating and central AC	0.00		
6075	HVAC Equipment	Programmable Thermostats Tier 2	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 2 programmable thermostat in homes with gas heating and central AC	0.00		
6076	HVAC Equipment	Programmable Thermostats Tier 3	MF	All	RETRO	472.440	0.067	31.654	0.000	0.000	56.745	-	2.558	10	$400.00	$0.00	$0.00	$0.00	Installation of Tier 3 programmable thermostat in homes with gas heating and central AC	0.36	$0.120	0.128
6077	HVAC Equipment	Programmable Thermostats Tier 1	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 1 programmable thermostat in homes with gas heating and no AC	0.00		
6078	HVAC Equipment	Programmable Thermostats Tier 2	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 2 programmable thermostat in homes with gas heating and no AC	0.00		
6079	HVAC Equipment	Programmable Thermostats Tier 3	MF	All	RETRO	0.000	-	0.000	0.000	0.000	56.745	-	2.602	10	$400.00	$0.00	$0.00	$0.00	Installation of Tier 3 programmable thermostat in homes with gas heating and no AC	0.32		
6080	HVAC Equipment	Programmable Thermostats Tier 1	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 1 programmable thermostat in homes with electric heating and central AC	0.00		
6081	HVAC Equipment	Programmable Thermostats Tier 2	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	0%	0.000	10	$10.00	$0.00	$0.00	$0.00	Installation of Tier 2 programmable thermostat in homes with electric heating and central AC	0.00		
6082	HVAC Equipment	Programmable Thermostats Tier 3	MF	All	RETRO	5542.288	0.070	387.960	0.000	0.000	0.000	-	0.000	10	$400.00	$0.00	$0.00	$0.00	Installation of Tier 3 programmable thermostat in homes with electric heating and central AC	0.61	$0.076	0.084
6083	HVAC Equipment	Smartphone Behavior Application	MF	All	RETRO	1257.025	0.011	13.199	0.000	0.000	41.501	1%	0.436	1	$5.00	$0.00	$0.00	$0.00	Use of smartphone application to deliver behavioral savings	0.72	$0.053	0.116
6084	HVAC Equipment	Smartphone Behavior Application	MF	All	RETRO			0.000	0.000	0.000	0.000	0%	0.000	1	$5.00	$0.00	$0.00	$0.00	Use of smartphone application to deliver behavioral savings	0.00		
6085	HVAC Equipment	Smartphone Behavior Application	MF	All	RETRO			0.000	0.000	0.000	0.000	0%	0.000	1	$5.00	$0.00	$0.00	$0.00	Use of smartphone application to deliver behavioral savings	0.00		
6086	HVAC Equipment	PTAC 9.3 EER	MF	All	ROB	1114.690	-	126.795	0.123	0.123	0.000	-	0.000	15	$135.59	$0.00	$0.00	$0.00	Installation of 9.3 EER packaged terminal air conditioner (PTAC) - in homes with PTACs	2.96	$0.061	0.068
6087	HVAC Equipment	ENERGY STAR Room AC	MF	All	ROB	471.193	0.092	43.193	0.067	0.067	0.000	0%	0.000	15	$75.00	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement room AC instead of a standard units	2.60	$0.099	0.106
6088	HVAC Equipment	Air-Cooled Recip Chiller COP = 2.8, IPLV = 3.41	MF	All	ROB	144433.455	-	36108.364	7.206	7.206	0.000	-	0.000	20	$8,481.25	$0.00	$0.00	$0.00	Installation of efficient reciprocating chiller in apartment buildings with chillers	7.07	$0.012	0.017
6089	HVAC Equipment	CHW reset 10 deg	MF	All	RETRO	144433.455	-	15155.695	0.000	0.000	0.000	-	0.000	5	$158.98	$0.00	$0.00	$0.00	Chilled water reset control strategy (10 degrees) - in apartment buildings with chillers	34.20	$0.001	0.016
6090	HVAC Equipment	ECM Furnace Fan	MF	All	RETRO	1216.000	0.603	733.000	0.073	0.073	56.745	0%	0.000	10	$788.00	$0.00	$0.00	$0.00	Installation of efficient fan motor in homes with furnaces	0.72	$0.079	0.087

CE (Michigan) **Measure Assumption**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Base Fuel Use	% Fuel Savings	Per unit Fuel Saving	Useful Life	Measure Cost	O&M Benefits	O&M Costs	Tax Credits	Measure Description	UCT Ratio	Utility $ / LFT-kWh Saved (-Admin)	Utility $ / LFT-kWh Saved (+Admin)
6091	HVAC Equipment	O2 Trim Control	MF	All	RETRO	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	1.1% improvement in boiler efficiency resulting from the addition of oxygen trim controls - apartment buildings with boilers	0.00		
6092	HVAC Equipment	Boiler 85% Ec	MF	All	RETRO	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	5% increase in boiler efficiency - in apartments with gas boilers and no central AC	0.00		
6093	HVAC Equipment	Boiler turndown control	MF	All	RETRO	0.000	-	0.000	0.000	0.000	0.000	-	0.000	10	$10.00	$0.00	$0.00	$0.00	Installing boiler turndown controls - in apartment buildings with boilers	0.00		
6094	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	MF	All	NC	7248.271	0.201	1459.956	0.545	0.545	0.000	0%	0.000	15	$1,827.63	$0.00	$0.00	$0.00	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.38	$0.072	0.078
6095	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	MF	All	NC	7248.271	0.302	2189.934	0.818	0.818	0.000	0%	0.000	15	$3,198.36	$0.00	$0.00	$0.00	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.18	$0.083	0.090
6096	HVAC Equipment	SEER21 Minisplit Heat pump	MF	All	NC	7248.271	0.204	1475.970	0.163	0.163	0.000	0%	0.000	15	$1,160.27	$0.00	$0.00	$0.00	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.41	$0.045	0.052
6097	HVAC Equipment	PTHP 9.1 EER	MF	All	NC	7248.271	0.036	264.072	0.130	0.130	0.000	0%	0.000	15	$169.21	$0.00	$0.00	$0.00	Installation of 9.3 EER packaged terminal heat pump (PTHP) - in homes with PTHPs	3.13	$0.037	0.043
6098	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	MF	All	NC	7248.271	0.196	1423.773	0.545	0.545	56.745	7%	4.140	15	$1,189.14	$0.00	$0.00	$0.00	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	2.33	$0.043	0.050
6099	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	MF	All	NC	7248.271	0.295	2135.659	0.818	0.818	56.745	11%	6.210	15	$2,125.65	$0.00	$0.00	$0.00	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.95	$0.051	0.058
6100	HVAC Equipment	Furnace/AC - SEER 16	MF	All	NC	1343.544	0.231	310.049	0.361	0.361	56.745	-28%	-15.897	15	$1,381.90	$0.00	$0.00	$0.00	Installation of 16 SEER air conditioner - baseline is 13 SEER AC	0.04	$0.255	0.261
6101	HVAC Equipment	Furnace/AC - SEER 21	MF	All	NC	1343.544	0.355	476.390	0.582	0.582	56.745	-28%	-16.052	15	$2,211.04	$0.00	$0.00	$0.00	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.32	$0.265	0.272
6102	HVAC Equipment	PTAC 9.3 EER	MF	All	NC	1343.544	0.115	154.115	0.129	0.129	0.000	0%	0.000	15	$135.59	$0.00	$0.00	$0.00	Installation of 9.3 EER packaged terminal air conditioner (PTAC) - in homes with PTACs	3.25	$0.050	0.057
6103	HVAC Equipment	ENERGY STAR Room AC	MF	All	NC	471.193	0.092	43.193	0.067	0.067	0.000	0%	0.000	15	$75.00	$0.00	$0.00	$0.00	Installation of ENERGY STAR replacement room AC instead of a standard units	2.60	$0.099	0.106
6104	HVAC Equipment	Air-Cooled Recip Chiller COP = 2.8, IPLV = 3.41	MF	All	NC	156565.172	0.250	39141.293	3.051	3.051	0.000	0%	0.000	20	$8,481.25	$0.00	$0.00	$0.00	Installation of efficient reciprocating chiller in apartment buildings with chillers	6.06	$0.011	0.017
6105	HVAC Equipment	CHW reset 10 deg	MF	All	NC	156565.172	0.103	16150.874	0.000	0.000	0.000	0%	0.000	5	$158.98	$0.00	$0.00	$0.00	Chilled water reset control strategy (10 degrees) - in apartment buildings with chillers	36.44	$0.001	0.016
6106	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	MF	All	NC	1216.000	0.236	286.996	0.140	0.140	56.745	22%	12.361	15	$1,427.65	$0.00	$0.00	$0.00	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.98	$0.116	0.122
6107	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	MF	All	NC	1216.000	0.236	286.996	0.140	0.140	56.745	28%	16.109	15	$1,608.58	$0.00	$0.00	$0.00	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.03	$0.110	0.117
6108	HVAC Equipment	ECM Furnace Fan	MF	All	NC	1216.000	0.603	733.000	0.073	0.073	56.745	0%	0.000	10	$788.00	$0.00	$0.00	$0.00	Installation of efficient fan motor in homes with furnaces	0.72	$0.079	0.087
6109	HVAC Equipment	Boiler 92% plus AFUE	MF	All	NC	0.000	0.000	0.000	0.000	0.000	82.875	0%	0.000	20	$1,954.00	$0.00	$0.00	$0.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6110	HVAC Equipment	Boiler 95% plus AFUE	MF	All	NC	0.000	0.000	0.000	0.000	0.000	82.875	0%	0.000	20	$2,436.00	$0.00	$0.00	$0.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.00		
6111	HVAC Equipment	O2 Trim Control	MF	All	NC	0.000	0.000	0.000	0.000	0.000	82.875	0%	0.000	15	$255.00	$0.00	$0.00	$0.00	1.1% improvement in boiler efficiency resulting from the addition of oxygen trim controls - apartment buildings with boilers	0.00		
6112	HVAC Equipment	Boiler 85% Ec	MF	All	NC	0.000	0.000	0.000	0.000	0.000	82.875	0%	0.000	20	$7,232.27	$0.00	$0.00	$0.00	5% increase in boiler efficiency - in apartments with gas boilers and no central AC	0.00		
6113	HVAC Equipment	Boiler turndown control	MF	All	NC	0.000	0.000	0.000	0.000	0.000	82.875	0%	0.000	15	$195.00	$0.00	$0.00	$0.00	Installing boiler turndown controls - in apartment buildings with boilers	0.00		
7001	Miscellaneous	Pump and Motor Single Speed	SF	All	ROB	2120.860	0.327	694.000	0.715	0.000	0.000	0%	0.000	10	$85.00	$0.00	$0.00	$0.00	Installing high efficiency single-speed pool pumps and motors in homes that have inefficient pool pumps and motors	12.35	$0.009	0.018
7002	Miscellaneous	Pump and motor w auto controls - multi speed	SF	All	ROB	2120.860	0.510	1081.000	1.592	0.000	0.000	0%	0.000	10	$579.00	$0.00	$0.00	$0.00	Installing high efficiency multi-speed pool pumps and motors in homes that have inefficient pool pumps and motors	3.52	$0.039	0.048
7003	Miscellaneous	Pump and Motor Single Speed	SF	All	NC	2120.860	0.327	694.000	0.715	0.000	0.000	0%	0.000	10	$85.00	$0.00	$0.00	$0.00	Installing high efficiency single-speed pool pumps and motors in homes that have inefficient pool pumps and motors	12.35	$0.009	0.018
7004	Miscellaneous	Pump and motor w auto controls - multi speed	SF	All	NC	2120.860	0.510	1081.000	1.592	0.000	0.000	0%	0.000	10	$579.00	$0.00	$0.00	$0.00	Installing high efficiency multi-speed pool pumps and motors in homes that have inefficient pool pumps and motors	3.52	$0.039	0.048
8001	Cross-Cutting	Behavior Modification: Home Energy Reports	SF	All	RETRO	8093.600	0.020	161.872	0.018	0.018	93.520	1%	0.935	1	$6.77	$0.00	$0.00	$0.00	Delivery of home energy reports	3.12	$0.016	0.079
8002	Cross-Cutting	Behavior Modification: Home Energy Reports	SF	All	NC	8093.600	0.020	161.872	0.018	0.018	93.520	1%	0.935	1	$6.77	$0.00	$0.00	$0.00	Delivery of home energy reports	3.12	$0.016	0.079
8003	Cross-Cutting	Behavior Modification: Home Energy Reports	MF	All	RETRO	4046.800	0.020	80.936	0.009	0.009	46.760	1%	0.468	1	$6.77	$0.00	$0.00	$0.00	Delivery of home energy reports	1.56	$0.033	0.095
8004	Cross-Cutting	Behavior Modification: Home Energy Reports	MF	All	NC	4046.800	0.020	80.936	0.009	0.009	46.760	1%	0.468	1	$6.77	$0.00	$0.00	$0.00	Delivery of home energy reports	1.56	$0.033	0.095

The list of sources provided below indicates where key assumptions, algorithms, parameters, etc. were obtained to calculate measure level estimates of energy and demand savings, useful lives, measure cost, and baseline/efficient saturations. The key data sources are provided by residential end-use. Data sources are recorded by measure and can be produced if needed. A list of

End Use	Energy Savings	Demand Savings	EUL	Measure Cost	Base Saturation	EE Saturation
Lighting	MEMD Illinois TRM GDS calculations	MEMD Illinois TRM GDS calculations	MEMD	MEMD Energy Information Adminstration / GDS calcuation	2014 RAS	2014 RAS
Appliances	MEMD Illinois TRM ENERGY STAR calculators GDS calculations	MEMD Illinois TRM ENERGY STAR calculators GDS calculations	MEMD Illinois TRM ENERGY STAR calculators	MEMD Illinois TRM ENERGY STAR calculators	2013 RAS 2014 PA Baseline	2013 RAS 2014 PA Baseline GDS
Electronics	MEMD Hawaii TRM ENERGY STAR calculators	MEMD Hawaii TRM Vermont TRM ENERGY STAR calculators	MEMD Hawaii TRM	MEMD Vermont TRM GDS research / estimate	2014 RAS 2014 PA Baseline	ENERGY STAR 2014 PA Baseline GDS
Water Heating	MEMD GDS calculations	MEMD Vermont TRM	MEMD Illinois TRM	MEMD Illinois TRM	2013 RAS 2014 PA Baseline	2014 RAS 2014 PA Baseline GDS
HVAC Equipment	MEMD	MEMD	MEMD	MEMD	2014 RAS GDS	2014 RAS GDS
HVAC Shell	MEMD	MEMD	MEMD	MEMD	2014 RAS GDS	2014 RAS GDS
Other	MEMD	MEMD	MEMD	MEMD	2014 RAS	ENERGY STAR GDS
Cross-Cutting	MEMD GDS calculations	MEMD GDS calculations	MEMD	MEMD	GDS	GDS

List of Abbreviations

2014 RAS: 2014 Residential Appliance Saturation & Home Characteristics Study, March 2014

2014 PA Baseline: 2014 Pennsylvania Statewide Act 129 Residential Baseline Study

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
1001	Lighting	Standard CFL (Replacing EISA Bulb)	SF	NLI	ROB	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing Standard Halogen/Incandescent Bulb	19.42	$0.003	0.012
1002	Lighting	Specialty CFL (Replacing Specialty Incandescent)	SF	NLI	ROB	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	11.24	$0.005	0.014
1003	Lighting	Standard LED (Replacing EISA Bulb)	SF	NLI	ROB	41.28	71%	29.11	0.038	0.038	-0.051	15	$6.04	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.36	$0.013	0.020
1004	Lighting	Specialty LED (Replacing Specialty Incandescent)	SF	NLI	ROB	57.57	79%	45.40	0.059	0.059	-0.080	15	$8.10	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.08	$0.011	0.019
1005	Lighting	Standard CFL (Replacing CFL)	SF	NLI	ROB	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing CFL	19.42	$0.003	0.012
1006	Lighting	Specialty CFL (Replacing Specialty CFL)	SF	NLI	ROB	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty CFL Bulb	11.24	$0.005	0.014
1007	Lighting	Standard LED (Replacing CFL)	SF	NLI	ROB	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.20	Standard LED Replacing Standard CFL Bulb	0.40	$0.144	0.151
1008	Lighting	Specialty LED (Replacing Specialty CFL)	SF	NLI	ROB	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.77	Specialty LED Replacing Specialty CFL Bulb	0.36	$0.160	0.167
1009	Lighting	Reflector CFL (Replacing EISA Bulb)	SF	NLI	ROB	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.21	$0.008	0.018
1010	Lighting	Reflector LED (Replacing EISA Bulb)	SF	NLI	ROB	60.00	82%	49.09	0.064	0.064	-0.087	15	$19.37	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.30	$0.025	0.032
1011	Lighting	Reflector CFL (Replacing CFL)	SF	NLI	ROB	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Reflector CFL Bulb	6.21	$0.008	0.018
1012	Lighting	Reflector LED (Replacing CFL Bulb)	SF	NLI	ROB	15.52	30%	4.62	0.006	0.006	-0.008	15	$15.42	Reflector LED Replacing Reflector CFL Bulb	0.27	$0.211	0.218
1013	Lighting	T8 Replacing T12 Linear Fluorescent Bulb	SF	NLI	RETRO	70.10	29%	20.57	0.025	0.025	0.000	8	$106.76	T8 Linear Tube Fluorescent Replacing T12 LTF	0.12	$0.474	0.485
1014	Lighting	Residential Occupancy Sensors	SF	NLI	RETRO	53.27	30%	15.98	0.044	0.044	0.000	10	$30.00	Residential Occupancy Sensors	0.47	$0.148	0.157
1015	Lighting	LED Nightlights	SF	NLI	RETRO	25.55	86%	21.90	0.006	0.006	0.000	12	$5.00	LED Nightlights Replacing Incandescent Nightlights	3.29	$0.016	0.024
1016	Lighting	DI Standard CFL (Replacing EISA Bulb)	SF	LI	DI	41.28	65%	26.82	0.035	0.035	-0.047	9	$2.34	Standard CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	3.49	$0.015	0.025
1017	Lighting	DI Specialty CFL (Replacing Specialty Incandescent)	SF	LI	DI	57.57	75%	43.12	0.056	0.056	-0.076	9	$3.83	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	3.42	$0.015	0.025
1018	Lighting	DI Standard LED (Replacing EISA Bulb)	SF	LI	DI	41.28	71%	29.11	0.038	0.038	-0.051	15	$7.54	Standard LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.75	$0.033	0.040
1019	Lighting	DI Specialty LED (Replacing Specialty Incandescent)	SF	LI	DI	57.57	79%	45.40	0.059	0.059	-0.080	15	$9.60	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	2.14	$0.027	0.034
1020	Lighting	DI Standard CFL (Replacing CFL)	SF	LI	DI	41.28	65%	26.82	0.035	0.035	-0.047	9	$2.34	Standard CFL Replacing Standard CFL Bulb (DIRECT INSTALL)	3.49	$0.015	0.025
1021	Lighting	DI Specialty CFL (Replacing Specialty CFL)	SF	LI	DI	57.57	75%	43.12	0.056	0.056	-0.076	9	$3.83	Specialty CFL Replacing Specialty CFL Bulb (DIRECT INSTALL)	3.42	$0.015	0.025
1022	Lighting	DI Standard LED (Replacing CFL)	SF	LI	DI	14.45	16%	2.28	0.003	0.003	-0.004	15	$7.54	Standard LED Replacing Standard CFL Bulb (DIRECT INSTALL)	0.14	$0.417	0.425
1023	Lighting	DI Specialty LED (Replacing Specialty CFL)	SF	LI	DI	14.45	16%	2.28	0.003	0.003	-0.004	15	$9.60	Specialty LED Replacing Specialty CFL Bulb (DIRECT INSTALL)	0.11	$0.531	0.539
1024	Lighting	DI Reflector CFL (Replacing EISA Bulb)	SF	LI	DI	54.55	74%	40.28	0.052	0.052	-0.071	9	$6.25	Reflector CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.96	$0.026	0.036
1025	Lighting	DI Reflector LED (Replacing EISA Bulb)	SF	LI	DI	60.00	82%	49.09	0.064	0.064	-0.087	15	$21.67	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.03	$0.056	0.063
1026	Lighting	DI Reflector CFL (Replacing CFL Bulb)	SF	LI	DI	54.55	74%	40.28	0.052	0.052	-0.071	9	$6.25	Reflector CFL Replacing Reflecor CFL Bulb (DIRECT INSTALL)	1.96	$0.026	0.036
1027	Lighting	DI Reflector LED (Replacing CFL Bulb)	SF	LI	DI	60.00	74%	44.48	0.058	0.058	-0.079	15	$21.67	Reflector LED Replacing Reflector CFL Bulb (DIRECT INSTALL)	0.93	$0.062	0.069
1028	Lighting	DI T8 Replacing T12 Linear Fluorescent Bulb	SF	LI	DI	70.10	29%	20.57	0.025	0.025	0.000	8	$106.76	T8 Linear Tube Fluorescent Replacing T12 LTF (DIRECT INSTALL)	0.06	$0.949	0.959
1029	Lighting	DI LED Nightlights	SF	LI	DI	25.55	86%	21.90	0.006	0.006	0.000	12	$5.00	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)	1.65	$0.032	0.041
1030	Lighting	Standard CFL (Replacing EISA Bulb)	SF	ALL	NC	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing Standard Halogen/Incandescent Bulb	19.42	$0.003	0.012
1031	Lighting	Specialty CFL (Replacing Specialty Incandescent)	SF	ALL	NC	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	11.24	$0.005	0.014
1032	Lighting	Standard LED (Replacing EISA Bulb)	SF	ALL	NC	41.28	71%	29.11	0.038	0.038	-0.051	15	$6.04	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.36	$0.013	0.020
1033	Lighting	Specialty LED (Replacing Specialty Incandescent)	SF	ALL	NC	57.57	79%	45.40	0.059	0.059	-0.080	15	$8.10	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.08	$0.011	0.019
1034	Lighting	Standard CFL (Replacing CFL)	SF	ALL	NC	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing CFL	19.42	$0.003	0.012
1035	Lighting	Specialty CFL (Replacing Specialty CFL)	SF	ALL	NC	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty CFL Bulb	11.24	$0.005	0.014
1036	Lighting	Standard LED (Replacing CFL)	SF	ALL	NC	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.20	Standard LED Replacing Standard CFL Bulb	0.40	$0.144	0.151
1037	Lighting	Specialty LED (Replacing Specialty CFL)	SF	ALL	NC	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.77	Specialty LED Replacing Specialty CFL Bulb	0.36	$0.160	0.167
1038	Lighting	Reflector CFL (Replacing EISA Bulb)	SF	ALL	NC	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.21	$0.008	0.018
1039	Lighting	Reflector LED (Replacing EISA Bulb)	SF	ALL	NC	60.00	82%	49.09	0.064	0.064	-0.087	15	$19.37	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.30	$0.025	0.032
1040	Lighting	Reflector CFL (Replacing CFL)	SF	ALL	NC	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Reflector CFL Bulb	6.21	$0.008	0.018
1041	Lighting	Reflector LED (Replacing CFL Bulb)	SF	ALL	NC	15.52	30%	4.62	0.006	0.006	-0.008	15	$15.42	Reflector LED Replacing Reflector CFL Bulb	0.27	$0.211	0.218
1042	Lighting	Residential Occupancy Sensors	SF	ALL	NC	53.27	30%	15.98	0.044	0.044	0.000	10	$30.00	Residential Occupancy Sensors	0.47	$0.148	0.157
1043	Lighting	Standard CFL (Replacing EISA Bulb)	MF	NLI	ROB	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing Standard Halogen/Incandescent Bulb	19.42	$0.003	0.012
1044	Lighting	Specialty CFL (Replacing Specialty Incandescent)	MF	NLI	ROB	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	11.24	$0.005	0.014
1045	Lighting	Standard LED (Replacing EISA Bulb)	MF	NLI	ROB	41.28	71%	29.11	0.038	0.038	-0.051	15	$6.04	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.36	$0.013	0.020
1046	Lighting	Specialty LED (Replacing Specialty Incandescent)	MF	NLI	ROB	57.57	79%	45.40	0.059	0.059	-0.080	15	$8.10	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.08	$0.011	0.019
1047	Lighting	Standard CFL (Replacing CFL)	MF	NLI	ROB	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing CFL	19.42	$0.003	0.012
1048	Lighting	Specialty CFL (Replacing Specialty CFL)	MF	NLI	ROB	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty CFL Bulb	11.24	$0.005	0.014
1049	Lighting	Standard LED (Replacing CFL)	MF	NLI	ROB	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.20	Standard LED Replacing Standard CFL Bulb	0.40	$0.144	0.151
1050	Lighting	Specialty LED (Replacing Specialty CFL)	MF	NLI	ROB	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.77	Specialty LED Replacing Specialty CFL Bulb	0.36	$0.160	0.167
1051	Lighting	Reflector CFL (Replacing EISA Bulb)	MF	NLI	ROB	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.21	$0.008	0.018
1052	Lighting	Reflector LED (Replacing EISA Bulb)	MF	NLI	ROB	60.00	82%	49.09	0.064	0.064	-0.087	15	$19.37	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.30	$0.025	0.032
1053	Lighting	Reflector CFL (Replacing CFL)	MF	NLI	ROB	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Reflector CFL Bulb	6.21	$0.008	0.018
1054	Lighting	Reflector LED (Replacing CFL Bulb)	MF	NLI	ROB	15.52	30%	4.62	0.006	0.006	-0.008	15	$15.42	Reflector LED Replacing Reflector CFL Bulb	0.27	$0.211	0.218
1055	Lighting	T8 Replacing T12 Linear Fluorescent Bulb	MF	NLI	RETRO	70.10	29%	20.57	0.025	0.025	0.000	8	$106.76	T8 Linear Tube Fluorescent Replacing T12 LTF	0.12	$0.474	0.485
1056	Lighting	Residential Occupancy Sensors	MF	NLI	RETRO	53.27	30%	15.98	0.044	0.044	0.000	10	$30.00	Residential Occupancy Sensors	0.47	$0.148	0.157
1057	Lighting	LED Nightlights	MF	NLI	RETRO	25.55	86%	21.90	0.006	0.006	0.000	12	$5.00	LED Nightlights Replacing Incandescent Nightlights	3.29	$0.016	0.024
1058	Lighting	DI Standard CFL (Replacing EISA Bulb)	MF	LI	DI	41.28	65%	26.82	0.035	0.035	-0.047	9	$2.34	Standard CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	3.49	$0.015	0.025

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
1059	Lighting	DI Specialty CFL (Replacing Specialty Incandescent)	MF	LI	DI	57.57	75%	43.12	0.056	0.056	-0.076	9	$3.83	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	3.42	$0.015	0.025
1060	Lighting	DI Standard LED (Replacing EISA Bulb)	MF	LI	DI	41.28	71%	29.11	0.038	0.038	-0.051	15	$7.54	Standard LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.75	$0.033	0.040
1061	Lighting	DI Specialty LED (Replacing Specialty Incandescent)	MF	LI	DI	57.57	79%	45.40	0.059	0.059	-0.080	15	$9.60	Specialty LED Replacing Specialty Halogen/Incandescent Bulb (DIRECT INSTALL)	2.14	$0.027	0.034
1062	Lighting	DI Standard CFL (Replacing CFL)	MF	LI	DI	41.28	65%	26.82	0.035	0.035	-0.047	9	$2.34	Standard CFL Replacing Standard CFL Bulb (DIRECT INSTALL)	3.49	$0.015	0.025
1063	Lighting	DI Specialty CFL (Replacing Specialty CFL)	MF	LI	DI	57.57	75%	43.12	0.056	0.056	-0.076	9	$3.83	Specialty CFL Replacing Specialty CFL Bulb (DIRECT INSTALL)	3.42	$0.015	0.025
1064	Lighting	DI Standard LED (Replacing CFL)	MF	LI	DI	14.45	16%	2.28	0.003	0.003	-0.004	15	$7.54	Standard LED Replacing Standard CFL Bulb (DIRECT INSTALL)	0.14	$0.417	0.425
1065	Lighting	DI Specialty LED (Replacing Specialty CFL)	MF	LI	DI	14.45	16%	2.28	0.003	0.003	-0.004	15	$9.60	Specialty LED Replacing Specialty CFL Bulb (DIRECT INSTALL)	0.11	$0.531	0.539
1066	Lighting	DI Reflector CFL (Replacing EISA Bulb)	MF	LI	DI	54.55	74%	40.28	0.052	0.052	-0.071	9	$6.25	Reflector CFL Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.96	$0.026	0.036
1067	Lighting	DI Reflector LED (Replacing EISA Bulb)	MF	LI	DI	60.00	82%	49.09	0.064	0.064	-0.087	15	$21.67	Reflector LED Replacing Standard Halogen/Incandescent Bulb (DIRECT INSTALL)	1.03	$0.056	0.063
1068	Lighting	DI Reflector CFL (Replacing CFL Bulb)	MF	LI	DI	54.55	74%	40.28	0.052	0.052	-0.071	9	$6.25	Reflector CFL Replacing Reflecor CFL Bulb (DIRECT INSTALL)	1.96	$0.026	0.036
1069	Lighting	DI Reflector LED (Replacing CFL Bulb)	MF	LI	DI	60.00	74%	44.48	0.058	0.058	-0.079	15	$21.67	Reflector LED Replacing Reflector CFL Bulb (DIRECT INSTALL)	0.93	$0.062	0.069
1070	Lighting	DI T8 Replacing T12 Linear Fluorescent Bulb	MF	LI	DI	70.10	29%	20.57	0.025	0.025	0.000	8	$106.76	T8 Linear Tube Fluorescent Replacing T12 LTF (DIRECT INSTALL)	0.06	$0.949	0.959
1071	Lighting	DI LED Nightlights	MF	LI	DI	25.55	86%	21.90	0.006	0.006	0.000	12	$5.00	LED Nightlights Replacing Incandescent Nightlights (DIRECT INSTALL)	1.65	$0.032	0.041
1072	Lighting	Standard CFL (Replacing EISA Bulb)	MF	ALL	NC	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing Standard Halogen/Incandescent Bulb	19.42	$0.003	0.012
1073	Lighting	Specialty CFL (Replacing Specialty Incandescent)	MF	ALL	NC	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty Halogen/Incandescent Bulb	11.24	$0.005	0.014
1074	Lighting	Standard LED (Replacing EISA Bulb)	MF	ALL	NC	41.28	71%	29.11	0.038	0.038	-0.051	15	$6.04	Standard LED Replacing Standard Halogen/Incandescent Bulb	4.36	$0.013	0.020
1075	Lighting	Specialty LED (Replacing Specialty Incandescent)	MF	ALL	NC	57.57	79%	45.40	0.059	0.059	-0.080	15	$8.10	Specialty LED Replacing Specialty Halogen/Incandescent Bulb	5.08	$0.011	0.019
1076	Lighting	Standard CFL (Replacing CFL)	MF	ALL	NC	41.28	65%	26.82	0.035	0.035	-0.047	9	$0.84	Standard CFL Replacing CFL	19.42	$0.003	0.012
1077	Lighting	Specialty CFL (Replacing Specialty CFL)	MF	ALL	NC	57.57	75%	43.12	0.056	0.056	-0.076	9	$2.33	Specialty CFL Replacing Specialty CFL Bulb	11.24	$0.005	0.014
1078	Lighting	Standard LED (Replacing CFL)	MF	ALL	NC	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.20	Standard LED Replacing Standard CFL Bulb	0.40	$0.144	0.151
1079	Lighting	Specialty LED (Replacing Specialty CFL)	MF	ALL	NC	14.45	16%	2.28	0.003	0.003	-0.004	15	$5.77	Specialty LED Replacing Specialty CFL Bulb	0.36	$0.160	0.167
1080	Lighting	Reflector CFL (Replacing EISA Bulb)	MF	ALL	NC	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Standard Halogen/Incandescent Bulb	6.21	$0.008	0.018
1081	Lighting	Reflector LED (Replacing EISA Bulb)	MF	ALL	NC	60.00	82%	49.09	0.064	0.064	-0.087	15	$19.37	Reflector LED Replacing Standard Halogen/Incandescent Bulb	2.30	$0.025	0.032
1082	Lighting	Reflector CFL (Replacing CFL)	MF	ALL	NC	54.55	74%	40.28	0.052	0.052	-0.071	9	$3.95	Reflector CFL Replacing Reflector CFL Bulb	6.21	$0.008	0.018
1083	Lighting	Reflector LED (Replacing CFL Bulb)	MF	ALL	NC	15.52	30%	4.62	0.006	0.006	-0.008	15	$15.42	Reflector LED Replacing Reflector CFL Bulb	0.27	$0.211	0.218
1084	Lighting	Residential Occupancy Sensors	MF	ALL	NC	53.27	30%	15.98	0.044	0.044	0.000	10	$30.00	Residential Occupancy Sensors	0.47	$0.148	0.157
2001	Appliances	Refrigerators ENERGY STAR	SF	NLI	ROB	503.09	10%	48.37	0.008	0.008	0.000	16	$29.24	Installation of high efficiency replacement refrigerators	1.91	$0.037	0.044
2002	Appliances	Refrigerator recycling	SF	NLI	RECYCLE	1135.00	100%	1135.00	0.131	0.131	0.000	8	$78.00	Removal and recylcing of non-primary refrigerators	9.13	$0.006	0.017
2003	Appliances	Refrigerators ENERGY STAR	SF	LI	DI	503.09	10%	48.37	0.008	0.008	0.000	16	$29.24	Installation of high efficiency replacement refrigerators	0.95	$0.074	0.081
2004	Appliances	Refrigerator recycling	SF	LI	DI	1135.00	100%	1135.00	0.131	0.131	0.000	8	$78.00	Removal and recylcing of non-primary refrigerators	4.56	$0.013	0.023
2005	Appliances	Freezers ENERGY STAR	SF	All	ROB	334.59	10%	33.49	0.006	0.006	0.000	21	$10.00	Installation of high efficiency replacement freezers	4.54	$0.016	0.023
2006	Appliances	Freezer recycling	SF	All	RECYCLE	944.00	100%	944.00	0.116	0.116	0.000	8	$78.00	Removal and recylcing of non-primary freezers	7.73	$0.008	0.018
2007	Appliances	Room AC recycling	SF	All	RECYCLE	113.00	100%	113.00	0.107	0.107	0.000	8	$49.00	Removal and recycling of room air conditioners (non-primary or secondary)	3.27	$0.040	0.050
2008	Appliances	ENERGY STAR Dishwasher - elec water heater	SF	All	ROB	307.00	12%	37.00	0.064	0.064	0.000	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	9.42	$0.021	0.031
2009	Appliances	ENERGY STAR Dishwasher - gas water heater	SF	All	ROB	135.08	12%	16.28	0.050	0.050	0.094	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	7.05	$0.045	0.054
2010	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	SF	All	ROB	241.66	35%	84.00	0.012	0.012	0.369	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.22	$0.024	0.033
2011	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	SF	All	ROB	598.10	29%	175.00	0.025	0.025	0.000	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.45	$0.016	0.024
2012	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	SF	All	ROB	42.29	39%	16.65	0.002	0.002	0.598	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.25	$0.043	0.052
2013	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	SF	All	ROB	398.73	27%	108.20	0.015	0.015	0.285	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.57	$0.021	0.030
2014	Appliances	ENERGY STAR Electric Clothes Dryers	SF	All	ROB	768.92	21%	160.44	0.567	0.567	0.000	14	$152.00	Installation of high efficiency replacement electric clothes dryers	1.10	$0.062	0.069
2015	Appliances	ENERGY STAR Gas Clothes Dryers	SF	All	ROB	134.72	18%	24.78	0.088	0.088	0.444	14	$152.00	Installation of high efficiency replacement gas clothes dryers	0.36	$0.187	0.195
2016	Appliances	ENERGY STAR Dehumidifier	SF	All	ROB	624.22	27%	168.71	0.103	0.103	0.000	12	$50.00	Installation of high efficiency replacement dehumidifier	4.87	$0.021	0.029
2017	Appliances	Dehumidifier recycling	SF	All	RECYCLE	138.50	100%	138.50	0.035	0.035	0.000	8	$49.00	Retirement of secondary dehumidifiers	2.05	$0.032	0.043
2018	Appliances	Refrigerators ENERGY STAR	SF	All	NC	503.09	10%	48.37	0.008	0.008	0.000	16	$29.24	Installation of high efficiency replacement refrigerators	1.91	$0.037	0.044
2019	Appliances	Freezers ENERGY STAR	SF	All	NC	334.59	10%	33.49	0.006	0.006	0.000	21	$10.00	Installation of high efficiency replacement freezers	4.54	$0.016	0.023
2020	Appliances	ENERGY STAR Dishwasher - elec water heater	SF	All	NC	307.00	12%	37.00	0.064	0.064	0.000	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	9.42	$0.021	0.031
2021	Appliances	ENERGY STAR Dishwasher - gas water heater	SF	All	NC	135.08	12%	16.28	0.050	0.050	0.094	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	7.05	$0.045	0.054
2022	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	SF	All	NC	241.66	35%	84.00	0.012	0.012	0.369	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.22	$0.024	0.033
2023	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	SF	All	NC	598.10	29%	175.00	0.025	0.025	0.000	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.45	$0.016	0.024
2024	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	SF	All	NC	42.29	39%	16.65	0.002	0.002	0.598	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.25	$0.043	0.052
2025	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	SF	All	NC	398.73	27%	108.20	0.015	0.015	0.285	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.57	$0.021	0.030

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
2026	Appliances	ENERGY STAR Electric Clothes Dryers	SF	All	NC	768.92	21%	160.44	0.567	0.567	0.000	14	$152.00	Installation of high efficiency replacement electric clothes dryers	1.10	$0.062	0.069
2027	Appliances	ENERGY STAR Gas Clothes Dryers	SF	All	NC	134.72	18%	24.78	0.088	0.088	0.444	14	$152.00	Installation of high efficiency replacement gas clothes dryers	0.36	$0.187	0.195
2028	Appliances	ENERGY STAR Dehumidifier	SF	All	NC	624.22	27%	168.71	0.103	0.103	0.000	12	$50.00	Installation of high efficiency replacement dehumidifier	4.87	$0.021	0.029
2029	Appliances	Refrigerators ENERGY STAR	MF	NLI	ROB	503.09	10%	48.37	0.008	0.008	0.000	16	$29.24	Installation of high efficiency replacement refrigerators	1.91	$0.037	0.044
2030	Appliances	Refrigerator recycling	MF	NLI	RECYCLE	1135.00	100%	1135.00	0.131	0.131	0.000	8	$78.00	Removal and recylcing of non-primary refrigerators	9.13	$0.006	0.017
2031	Appliances	Refrigerators ENERGY STAR	MF	LI	DI	503.09	10%	48.37	0.008	0.008	0.000	16	$29.24	Installation of high efficiency replacement refrigerators	0.95	$0.074	0.081
2032	Appliances	Refrigerator recycling	MF	LI	DI	1135.00	100%	1135.00	0.131	0.131	0.000	8	$78.00	Removal and recylcing of non-primary refrigerators	4.56	$0.013	0.023
2033	Appliances	Freezers ENERGY STAR	MF	All	ROB	334.59	10%	33.49	0.006	0.006	0.000	21	$10.00	Installation of high efficiency replacement freezers	4.54	$0.016	0.023
2034	Appliances	Freezer recycling	MF	All	RECYCLE	944.00	100%	944.00	0.116	0.116	0.000	8	$78.00	Removal and recylcing of non-primary freezers	7.73	$0.008	0.018
2035	Appliances	Room AC recycling	MF	All	RECYCLE	113.00	100%	113.00	0.107	0.107	0.000	8	$49.00	Removal and recycling of room air conditioners (non-primary or secondary)	3.27	$0.040	0.050
2036	Appliances	ENERGY STAR Dishwasher - elec water heater	MF	All	ROB	307.00	12%	37.00	0.064	0.064	0.000	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	9.42	$0.021	0.031
2037	Appliances	ENERGY STAR Dishwasher - gas water heater	MF	All	ROB	135.08	12%	16.28	0.050	0.050	0.094	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	7.05	$0.045	0.054
2038	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	MF	All	ROB	241.66	35%	84.00	0.012	0.012	0.369	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.22	$0.024	0.033
2039	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	MF	All	ROB	598.10	29%	175.00	0.025	0.025	0.000	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.45	$0.016	0.024
2040	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	MF	All	ROB	42.29	39%	16.65	0.002	0.002	0.598	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.25	$0.043	0.052
2041	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	MF	All	ROB	398.73	27%	108.20	0.015	0.015	0.285	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.57	$0.021	0.030
2042	Appliances	ENERGY STAR Electric Clothes Dryers	MF	All	ROB	768.92	21%	160.44	0.567	0.567	0.000	14	$152.00	Installation of high efficiency replacement electric clothes dryers	1.10	$0.062	0.069
2043	Appliances	ENERGY STAR Gas Clothes Dryers	MF	All	ROB	134.72	18%	24.78	0.088	0.088	0.444	14	$152.00	Installation of high efficiency replacement gas clothes dryers	0.36	$0.187	0.195
2044	Appliances	ENERGY STAR Dehumidifier	MF	All	ROB	624.22	27%	168.71	0.103	0.103	0.000	12	$50.00	Installation of high efficiency replacement dehumidifier	4.87	$0.021	0.029
2045	Appliances	Dehumidifier recycling	MF	All	RECYCLE	138.50	100%	138.50	0.035	0.035	0.000	8	$49.00	Retirement of secondary dehumidifiers	2.05	$0.032	0.043
2046	Appliances	Refrigerators ENERGY STAR	MF	All	NC	503.09	10%	48.37	0.008	0.008	0.000	16	$29.24	Installation of high efficiency replacement refrigerators	1.91	$0.037	0.044
2047	Appliances	Freezers ENERGY STAR	MF	All	NC	334.59	10%	33.49	0.006	0.006	0.000	21	$10.00	Installation of high efficiency replacement freezers	4.54	$0.016	0.023
2048	Appliances	ENERGY STAR Dishwasher - elec water heater	MF	All	NC	307.00	12%	37.00	0.064	0.064	0.000	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and electric water heaters	9.42	$0.021	0.031
2049	Appliances	ENERGY STAR Dishwasher - gas water heater	MF	All	NC	135.08	12%	16.28	0.050	0.050	0.094	10	$10.00	Installation of high efficiency dishwashers in homes with dishwashers and gas water heaters	7.05	$0.045	0.054
2050	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	MF	All	NC	241.66	35%	84.00	0.012	0.012	0.369	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and gas dryers	2.22	$0.024	0.033
2051	Appliances	Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	MF	All	NC	598.10	29%	175.00	0.025	0.025	0.000	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with electric water heating and electric dryers	3.45	$0.016	0.024
2052	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	MF	All	NC	42.29	39%	16.65	0.002	0.002	0.598	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and gas dryers	1.25	$0.043	0.052
2053	Appliances	Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	MF	All	NC	398.73	27%	108.20	0.015	0.015	0.285	11	$36.57	Installation of ENERGY STAR replacement clothes washer in homes with gas water heating and electric dryers	2.57	$0.021	0.030
2054	Appliances	ENERGY STAR Electric Clothes Dryers	MF	All	NC	768.92	21%	160.44	0.567	0.567	0.000	14	$152.00	Installation of high efficiency replacement electric clothes dryers	1.10	$0.062	0.069
2055	Appliances	ENERGY STAR Gas Clothes Dryers	MF	All	NC	134.72	18%	24.78	0.088	0.088	0.444	14	$152.00	Installation of high efficiency replacement gas clothes dryers	0.36	$0.187	0.195
2056	Appliances	ENERGY STAR Dehumidifier	MF	All	NC	624.22	27%	168.71	0.103	0.103	0.000	12	$50.00	Installation of high efficiency replacement dehumidifier	4.87	$0.021	0.029
3001	Electronics	Smart Strip plug outlet	SF	All	RETRO	-	-	24.00	0.017	0.017	0.000	5	$40.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.31	$0.216	0.231
3002	Electronics	Advanced Power Strip Tier 2	SF	All	RETRO	-	-	307.10	0.032	0.032	0.000	8	$70.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.51	$0.021	0.031
3003	Electronics	ENERGY STAR 6.0 TV (31-40")	SF	All	ROB	170.63	41%	70.30	0.039	0.039	0.000	6	$10.00	Installation of high efficiency replacement televisions (under 40" diameter category)	3.84	$0.016	0.029
3004	Electronics	ENERGY STAR 6.0 TV (over 60")	SF	All	ROB	452.64	57%	255.80	0.140	0.140	0.000	6	$10.00	Installation of high efficiency replacement televisions (over 40" diameter category)	13.96	$0.004	0.017
3005	Electronics	Efficient Set Top Box	SF	All	ROB	274.80	58%	160.60	0.018	0.018	0.000	4	$5.00	Installation of efficient set top box in place of standard efficiency unit	9.42	$0.005	0.023
3006	Electronics	ENERGY STAR Display	SF	All	ROB	66.20	61%	40.20	0.020	0.020	0.000	5	$10.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.53	$0.032	0.047
3007	Electronics	ENERGY STAR PC	SF	All	ROB	238.50	32%	77.00	0.023	0.023	0.000	4	$8.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.15	$0.016	0.034
3008	Electronics	ENERGY STAR Laptop	SF	All	ROB	50.30	72%	35.97	0.004	0.004	0.000	4	$8.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.27	$0.035	0.053
3009	Electronics	Smart Strip plug outlet	SF	All	NC	-	-	24.00	0.017	0.017	0.000	5	$40.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.31	$0.216	0.231
3010	Electronics	Advanced Power Strip Tier 2	SF	All	NC	-	-	307.10	0.032	0.032	0.000	8	$70.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.51	$0.021	0.031
3011	Electronics	ENERGY STAR 6.0 TV (31-40")	SF	All	NC	170.63	41%	70.30	0.039	0.039	0.000	6	$10.00	Installation of high efficiency replacement televisions (under 40" diameter category)	3.84	$0.016	0.029
3012	Electronics	ENERGY STAR 6.0 TV (over 60")	SF	All	NC	452.64	57%	255.80	0.140	0.140	0.000	6	$10.00	Installation of high efficiency replacement televisions (over 40" diameter category)	13.96	$0.004	0.017
3013	Electronics	Efficient Set Top Box	SF	All	NC	274.80	58%	160.60	0.018	0.018	0.000	4	$5.00	Installation of efficient set top box in place of standard efficiency unit	9.42	$0.005	0.023
3014	Electronics	ENERGY STAR Display	SF	All	NC	66.20	61%	40.20	0.020	0.020	0.000	5	$10.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.53	$0.032	0.047
3015	Electronics	ENERGY STAR PC	SF	All	NC	238.50	32%	77.00	0.023	0.023	0.000	4	$8.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.15	$0.016	0.034

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
3016	Electronics	ENERGY STAR Laptop	SF	All	NC	50.30	72%	35.97	0.004	0.004	0.000	4	$8.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.27	$0.035	0.053
3017	Electronics	Smart Strip plug outlet	MF	All	RETRO	-	-	24.00	0.017	0.017	0.000	5	$40.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.31	$0.216	0.231
3018	Electronics	Advanced Power Strip Tier 2	MF	All	RETRO	-	-	307.10	0.032	0.032	0.000	8	$70.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.51	$0.021	0.031
3019	Electronics	ENERGY STAR 6.0 TV (31-40")	MF	All	ROB	170.63	41%	70.30	0.039	0.039	0.000	6	$10.00	Installation of high efficiency replacement televisions (under 40" diameter category)	3.84	$0.016	0.029
3020	Electronics	ENERGY STAR 6.0 TV (over 60")	MF	All	ROB	452.64	57%	255.80	0.140	0.140	0.000	6	$10.00	Installation of high efficiency replacement televisions (over 40" diameter category)	13.96	$0.004	0.017
3021	Electronics	Efficient Set Top Box	MF	All	ROB	274.80	58%	160.60	0.018	0.018	0.000	4	$5.00	Installation of efficient set top box in place of standard efficiency unit	9.42	$0.005	0.023
3022	Electronics	ENERGY STAR Display	MF	All	ROB	66.20	61%	40.20	0.020	0.020	0.000	5	$10.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.53	$0.032	0.047
3023	Electronics	ENERGY STAR PC	MF	All	ROB	238.50	32%	77.00	0.023	0.023	0.000	4	$8.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.15	$0.016	0.034
3024	Electronics	ENERGY STAR Laptop	MF	All	ROB	50.30	72%	35.97	0.004	0.004	0.000	4	$8.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.27	$0.035	0.053
3025	Electronics	Smart Strip plug outlet	MF	All	NC	-	-	24.00	0.017	0.017	0.000	5	$40.00	Installation of Tier 1 smart strip power strips for home enertertainment and office centers to eliminate standby power use	0.31	$0.216	0.231
3026	Electronics	Advanced Power Strip Tier 2	MF	All	NC	-	-	307.10	0.032	0.032	0.000	8	$70.00	Installation of Tier 2 smart strip power strips for home enertertainment and office centers to eliminate standby power use	2.51	$0.021	0.031
3027	Electronics	ENERGY STAR 6.0 TV (31-40")	MF	All	NC	170.63	41%	70.30	0.039	0.039	0.000	6	$10.00	Installation of high efficiency replacement televisions (under 40" diameter category)	3.84	$0.016	0.029
3028	Electronics	ENERGY STAR 6.0 TV (over 60")	MF	All	NC	452.64	57%	255.80	0.140	0.140	0.000	6	$10.00	Installation of high efficiency replacement televisions (over 40" diameter category)	13.96	$0.004	0.017
3029	Electronics	Efficient Set Top Box	MF	All	NC	274.80	58%	160.60	0.018	0.018	0.000	4	$5.00	Installation of efficient set top box in place of standard efficiency unit	9.42	$0.005	0.023
3030	Electronics	ENERGY STAR Display	MF	All	NC	66.20	61%	40.20	0.020	0.020	0.000	5	$10.00	Installation of high-efficiency displays (10% more efficient than ENERGY STAR minimum spec) for desktop computers in homes with deskptop computers	1.53	$0.032	0.047
3031	Electronics	ENERGY STAR PC	MF	All	NC	238.50	32%	77.00	0.023	0.023	0.000	4	$8.00	Installation of high-efficiency desktop computers in homes with desktop computers	3.15	$0.016	0.034
3032	Electronics	ENERGY STAR Laptop	MF	All	NC	50.30	72%	35.97	0.004	0.004	0.000	4	$8.00	Installation of high-efficiency laptop computers in homes with laptop computers	1.27	$0.035	0.053
4001	Water Heating	Pipe Wrap - gas water heater	SF	NLI	RETRO	-	-	0.00	0.000	0.000	1.300	20	$65.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	1.64		
4002	Water Heating	Pipe Wrap - electric water heater	SF	NLI	RETRO	385.00	67%	257.00	0.029	0.029	0.000	20	$65.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	4.78	$0.014	0.021
4003	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	SF	NLI	RETRO	-	-	0.00	0.000	0.000	2.200	10	$34.20	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	3.38		
4004	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	SF	NLI	RETRO	-	-	0.00	0.000	0.000	1.470	10	$34.20	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	2.26		
4005	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	SF	NLI	RETRO	834.39	40%	333.76	0.038	0.038	0.000	10	$34.20	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	7.06	$0.008	0.017
4006	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	SF	NLI	RETRO	834.39	60%	500.64	0.057	0.057	0.000	10	$34.20	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	10.59	$0.005	0.015
4007	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	SF	NLI	RETRO	876.84	55%	478.28	0.055	0.055	0.000	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	36.43	$0.002	0.011
4008	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	SF	NLI	RETRO	125.04	55%	68.20	0.008	0.008	0.000	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.19	$0.011	0.020
4009	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	SF	NLI	RETRO	-	-	0.00	0.000	0.000	2.104	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	11.64		
4010	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	SF	NLI	RETRO	-	-	0.00	0.000	0.000	0.300	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	1.66		
4011	Water Heating	Pipe Wrap - gas water heater	SF	LI	DI	-	-	0.00	0.000	0.000	1.300	20	$65.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.82		
4012	Water Heating	Pipe Wrap - electric water heater	SF	LI	DI	385.00	67%	257.00	0.029	0.029	0.000	20	$65.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	2.39	$0.028	0.035
4013	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	SF	LI	DI	-	-	0.00	0.000	0.000	2.200	10	$34.20	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	1.69		
4014	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	SF	LI	DI	-	-	0.00	0.000	0.000	1.470	10	$34.20	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	1.13		
4015	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	SF	LI	DI	834.39	40%	333.76	0.038	0.038	0.000	10	$34.20	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	3.53	$0.016	0.025
4016	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	SF	LI	DI	834.39	60%	500.64	0.057	0.057	0.000	10	$34.20	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	5.30	$0.011	0.020
4017	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	SF	LI	DI	876.84	55%	478.28	0.055	0.055	0.000	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	18.21	$0.003	0.012
4018	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	SF	LI	DI	125.04	55%	68.20	0.008	0.008	0.000	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	2.60	$0.022	0.031
4019	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	SF	LI	DI	-	-	0.00	0.000	0.000	2.104	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	5.82		
4020	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	SF	LI	DI	-	-	0.00	0.000	0.000	0.300	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.83		
4021	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	SF	All	RETRO	-	-	542.23	0.043	0.043	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.77	$0.007	0.016
4022	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	SF	All	RETRO	-	-	0.00	0.000	0.000	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4023	Water Heating	Shower Start 2.0 gpm gas water heater	SF	All	RETRO	-	-	0.00	0.000	0.000	0.361	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.50		
4024	Water Heating	Shower Start 2.0 gpm electric water heater	SF	All	RETRO	87.36	94%	82.12	0.009	0.009	0.000	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.56	$0.037	0.046
4025	Water Heating	Heat Pump Water Heaters, <= 55 gallons	SF	All	ROB	3696.00	52%	1913.00	0.218	0.218	0.000	13	$1,100.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.55	$0.039	0.047

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
4026	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	SF	All	ROB	-	-	0.00	0.000	0.000	2.100	13	$440.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.30		
4027	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	SF	All	ROB	-	-	0.00	0.000	0.000	5.000	13	$520.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.61		
4028	Water Heating	Instant Gas Water Heater	SF	All	ROB	-	-	0.00	0.000	0.000	5.400	20	$602.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.73		
4029	Water Heating	Solar Domestic Hot Water - electric water heater	SF	All	ROB	3696.00	56%	2059.00	0.600	0.600	0.000	20	$4,500.00	Installing a solar domestic water heater in homes with electric water heating	0.63	$0.122	0.129
4030	Water Heating	Solar Domestic Hot Water - gas water heater	SF	All	ROB	-	-	0.00	0.000	0.000	9.500	20	$4,500.00	Installing a solar domestic water heater in homes with gas water heating	0.17		
4031	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	SF	All	RETRO	3696.00	6%	208.00	0.034	0.034	0.000	20	$1,022.00	Installing a gravity film heat exchanger in homes with electric water heating	0.25	$0.275	0.282
4032	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	SF	All	RETRO	-	-	0.00	0.000	0.000	1.015	20	$1,022.00	Installing a gravity film heat exchanger in homes with gas water heating	0.08		
4033	Water Heating	Pipe Wrap - gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	1.300	20	$65.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	1.64		
4034	Water Heating	Pipe Wrap - electric water heater	SF	All	NC	385.00	67%	257.00	0.029	0.029	0.000	20	$65.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	4.78	$0.014	0.021
4035	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	2.200	10	$34.20	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	3.38		
4036	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	1.470	10	$34.20	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	2.26		
4037	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	SF	All	NC	834.39	40%	333.76	0.038	0.038	0.000	10	$34.20	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	7.06	$0.008	0.017
4038	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	SF	All	NC	834.39	60%	500.64	0.057	0.057	0.000	10	$34.20	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	10.59	$0.005	0.015
4039	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	SF	All	NC	876.84	55%	478.28	0.055	0.055	0.000	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	36.43	$0.002	0.011
4040	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	SF	All	NC	125.04	55%	68.20	0.008	0.008	0.000	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.19	$0.011	0.020
4041	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	2.104	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	11.64		
4042	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	0.300	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	1.66		
4043	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	SF	All	NC	-	-	542.23	0.043	0.043	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.77	$0.007	0.016
4044	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	SF	All	NC	-	-	0.00	0.000	0.000	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4045	Water Heating	Shower Start 2.0 gpm gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	0.361	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.50		
4046	Water Heating	Shower Start 2.0 gpm electric water heater	SF	All	NC	87.36	94%	82.12	0.009	0.009	0.000	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.56	$0.037	0.046
4047	Water Heating	Heat Pump Water Heaters, <= 55 gallons	SF	All	NC	3696.00	52%	1913.00	0.218	0.218	0.000	13	$1,100.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.55	$0.039	0.047
4048	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	SF	All	NC	-	-	0.00	0.000	0.000	2.100	13	$440.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.30		
4049	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	SF	All	NC	-	-	0.00	0.000	0.000	5.000	13	$520.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.61		
4050	Water Heating	Instant Gas Water Heater	SF	All	NC	-	-	0.00	0.000	0.000	5.400	20	$602.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.73		
4051	Water Heating	Solar Domestic Hot Water - electric water heater	SF	All	NC	3696.00	56%	2059.00	0.600	0.600	0.000	20	$4,500.00	Installing a solar domestic water heater in homes with electric water heating	0.63	$0.122	0.129
4052	Water Heating	Solar Domestic Hot Water - gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	9.500	20	$4,500.00	Installing a solar domestic water heater in homes with gas water heating	0.17		
4053	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	SF	All	NC	3696.00	6%	208.00	0.034	0.034	0.000	20	$1,022.00	Installing a gravity film heat exchanger in homes with electric water heating	0.25	$0.275	0.282
4054	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	SF	All	NC	-	-	0.00	0.000	0.000	1.015	20	$1,022.00	Installing a gravity film heat exchanger in homes with gas water heating	0.08		
4055	Water Heating	Pipe Wrap - gas water heater	MF	NLI	RETRO	-	-	0.00	0.000	0.000	1.300	20	$65.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	1.64		
4056	Water Heating	Pipe Wrap - electric water heater	MF	NLI	RETRO	385.00	67%	257.00	0.029	0.029	0.000	20	$65.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	4.78	$0.014	0.021
4057	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	MF	NLI	RETRO	-	-	0.00	0.000	0.000	2.150	10	$34.20	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	3.30		
4058	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	MF	NLI	RETRO	-	-	0.00	0.000	0.000	1.470	10	$34.20	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	2.26		
4059	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	MF	NLI	RETRO	815.59	40%	326.23	0.037	0.037	0.000	10	$34.20	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	6.90	$0.008	0.017
4060	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	MF	NLI	RETRO	815.59	60%	489.35	0.056	0.056	0.000	10	$34.20	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	10.35	$0.006	0.015
4061	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	MF	NLI	RETRO	634.23	55%	345.95	0.039	0.039	0.000	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	26.35	$0.002	0.011
4062	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	MF	NLI	RETRO	129.02	55%	70.38	0.008	0.008	0.000	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.36	$0.011	0.020
4063	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	MF	NLI	RETRO	-	-	0.00	0.000	0.000	1.522	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	8.42		
4064	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	MF	NLI	RETRO	-	-	0.00	0.000	0.000	0.310	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	1.72		
4065	Water Heating	Pipe Wrap - gas water heater	MF	LI	DI	-	-	0.00	0.000	0.000	1.300	20	$65.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	0.82		
4066	Water Heating	Pipe Wrap - electric water heater	MF	LI	DI	385.00	67%	257.00	0.029	0.029	0.000	20	$65.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	2.39	$0.028	0.035
4067	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	MF	LI	DI	-	-	0.00	0.000	0.000	2.150	10	$34.20	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	1.65		
4068	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	MF	LI	DI	-	-	0.00	0.000	0.000	1.470	10	$34.20	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	1.13		
4069	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	MF	LI	DI	815.59	40%	326.23	0.037	0.037	0.000	10	$34.20	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	3.45	$0.017	0.026

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
4070	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	MF	LI	DI	815.59	60%	489.35	0.056	0.056	0.000	10	$34.20	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	5.18	$0.011	0.020
4071	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	MF	LI	DI	634.23	55%	345.95	0.039	0.039	0.000	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	13.17	$0.004	0.014
4072	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	MF	LI	DI	129.02	55%	70.38	0.008	0.008	0.000	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	2.68	$0.021	0.030
4073	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	MF	LI	DI	-	-	0.00	0.000	0.000	1.522	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	4.21		
4074	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	MF	LI	DI	-	-	0.00	0.000	0.000	0.310	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	0.86		
4075	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	MF	All	RETRO	-	-	530.01	0.042	0.042	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.59	$0.007	0.016
4076	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	MF	All	RETRO	-	-	0.00	0.000	0.000	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4077	Water Heating	Shower Start 2.0 gpm gas water heater	MF	All	RETRO	-	-	0.00	0.000	0.000	0.353	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.49		
4078	Water Heating	Shower Start 2.0 gpm electric water heater	MF	All	RETRO	85.39	94%	80.27	0.009	0.009	0.000	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.52	$0.038	0.047
4079	Water Heating	Heat Pump Water Heaters, <= 55 gallons	MF	All	ROB	3111.00	52%	1610.00	0.184	0.184	0.000	13	$1,100.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.30	$0.046	0.054
4080	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	MF	All	ROB	-	-	0.00	0.000	0.000	1.700	13	$440.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.24		
4081	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	MF	All	ROB	-	-	0.00	0.000	0.000	4.200	13	$520.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.51		
4082	Water Heating	Instant Gas Water Heater	MF	All	ROB	-	-	0.00	0.000	0.000	4.500	20	$602.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.61		
4083	Water Heating	Solar Domestic Hot Water - electric water heater	MF	All	ROB	3111.00	66%	2059.00	0.600	0.600	0.000	20	$4,500.00	Installing a solar domestic water heater in homes with electric water heating	0.63	$0.122	0.129
4084	Water Heating	Solar Domestic Hot Water - gas water heater	MF	All	ROB	-	-	0.00	0.000	0.000	9.500	20	$4,500.00	Installing a solar domestic water heater in homes with gas water heating	0.17		
4085	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	MF	All	RETRO	3111.00	4%	134.93	0.022	0.022	0.000	20	$1,022.00	Installing a gravity film heat exchanger in homes with electric water heating	0.16	$0.424	0.431
4086	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	MF	All	RETRO	-	-	0.00	0.000	0.000	0.658	20	$1,022.00	Installing a gravity film heat exchanger in homes with gas water heating	0.05		
4087	Water Heating	Pipe Wrap - gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	1.300	20	$65.00	Installing pipe wrap on hot water lines in homes that have gas water heaters	1.64		
4088	Water Heating	Pipe Wrap - electric water heater	MF	All	NC	385.00	67%	257.00	0.029	0.029	0.000	20	$65.00	Installing pipe wrap on hot water lines in homes that have electric water heaters	4.78	$0.014	0.021
4089	Water Heating	Low Flow Showerheads 1.5 gpm gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	2.150	10	$34.20	Installation of low flow showerheads (1.5 gpm) in hoes with gas water heaters	3.30		
4090	Water Heating	Low Flow Showerheads 1.0 gpm gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	1.470	10	$34.20	Installation of low flow showerheads (1.0 gpm) in hoes with gas water heaters	2.26		
4091	Water Heating	Low Flow Showerheads 1.5 gpm electric water heater	MF	All	NC	815.59	40%	326.23	0.037	0.037	0.000	10	$34.20	Installation of low flow showerheads (1.5 gpm) in homes with electric water heating	6.90	$0.008	0.017
4092	Water Heating	Low Flow Showerheads 1.0 gpm electric water heater	MF	All	NC	815.59	60%	489.35	0.056	0.056	0.000	10	$34.20	Installation of low flow showerheads (1.0 gpm) in homes with electric water heating	10.35	$0.006	0.015
4093	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm electric water heater	MF	All	NC	634.23	55%	345.95	0.039	0.039	0.000	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with electric water heating	26.35	$0.002	0.011
4094	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm electric water heater	MF	All	NC	129.02	55%	70.38	0.008	0.008	0.000	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with electric water heating	5.36	$0.011	0.020
4095	Water Heating	Low Flow Kitchen Faucet Aerators - 1.0 gpm gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	1.522	10	$9.50	Installing 1.0 gpm low flow kitchen faucet aerators in homes with gas water heating	8.42		
4096	Water Heating	Low Flow Bathroom Faucet Aerators - 1.0 gpm gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	0.310	10	$9.50	Installing 1.0 gpm low flow bathroom faucet aerators in homes with gas water heating	1.72		
4097	Water Heating	TubSpout with Showerhead 1.5 GPM, electric DHW	MF	All	NC	-	-	530.01	0.042	0.042	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and electric water heating	7.59	$0.007	0.016
4098	Water Heating	TubSpout with Showerhead 1.5 GPM, gas DHW	MF	All	NC	-	-	0.00	0.000	0.000	0.000	10	$48.70	Installation of TubSpout technology in homes with low flow shower heads and gas water heating	0.00		
4099	Water Heating	Shower Start 2.0 gpm gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	0.353	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with a gas water heater	0.49		
4100	Water Heating	Shower Start 2.0 gpm electric water heater	MF	All	NC	85.39	94%	80.27	0.009	0.009	0.000	10	$38.20	Installation of thermostatic restriction valve on a 2.0 gpm showerhead in homes with an electric water heater	1.52	$0.038	0.047
4101	Water Heating	Heat Pump Water Heaters, <= 55 gallons	MF	All	NC	3111.00	52%	1610.00	0.184	0.184	0.000	13	$1,100.00	Installing an efficient heat pump water heater in place of a standard efficiency storage tank water heater	1.30	$0.046	0.054
4102	Water Heating	High Efficiency Gas Water Heater 0.67 EF, <= 55 gallons	MF	All	NC	-	-	0.00	0.000	0.000	1.700	13	$440.00	Installing an efficient (0.67 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.24		
4103	Water Heating	Super Efficiency Gas Water Heater 0.80 EF, <= 55 gallons	MF	All	NC	-	-	0.00	0.000	0.000	4.200	13	$520.00	Installing an efficient (0.80 EF) replacement gas storage tank water heater instead of a standard efficiency gas storage tank water heater	0.51		
4104	Water Heating	Instant Gas Water Heater	MF	All	NC	-	-	0.00	0.000	0.000	4.500	20	$602.00	Installing an efficient replacement instantaneous gas tankless water heater instead of a standard efficiency gas storage tank water heater	0.61		
4105	Water Heating	Solar Domestic Hot Water - electric water heater	MF	All	NC	3111.00	66%	2059.00	0.600	0.600	0.000	20	$4,500.00	Installing a solar domestic water heater in homes with electric water heating	0.63	$0.122	0.129
4106	Water Heating	Solar Domestic Hot Water - gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	9.500	20	$4,500.00	Installing a solar domestic water heater in homes with gas water heating	0.17		
4107	Water Heating	Gravity Film Heat Exchanger GFX electric water heater	MF	All	NC	3111.00	4%	134.93	0.022	0.022	0.000	20	$1,022.00	Installing a gravity film heat exchanger in homes with electric water heating	0.16	$0.424	0.431
4108	Water Heating	Gravity Film Heat Exchanger GFX gas water heater	MF	All	NC	-	-	0.00	0.000	0.000	0.658	20	$1,022.00	Installing a gravity film heat exchanger in homes with gas water heating	0.05		
5001	HVAC Shell	Infiltration reduction - 30%	SF	NLI	RETRO	-	-	56.41	0.071	0.112	6.884	13	$190.08	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	3.00	$0.054	0.062
5002	HVAC Shell	Infiltration reduction - 50%	SF	NLI	RETRO	-	-	96.70	0.119	0.189	11.435	13	$190.08	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	5.01	$0.032	0.040
5003	HVAC Shell	Crawlspace Wall Insulation	SF	NLI	RETRO	-	-	-46.66	-0.026	-0.027	3.151	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and central AC	0.33	$0.000	0.006

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
5004	HVAC Shell	Basement Wall Insulation	SF	NLI	RETRO	-	-	-39.11	-0.048	-0.052	9.214	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.64	$0.000	0.006
5005	HVAC Shell	Floor Insulation	SF	NLI	RETRO	-	-	-61.73	-0.025	-0.026	5.233	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and central AC	0.44	$0.000	0.006
5006	HVAC Shell	Wall Insulation	SF	NLI	RETRO	-	-	110.44	0.096	0.113	11.168	25	$3,041.11	Installing wall insulation in homes with gas heating and central AC	0.44	$0.332	0.338
5007	HVAC Shell	R-38 Roof Insulation	SF	NLI	RETRO	-	-	42.77	0.046	0.043	4.233	20	$1,553.26	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and central AC	0.30	$0.529	0.535
5008	HVAC Shell	R-60 Roof Insulation	SF	NLI	RETRO	-	-	60.38	0.065	0.068	5.967	20	$3,351.78	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and central AC	0.20	$0.810	0.816
5009	HVAC Shell	Infiltration reduction - 30%	SF	NLI	RETRO	-	-	29.92	0.000	0.000	7.155	13	$190.08	Air sealing (30% infiltration reduction) in homes with gas heating and no central AC	2.50	$0.021	0.029
5010	HVAC Shell	Infiltration reduction - 50%	SF	NLI	RETRO	-	-	49.90	0.000	0.000	11.922	13	$190.08	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	4.16	$0.013	0.020
5011	HVAC Shell	Crawlspace Wall Insulation	SF	NLI	RETRO	-	-	11.81	0.000	0.000	4.356	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and no central AC	0.74	$0.079	0.085
5012	HVAC Shell	Basement Wall Insulation	SF	NLI	RETRO	-	-	33.90	0.000	0.000	9.859	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.85	$0.069	0.075
5013	HVAC Shell	Floor Insulation	SF	NLI	RETRO	-	-	20.15	0.000	0.000	4.215	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and no central AC	0.50	$0.118	0.124
5014	HVAC Shell	Wall Insulation	SF	NLI	RETRO	-	-	46.23	0.000	0.000	11.498	25	$3,041.11	Installing wall insulation in homes with gas heating and no central AC	0.36	$0.162	0.168
5015	HVAC Shell	R-38 Roof Insulation	SF	NLI	RETRO	-	-	17.58	0.000	0.000	4.737	20	$1,553.26	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and no central AC	0.26	$0.216	0.223
5016	HVAC Shell	R-60 Roof Insulation	SF	NLI	RETRO	-	-	24.59	0.000	0.000	6.519	20	$3,351.78	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and no central AC	0.17	$0.339	0.346
5017	HVAC Shell	Infiltration reduction - 30%	SF	NLI	RETRO	-	-	1568.82	0.112	0.071	0.000	13	$190.08	Air sealing (30% infiltration reduction) in homes with electric heating and central AC	7.22	$0.008	0.016
5018	HVAC Shell	Infiltration reduction - 50%	SF	NLI	RETRO	-	-	2602.15	0.189	0.119	0.000	13	$190.08	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	12.00	$0.005	0.013
5019	HVAC Shell	Crawlspace Wall Insulation	SF	NLI	RETRO	-	-	637.33	-0.027	-0.026	0.000	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and electric heating and central AC	1.22	$0.045	0.051
5020	HVAC Shell	Basement Wall Insulation	SF	NLI	RETRO	-	-	1969.24	-0.052	-0.048	0.000	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	1.94	$0.029	0.035
5021	HVAC Shell	Floor Insulation	SF	NLI	RETRO	-	-	1094.57	-0.026	-0.025	0.000	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and electric heating and central AC	1.46	$0.039	0.045
5022	HVAC Shell	Wall Insulation	SF	NLI	RETRO	-	-	2559.49	0.113	0.096	0.000	25	$3,041.11	Installing wall insulation in homes with electric heating and central AC	1.03	$0.062	0.068
5023	HVAC Shell	R-38 Roof Insulation	SF	NLI	RETRO	-	-	964.87	0.043	0.046	0.013	20	$1,553.26	Installing R-38 roof insulation in homes with poor attic insulation and electric heating and central AC	0.68	$0.090	0.097
5024	HVAC Shell	R-60 Roof Insulation	SF	NLI	RETRO	-	-	1358.43	0.068	0.065	0.013	20	$3,351.78	Installing R-60 roof insulation in homes with mediocre attic insulation and electric heating and central AC	0.45	$0.138	0.145
5025	HVAC Shell	Infiltration reduction - 50%	SF	LI	DI	-	-	96.70	0.119	0.189	11.435	13	$190.08	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	2.50	$0.064	0.072
5026	HVAC Shell	Crawlspace Wall Insulation	SF	LI	DI	-	-	-46.66	-0.026	-0.027	3.151	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and central AC	0.17	$0.000	0.006
5027	HVAC Shell	Basement Wall Insulation	SF	LI	DI	-	-	-39.11	-0.048	-0.052	9.214	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.32	$0.000	0.006
5028	HVAC Shell	Floor Insulation	SF	LI	DI	-	-	-61.73	-0.025	-0.026	5.233	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and central AC	0.22	$0.000	0.006
5029	HVAC Shell	Wall Insulation	SF	LI	DI	-	-	110.44	0.096	0.113	11.168	25	$3,041.11	Installing wall insulation in homes with gas heating and central AC	0.22	$0.664	0.671
5030	HVAC Shell	R-38 Roof Insulation	SF	LI	DI	-	-	42.77	0.046	0.043	4.233	20	$1,553.26	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and central AC	0.15	$1.057	1.064
5031	HVAC Shell	R-60 Roof Insulation	SF	LI	DI	-	-	60.38	0.065	0.068	5.967	20	$3,351.78	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and central AC	0.10	$1.619	1.626
5032	HVAC Shell	Infiltration reduction - 50%	SF	LI	DI	-	-	49.90	0.000	0.000	11.922	13	$190.08	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	2.08	$0.025	0.033
5033	HVAC Shell	Crawlspace Wall Insulation	SF	LI	DI	-	-	11.81	0.000	0.000	4.356	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and no central AC	0.37	$0.157	0.163
5034	HVAC Shell	Basement Wall Insulation	SF	LI	DI	-	-	33.90	0.000	0.000	9.859	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.42	$0.138	0.144
5035	HVAC Shell	Floor Insulation	SF	LI	DI	-	-	20.15	0.000	0.000	4.215	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and no central AC	0.25	$0.236	0.242
5036	HVAC Shell	Wall Insulation	SF	LI	DI	-	-	46.23	0.000	0.000	11.498	25	$3,041.11	Installing wall insulation in homes with gas heating and no central AC	0.18	$0.323	0.329
5037	HVAC Shell	R-38 Roof Insulation	SF	LI	DI	-	-	17.58	0.000	0.000	4.737	20	$1,553.26	Installing R-38 roof insulation in homes with poor attic insulation and gas heating and no central AC	0.13	$0.433	0.440
5038	HVAC Shell	R-60 Roof Insulation	SF	LI	DI	-	-	24.59	0.000	0.000	6.519	20	$3,351.78	Installing R-60 roof insulation in homes with mediocre attic insulation and gas heating and no central AC	0.08	$0.678	0.685
5039	HVAC Shell	Infiltration reduction - 50%	SF	LI	DI	-	-	2602.15	0.189	0.119	0.000	13	$190.08	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	6.00	$0.010	0.018
5040	HVAC Shell	Crawlspace Wall Insulation	SF	LI	DI	-	-	637.33	-0.027	-0.026	0.000	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and electric heating and central AC	0.61	$0.090	0.096
5041	HVAC Shell	Basement Wall Insulation	SF	LI	DI	-	-	1969.24	-0.052	-0.048	0.000	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	0.97	$0.059	0.065
5042	HVAC Shell	Floor Insulation	SF	LI	DI	-	-	1094.57	-0.026	-0.025	0.000	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and electric heating and central AC	0.73	$0.078	0.084
5043	HVAC Shell	Wall Insulation	SF	LI	DI	-	-	2559.49	0.113	0.096	0.000	25	$3,041.11	Installing wall insulation in homes with electric heating and central AC	0.51	$0.124	0.130

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
5044	HVAC Shell	R-38 Roof Insulation	SF	LI	DI	-	-	964.87	0.043	0.046	0.013	20	$1,553.26	Installing R-38 roof insulation in homes with poor attic insulation and electric heating and central AC	0.34	$0.180	0.187
5045	HVAC Shell	R-60 Roof Insulation	SF	LI	DI	-	-	1358.43	0.068	0.065	0.013	20	$3,351.78	Installing R-60 roof insulation in homes with mediocre attic insulation and electric heating and central AC	0.23	$0.276	0.283
5046	HVAC Shell	Duct Insulation	SF	All	RETRO	-	-	0.05	0.023	0.025	2.236	20	$380.16	Adding duct insulation in homes with gas heating and central AC	0.58	$78.635	78.641
5047	HVAC Shell	Duct location	SF	All	RETRO	-	-	75.19	0.070	0.081	7.871	30	$1,188.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	0.85	$0.183	0.189
5048	HVAC Shell	Duct sealing 15% leakage base	SF	All	RETRO	-	-	18.72	0.028	0.035	0.923	18	$341.86	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	0.39	$0.500	0.507
5049	HVAC Shell	Duct sealing 30% leakage base	SF	All	RETRO	-	-	57.15	0.074	0.085	2.368	18	$341.86	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	1.04	$0.169	0.176
5050	HVAC Shell	Door weatherstripping	SF	All	RETRO	-	-	12.80	0.000	0.000	0.394	5	$86.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.19	$0.221	0.237
5051	HVAC Shell	R0 to R19 kneewalls	SF	All	RETRO	-	-	75.95	0.084	0.092	7.284	20	$172.53	Installing R19 kneewall insulation in homes with no kneewall insulation in homes with gas heating and central AC	4.73	$0.034	0.041
5052	HVAC Shell	R6 to R19 kneewalls	SF	All	RETRO	-	-	25.05	0.027	0.028	2.995	20	$162.53	Installing R19 kneewall insulation in homes with R6 kneewall insulation in homes with gas heating and central AC	1.94	$0.082	0.088
5053	HVAC Shell	Rim Joist Insulation	SF	All	RETRO	-	-	34.89	0.026	0.030	3.456	25	$179.92	Installing rim joist insulation in homes with gas heating and central AC	2.24	$0.059	0.065
5054	HVAC Shell	Window Film	SF	All	RETRO	-	-	371.23	0.317	0.369	-8.109	10	$365.46	Installing window film on inefficient existing windows in homes with gas heating and central AC	0.42	$0.078	0.087
5055	HVAC Shell	Window Replacement	SF	All	ROB	-	-	313.16	0.315	0.360	12.126	25	$1,018.42	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and central AC	2.02	$0.078	0.084
5056	HVAC Shell	Original double hung window with low U storm	SF	All	RETRO	-	-	734.09	0.694	0.807	25.504	25	$3,564.00	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and central AC	1.25	$0.121	0.127
5057	HVAC Shell	Duct Insulation	SF	All	RETRO	-	-	-13.81	0.000	0.000	2.239	20	$380.16	Adding duct insulation in homes with gas heating and no central AC	0.44	$0.000	0.007
5058	HVAC Shell	Duct location	SF	All	RETRO	-	-	10.36	0.000	0.000	9.200	30	$1,188.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and no central AC	0.77	$0.078	0.084
5059	HVAC Shell	Duct sealing 15% leakage base	SF	All	RETRO	-	-	4.56	0.000	0.000	0.927	18	$341.86	Duct sealing (15% leakage reduction) in homes with gas heating and no central AC	0.22	$0.250	0.257
5060	HVAC Shell	Duct sealing 30% leakage base	SF	All	RETRO	-	-	14.43	0.000	0.000	2.367	18	$341.86	Duct sealing (30% leakage reduction) in homes with gas heating and no central AC	0.57	$0.097	0.103
5061	HVAC Shell	R0 to R19 kneewalls	SF	All	RETRO	-	-	29.82	0.000	0.000	7.559	20	$172.53	Installing R19 kneewall insulation in homes with no kneewall insulation in homes with gas heating and no central AC	3.76	$0.015	0.022
5062	HVAC Shell	R6 to R19 kneewalls	SF	All	RETRO	-	-	11.13	0.000	0.000	3.049	20	$162.53	Installing R19 kneewall insulation in homes with R6 kneewall insulation in homes with gas heating and no central AC	1.60	$0.035	0.042
5063	HVAC Shell	Rim Joist Insulation	SF	All	RETRO	-	-	0.00	0.000	0.000	3.536	25	$179.92	Installing rim joist insulation in homes with gas heating and no central AC	1.79		
5064	HVAC Shell	Window Film	SF	All	RETRO	-	-	-36.96	0.000	0.000	-8.143	10	$365.46	Installing window film on inefficient existing windows in homes with gas heating and no central AC	-1.23	-$0.781	-0.772
5065	HVAC Shell	Window Replacement	SF	All	ROB	-	-	51.04	0.000	0.000	12.479	25	$1,018.42	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and no central AC	1.17	$0.050	0.056
5066	HVAC Shell	Original double hung window with low U storm	SF	All	RETRO	-	-	146.67	0.000	0.000	25.489	25	$3,564.00	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and no central AC	0.70	$0.084	0.090
5067	HVAC Shell	HW pipe insulation	SF	All	RETRO	-	-	-8.94	0.000	0.000	29.119	11	$1,404.58	Installing hot water pipe insulation on boiler pipes in homes with boilers	1.16	$0.000	0.009
5068	HVAC Shell	Steam pipe insulation	SF	All	RETRO	-	-	-14.95	0.000	0.000	49.230	11	$1,404.58	Installing steam pipe insulation on boiler pipes in homes with boilers	1.97	$0.000	0.009
5069	HVAC Shell	Duct Insulation	SF	All	RETRO	-	-	534.20	0.025	0.023	0.000	20	$380.16	Adding duct insulation in homes with electric heating and central AC	1.55	$0.040	0.046
5070	HVAC Shell	Duct location	SF	All	RETRO	-	-	2151.72	0.095	0.083	0.000	30	$1,188.00	Moving ductwork from unconditioned space to conditioned space in homes with electric heating and central AC	2.37	$0.028	0.033
5071	HVAC Shell	Duct sealing 15% leakage base	SF	All	RETRO	-	-	240.31	0.035	0.028	0.000	18	$341.86	Duct sealing (15% leakage reduction) in homes with electric heating and central AC	0.84	$0.083	0.090
5072	HVAC Shell	Duct sealing 30% leakage base	SF	All	RETRO	-	-	625.84	0.085	0.074	0.000	18	$341.86	Duct sealing (30% leakage reduction) in homes with electric heating and central AC	2.17	$0.032	0.039
5073	HVAC Shell	R0 to R19 kneewalls	SF	All	RETRO	-	-	1706.72	0.094	0.085	0.000	20	$172.53	Installing R19 kneewall insulation in homes with no kneewall insulation in homes with electric heating and central AC	11.06	$0.006	0.012
5074	HVAC Shell	R6 to R19 kneewalls	SF	All	RETRO	-	-	555.27	0.028	0.027	0.590	20	$162.53	Installing R19 kneewall insulation in homes with R6 kneewall insulation in homes with electric heating and central AC	4.09	$0.015	0.022
5075	HVAC Shell	Rim Joist Insulation	SF	All	RETRO	-	-	798.25	0.030	0.026	0.000	25	$179.92	Installing rim joist insulation in homes with electric heating and central AC	5.37	$0.012	0.018
5076	HVAC Shell	Window Film	SF	All	RETRO	-	-	-1337.08	0.369	0.317	-0.020	10	$365.46	Installing window film on inefficient existing windows in homes with electric heating and central AC	-1.23	-$0.022	-0.012
5077	HVAC Shell	Window Replacement	SF	All	ROB	-	-	2997.22	0.360	0.315	0.000	25	$1,018.42	Replacing inefficient windows at the end of useful life with efficient windows in homes with electric heating and central AC	4.02	$0.018	0.024
5078	HVAC Shell	Original double hung window with low U storm	SF	All	RETRO	-	-	6404.40	0.807	0.694	0.000	25	$3,564.00	Retrofitting inefficient windows with efficient alternatives in homes with electric heating and central AC	2.47	$0.029	0.035
5079	HVAC Shell	Infiltration reduction - 30%	SF	All	NC	-	-	28.31	0.018	0.028	3.611	13	$190.08	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	1.44	$0.076	0.083
5080	HVAC Shell	Infiltration reduction - 50%	SF	All	NC	-	-	46.02	0.029	0.046	6.012	13	$190.08	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	2.39	$0.046	0.054
5081	HVAC Shell	Duct Insulation	SF	All	NC	-	-	7.11	0.029	0.030	1.663	20	$380.16	Adding duct insulation in homes with gas heating and central AC	0.51	$0.881	0.888
5082	HVAC Shell	Duct location	SF	All	NC	-	-	58.05	0.039	0.044	6.598	30	$1,188.00	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	0.67	$0.191	0.197
5083	HVAC Shell	Duct sealing 15% leakage base	SF	All	NC	-	-	11.218	0.015	0.018	0.340	18	$341.86	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	0.18	$1.003	1.010
5084	HVAC Shell	Duct sealing 30% leakage base	SF	All	NC	-	-	29.423	0.041	0.046	0.920	18	$341.86	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	0.48	$0.386	0.393
5085	HVAC Shell	Door weatherstripping	SF	All	NC	-	-	0.000	0.000	0.000	0.000	5	$86.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.00		
5086	HVAC Shell	Basement Wall Insulation	SF	All	NC	-	-	-1.652	-0.017	-0.028	3.651	25	$1,104.21	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.27	$0.000	0.006

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
5087	HVAC Shell	Floor Insulation	SF	All	NC	-	-	-6.083	0.000	0.000	0.642	25	$819.88	Installing floor wall insulation in homes with unconditioned basements or crawl spaces and gas heating and central AC	0.06	$0.000	0.006
5088	HVAC Shell	Crawlspace Wall Insulation	SF	All	NC	-	-	-1.863	0.000	0.000	0.074	25	$552.11	Installing crawlspace wall insulation in homes with unconditioned crawlspaces and gas heating and central AC	0.01	$0.000	0.006
5089	HVAC Shell	Wall Insulation	SF	All	NC	-	-	34.966	0.000	0.028	3.249	25	$3,041.11	Installing wall insulation in homes with gas heating and central AC	0.11	$0.549	0.555
5090	HVAC Shell	Window Film	SF	All	NC	-	-	97.641	0.044	0.052	-1.943	10	$365.46	Installing window film on windows in homes with gas heating and central AC	0.02	$0.296	0.305
5091	HVAC Shell	Window Replacement	SF	All	NC	-	-	75.944	0.007	0.099	1.305	25	$1,018.42	Installing efficient windows in homes with gas heating and central AC	0.21	$0.318	0.324
5092	HVAC Shell	Infiltration reduction - 30%	MF	NLI	RETRO	-	-	29.948	0.040	0.073	3.576	13	$101.16	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	2.98	$0.058	0.065
5093	HVAC Shell	Infiltration reduction - 50%	MF	NLI	RETRO	-	-	50.891	0.071	0.130	5.984	13	$101.16	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	5.04	$0.035	0.043
5094	HVAC Shell	Basement Wall Insulation	MF	NLI	RETRO	-	-	-20.080	-0.019	-0.026	4.435	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.59	$0.000	0.006
5095	HVAC Shell	Wall Insulation	MF	NLI	RETRO	-	-	46.189	0.032	0.039	6.507	25	$1,670.90	Installing wall insulation in homes with gas heating and central AC	0.42	$0.302	0.308
5096	HVAC Shell	Roof Insulation	MF	NLI	RETRO	-	-	48.543	0.032	0.033	4.148	25	$638.11	Installing roof insulation in homes with gas heating and central AC	0.77	$0.160	0.166
5097	HVAC Shell	Infiltration reduction - 30%	MF	NLI	RETRO	-	-	14.135	0.000	0.000	3.445	13	$101.16	Air sealing (30% infiltration reduction) in homes with gas heating and no central AC	2.26	$0.023	0.031
5098	HVAC Shell	Infiltration reduction - 50%	MF	NLI	RETRO	-	-	23.375	0.000	0.000	5.766	13	$101.16	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	3.78	$0.014	0.022
5099	HVAC Shell	Basement Wall Insulation	MF	NLI	RETRO	-	-	16.342	0.000	0.000	4.748	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.78	$0.075	0.081
5100	HVAC Shell	Wall Insulation	MF	NLI	RETRO	-	-	24.402	0.000	0.000	5.868	25	$1,670.90	Installing wall insulation in homes with gas heating and no central AC	0.34	$0.174	0.180
5101	HVAC Shell	Roof Insulation	MF	NLI	RETRO	-	-	15.625	0.000	0.000	4.176	25	$638.11	Installing roof insulation in homes with gas heating and no central AC	0.62	$0.094	0.100
5102	HVAC Shell	Infiltration reduction - 30%	MF	NLI	RETRO	-	-	714.758	0.042	0.075	0.000	13	$101.16	Air sealing (30% infiltration reduction) in homes with electric heating and central AC	6.06	$0.010	0.017
5103	HVAC Shell	Infiltration reduction - 50%	MF	NLI	RETRO	-	-	1191.506	0.071	0.129	0.000	13	$101.16	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	10.12	$0.006	0.014
5104	HVAC Shell	Basement Wall Insulation	MF	NLI	RETRO	-	-	854.119	-0.019	-0.026	0.000	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	1.61	$0.036	0.042
5105	HVAC Shell	Wall Insulation	MF	NLI	RETRO	-	-	1283.273	0.035	0.042	0.000	25	$1,670.90	Installing wall insulation in homes with electric heating and central AC	0.91	$0.068	0.074
5106	HVAC Shell	Roof Insulation	MF	NLI	RETRO	-	-	849.257	0.028	0.039	0.000	25	$638.11	Installing roof insulation in homes with electric heating and central AC	1.60	$0.039	0.045
5107	HVAC Shell	Infiltration reduction - 50%	MF	LI	DI	-	-	50.891	0.071	0.130	5.984	13	$101.16	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	2.52	$0.070	0.078
5108	HVAC Shell	Basement Wall Insulation	MF	LI	DI	-	-	-20.080	-0.019	-0.026	4.435	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.30	$0.000	0.006
5109	HVAC Shell	Wall Insulation	MF	LI	DI	-	-	46.189	0.032	0.039	6.507	25	$1,670.90	Installing wall insulation in homes with gas heating and central AC	0.21	$0.604	0.610
5110	HVAC Shell	Roof Insulation	MF	LI	DI	-	-	48.543	0.032	0.033	4.148	25	$638.11	Installing roof insulation in homes with gas heating and central AC	0.39	$0.320	0.326
5111	HVAC Shell	Infiltration reduction - 50%	MF	LI	DI	-	-	23.375	0.000	0.000	5.766	13	$101.16	Air sealing (50% infiltration reduction) in homes with gas heating and no central AC	1.89	$0.028	0.036
5112	HVAC Shell	Basement Wall Insulation	MF	LI	DI	-	-	16.342	0.000	0.000	4.748	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and gas heating and no central AC	0.39	$0.151	0.157
5113	HVAC Shell	Wall Insulation	MF	LI	DI	-	-	24.402	0.000	0.000	5.868	25	$1,670.90	Installing wall insulation in homes with gas heating and no central AC	0.17	$0.348	0.354
5114	HVAC Shell	Roof Insulation	MF	LI	DI	-	-	15.625	0.000	0.000	4.176	25	$638.11	Installing roof insulation in homes with gas heating and no central AC	0.31	$0.187	0.193
5115	HVAC Shell	Infiltration reduction - 50%	MF	LI	DI	-	-	1191.506	0.071	0.129	0.000	13	$101.16	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	5.06	$0.012	0.019
5116	HVAC Shell	Basement Wall Insulation	MF	LI	DI	-	-	854.119	-0.019	-0.026	0.000	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	0.81	$0.071	0.077
5117	HVAC Shell	Wall Insulation	MF	LI	DI	-	-	1283.273	0.035	0.042	0.000	25	$1,670.90	Installing wall insulation in homes with electric heating and central AC	0.46	$0.136	0.142
5118	HVAC Shell	Roof Insulation	MF	LI	DI	-	-	849.257	0.028	0.039	0.000	25	$638.11	Installing roof insulation in homes with electric heating and central AC	0.80	$0.078	0.084
5119	HVAC Shell	Duct Insulation	MF	All	RETRO	-	-	40.888	0.064	0.069	2.426	20	$202.32	Adding duct insulation in homes with gas heating and central AC	1.72	$0.119	0.125
5120	HVAC Shell	Duct location	MF	All	RETRO	-	-	81.138	0.127	0.153	4.888	30	$632.25	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	1.32	$0.166	0.171
5121	HVAC Shell	Duct sealing 15% leakage base	MF	All	RETRO	-	-	14.388	0.015	0.016	0.767	18	$181.94	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	0.53	$0.286	0.292
5122	HVAC Shell	Duct sealing 30% leakage base	MF	All	RETRO	-	-	39.214	0.040	0.044	2.048	18	$181.94	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	1.43	$0.106	0.113
5123	HVAC Shell	Door weatherstripping	MF	All	RETRO	-	-	9.188	0.003	0.004	0.213	5	$43.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.26	$0.250	0.265
5124	HVAC Shell	Window Film	MF	All	RETRO	-	-	429.355	0.391	0.411	-8.685	10	$194.50	Installing window film on inefficient existing windows in homes with gas heating and central AC	1.23	$0.036	0.045
5125	HVAC Shell	Window Replacement	MF	All	ROB	-	-	150.894	0.143	0.162	5.972	25	$542.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and central AC	1.81	$0.084	0.090
5126	HVAC Shell	Original double hung window with low U storm	MF	All	RETRO	-	-	671.964	0.660	0.734	46.728	25	$1,896.75	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and central AC	3.30	$0.047	0.053
5127	HVAC Shell	Duct Insulation	MF	All	RETRO	-	-	0.352	0.000	0.000	2.426	20	$202.32	Adding duct insulation in homes with gas heating and no central AC	0.98	$0.057	0.064
5128	HVAC Shell	Duct location	MF	All	RETRO	-	-	5.559	0.000	0.000	4.890	30	$632.25	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and no central AC	0.77	$0.078	0.084
5129	HVAC Shell	Duct sealing 15% leakage base	MF	All	RETRO	-	-	3.651	0.000	0.000	0.766	18	$181.94	Duct sealing (15% leakage reduction) in homes with gas heating and no central AC	0.34	$0.161	0.168
5130	HVAC Shell	Duct sealing 30% leakage base	MF	All	RETRO	-	-	10.076	0.000	0.000	2.046	18	$181.94	Duct sealing (30% leakage reduction) in homes with gas heating and no central AC	0.92	$0.060	0.067
5131	HVAC Shell	Window Film	MF	All	RETRO	-	-	-36.710	0.000	0.000	-8.685	10	$194.50	Installing window film on inefficient existing windows in homes with gas heating and no central AC	-2.46	-$0.418	-0.409
5132	HVAC Shell	Window Replacement	MF	All	ROB	-	-	23.313	0.000	0.000	5.725	25	$542.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with gas heating and no central AC	1.01	$0.058	0.064

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
5133	HVAC Shell	Original double hung window with low U storm	MF	All	RETRO	-	-	240.943	-0.011	-0.012	46.521	25	$1,896.75	Retrofitting inefficient windows with efficient alternatives in homes with gas heating and no central AC	2.37	$0.023	0.029
5134	HVAC Shell	Duct Insulation	MF	All	RETRO	-	-	585.128	0.065	0.071	0.000	20	$202.32	Adding duct insulation in homes with electric heating and central AC	3.51	$0.019	0.026
5135	HVAC Shell	Duct location	MF	All	RETRO	-	-	1160.832	0.126	0.152	0.000	30	$632.25	Moving ductwork from unconditioned space to conditioned space in homes with electric heating and central AC	2.64	$0.027	0.033
5136	HVAC Shell	Duct sealing 15% leakage base	MF	All	RETRO	-	-	179.645	0.015	0.016	0.000	18	$181.94	Duct sealing (15% leakage reduction) in homes with electric heating and central AC	1.08	$0.059	0.066
5137	HVAC Shell	Duct sealing 30% leakage base	MF	All	RETRO	-	-	480.532	0.040	0.044	0.000	18	$181.94	Duct sealing (30% leakage reduction) in homes with electric heating and central AC	2.90	$0.022	0.029
5138	HVAC Shell	Window Film	MF	All	RETRO	-	-	-1098.453	0.399	0.419	0.000	10	$194.50	Installing window film on inefficient existing windows in homes with electric heating and central AC	-1.36	-$0.014	-0.005
5139	HVAC Shell	Window Replacement	MF	All	ROB	-	-	1592.264	0.192	0.220	0.000	25	$542.00	Replacing inefficient windows at the end of useful life with efficient windows in homes with electric heating and central AC	4.01	$0.018	0.024
5140	HVAC Shell	Original double hung window with low U storm	MF	All	RETRO	-	-	7984.311	0.648	0.720	0.000	25	$1,896.75	Retrofitting inefficient windows with efficient alternatives in homes with electric heating and central AC	5.44	$0.012	0.018
5141	HVAC Shell	Infiltration reduction - 30%	MF	All	NC	-	-	18.306	0.028	0.043	2.272	13	$101.16	Air sealing (30% infiltration reduction) in homes with gas heating and central AC	1.91	$0.097	0.105
5142	HVAC Shell	Infiltration reduction - 50%	MF	All	NC	-	-	31.138	0.044	0.069	3.812	13	$101.16	Air sealing (50% infiltration reduction) in homes with gas heating and central AC	3.18	$0.056	0.063
5143	HVAC Shell	Airtight Can Lights	MF	All	NC	-	-	13.859	0.021	0.033	1.756	15	$459.90	Installing air can lights to reduce infiltration in homes with gas heating and central AC	0.36	$0.536	0.543
5144	HVAC Shell	Duct Insulation	MF	All	NC	-	-	51.471	0.074	0.081	2.140	20	$202.32	Adding duct insulation in homes with gas heating and central AC	1.74	$0.111	0.117
5145	HVAC Shell	Duct location	MF	All	NC	-	-	83.190	0.127	0.152	3.581	30	$632.25	Moving ductwork from unconditioned space to conditioned space in homes with gas heating and central AC	1.12	$0.191	0.197
5146	HVAC Shell	Duct sealing 15% leakage base	MF	All	NC	-	-	10.718	0.011	0.011	0.464	18	$181.94	Duct sealing (15% leakage reduction) in homes with gas heating and central AC	0.35	$0.431	0.438
5147	HVAC Shell	Duct sealing 30% leakage base	MF	All	NC	-	-	29.127	0.031	0.033	1.244	18	$181.94	Duct sealing (30% leakage reduction) in homes with gas heating and central AC	0.95	$0.163	0.170
5148	HVAC Shell	Door weatherstripping	MF	All	NC	-	-	5.380	0.003	0.003	0.244	5	$43.00	Installing door weatherstripping - savings estimate weighted across heating/cooling combinations	0.25	$0.325	0.340
5149	HVAC Shell	Basement Wall Insulation	MF	All	NC	-	-	-0.871	-0.011	-0.015	1.924	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and gas heating and central AC	0.26	$0.000	0.006
5150	HVAC Shell	Wall Insulation	MF	All	NC	-	-	13.630	0.012	0.014	2.116	25	$1,670.90	Installing wall insulation in homes with gas heating and central AC	0.14	$1.065	1.071
5151	HVAC Shell	Roof Insulation	MF	All	NC	-	-	16.723	0.009	0.009	1.534	25	$638.11	Installing roof insulation in homes with gas heating and central AC	0.28	$0.408	0.414
5152	HVAC Shell	Cool roof	MF	All	NC	-	-	68.648	0.060	0.060	-0.455	20	$644.90	Installing a cool roof in homes with gas heating and central AC	0.21	$0.526	0.532
5153	HVAC Shell	Window Film	MF	All	NC	-	-	106.266	0.083	0.086	-2.174	10	$194.50	Installing window film on windows in homes with gas heating and central AC	0.22	$0.145	0.154
5154	HVAC Shell	Window Replacement	MF	All	NC	-	-	33.113	0.030	0.030	0.790	25	$2,878.72	Installing efficient windows in homes with gas heating and central AC	0.06	$2.561	2.567
5155	HVAC Shell	Infiltration reduction - 30%	MF	All	NC	-	-	265.185	0.028	0.030	0.000	13	$101.16	Air sealing (30% infiltration reduction) in homes with electric heating and central AC	2.41	$0.026	0.034
5156	HVAC Shell	Infiltration reduction - 50%	MF	All	NC	-	-	442.988	0.039	0.041	0.000	13	$101.16	Air sealing (50% infiltration reduction) in homes with electric heating and central AC	3.92	$0.016	0.023
5157	HVAC Shell	Airtight Can Lights	MF	All	NC	-	-	204.708	0.018	0.029	0.000	15	$459.90	Installing air can lights to reduce infiltration in homes with electric heating and central AC	0.44	$0.142	0.149
5158	HVAC Shell	Duct Insulation	MF	All	NC	-	-	492.048	0.089	0.089	0.000	20	$202.32	Adding duct insulation in homes with electric heating and central AC	3.23	$0.023	0.030
5159	HVAC Shell	Duct location	MF	All	NC	-	-	770.933	0.131	0.148	0.000	30	$632.25	Moving ductwork from unconditioned space to conditioned space in homes with electric heating and central AC	1.90	$0.041	0.047
5160	HVAC Shell	Duct sealing 15% leakage base	MF	All	NC	-	-	76.904	0.009	0.011	0.000	18	$181.94	Duct sealing (15% leakage reduction) in homes with electric heating and central AC	0.49	$0.138	0.145
5161	HVAC Shell	Duct sealing 30% leakage base	MF	All	NC	-	-	205.498	0.027	0.030	0.000	18	$181.94	Duct sealing (30% leakage reduction) in homes with electric heating and central AC	1.32	$0.052	0.058
5162	HVAC Shell	Basement Wall Insulation	MF	All	NC	-	-	215.779	0.000	0.000	0.000	25	$581.78	Installing basement wall insulation in homes with unconditioned basements and electric heating and central AC	0.42	$0.141	0.147
5163	HVAC Shell	Wall Insulation	MF	All	NC	-	-	261.392	0.014	0.014	0.000	25	$1,670.90	Installing wall insulation in homes with electric heating and central AC	0.19	$0.334	0.340
5164	HVAC Shell	Roof Insulation	MF	All	NC	-	-	208.608	0.007	0.007	0.000	25	$638.11	Installing roof insulation in homes with electric heating and central AC	0.39	$0.160	0.166
5165	HVAC Shell	Cool roof	MF	All	NC	-	-	10.590	0.037	0.037	0.000	20	$644.90	Installing a cool roof in homes with electric heating and central AC	0.11	$3.410	3.416
5166	HVAC Shell	Window Film	MF	All	NC	-	-	-69.739	0.087	0.087	0.000	10	$194.50	Installing window film on windows in homes with electric heating and central AC	0.26	-$0.220	-0.211
5167	HVAC Shell	Window Replacement	MF	All	NC	-	-	140.165	0.030	0.030	0.000	25	$2,878.72	Installing efficient windows in homes with electric heating and central AC	0.07	$1.072	1.078
6001	HVAC Equipment	Furnace/AC - SEER 18	SF	NLI	ROB	1925.834	-	444.423	0.329	0.329	-1.758	15	$829.14	Installation of 18 SEER air conditioner - baseline is 13 SEER AC	0.89	$0.118	0.125
6002	HVAC Equipment	Furnace/AC - SEER 21	SF	NLI	ROB	1925.834	-	762.677	0.761	0.761	-2.052	15	$2,211.04	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.73	$0.183	0.190
6003	HVAC Equipment	RCA 10% improvement	SF	NLI	RETRO	2503.584	-	115.981	0.165	0.165	0.000	5	$139.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	0.99	$0.155	0.170
6004	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	SF	NLI	ROB	1216.000	-	536.032	0.000	0.000	21.805	15	$1,427.65	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.38	$0.040	0.047
6005	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	SF	NLI	ROB	1216.000	-	536.032	0.000	0.000	29.062	15	$1,608.58	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.54	$0.035	0.043
6006	HVAC Equipment	O&M Tune-up - furnace only	SF	NLI	RETRO	0.000	-	0.000	0.000	0.000	6.492	3	$139.00	5% increase in furnace efficiency - in homes with gas furnaces	0.91		
6007	HVAC Equipment	Boiler 95% plus AFUE	SF	NLI	ROB	0.000	-	-436.568	0.000	0.000	52.706	15	$2,436.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	1.35	$0.000	0.007
6008	HVAC Equipment	Boiler 92% plus AFUE	SF	NLI	ROB	0.000	-	-436.568	0.000	0.000	47.878	15	$1,954.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	1.51	$0.000	0.007
6009	HVAC Equipment	Boiler Tune-up	SF	NLI	RETRO	0.000	-	0.000	0.000	0.000	6.979	5	$139.00	Increasing boiler efficiency by 5% - in homes with gas boilers	1.52		
6010	HVAC Equipment	Furnace/AC - SEER 18	SF	LI	DI	1925.834	-	444.423	0.329	0.329	-1.758	15	$829.14	Installation of 18 SEER air conditioner - baseline is 13 SEER AC	0.44	$0.236	0.243
6011	HVAC Equipment	RCA 10% improvement	SF	LI	DI	2503.584	-	115.981	0.165	0.165	0.000	5	$139.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	0.49	$0.311	0.326

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
6012	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	SF	LI	DI	1216.000	-	536.032	0.000	0.000	21.805	15	$1,427.65	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.69	$0.079	0.086
6013	HVAC Equipment	O&M Tune-up - furnace only	SF	LI	DI	0.000	-	0.000	0.000	0.000	6.492	3	$139.00	5% increase in furnace efficiency - in homes with gas furnaces	0.46		
6014	HVAC Equipment	Boiler 92% plus AFUE	SF	LI	DI	0.000	-	-436.568	0.000	0.000	47.878	15	$1,954.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.75	$0.000	0.007
6015	HVAC Equipment	Boiler Tune-up	SF	LI	DI	0.000	-	0.000	0.000	0.000	6.979	5	$139.00	Increasing boiler efficiency by 5% - in homes with gas boilers	0.76		
6016	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	SF	All	ROB	6591.974	-	1398.000	0.617	0.617	0.000	15	$1,827.63	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.14	$0.083	0.090
6017	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	SF	All	ROB	6591.974	-	2096.999	0.926	0.926	0.000	15	$3,198.36	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.98	$0.096	0.104
6018	HVAC Equipment	GSHP - EER 19 ASHP SEER 14 Base	SF	All	ROB	6591.974	-	4755.965	0.359	0.359	0.000	15	$20,313.66	Installation of EER 19 GSHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.23	$0.270	0.277
6019	HVAC Equipment	SEER21 Minisplit Heat pump	SF	All	ROB	6591.974	-	3569.626	0.621	0.621	0.000	15	$2,111.74	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.88	$0.037	0.045
6020	HVAC Equipment	SEER21 Minisplit Heat pump	SF	All	RETRO	22188.534	-	8875.414	-1.040	-1.040	0.000	15	$4,334.05	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is electic furnace / central air conditioning	1.43	$0.031	0.038
6021	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	SF	All	ROB	6591.974	-	1405.219	0.617	0.617	2.023	15	$1,189.14	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.87	$0.050	0.057
6022	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	SF	All	ROB	6591.974	-	2107.829	0.926	0.926	3.035	15	$2,125.65	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.57	$0.060	0.067
6023	HVAC Equipment	Programmable Thermostats Tier 1	SF	All	RETRO	0.000	-	62.811	0.000	0.000	7.516	10	$42.72	0.000	10.16	$0.005	0.014
6024	HVAC Equipment	Programmable Thermostats Tier 2	SF	All	RETRO	0.000	-	206.458	0.000	0.000	24.706	10	$161.72	0.000	8.83	$0.006	0.015
6025	HVAC Equipment	Programmable Thermostats Tier 3	SF	All	RETRO	1239.623	-	111.566	0.000	0.000	7.522	10	$237.99	Installation of Tier 3 programmable thermostat in homes with gas heating and central AC	1.95	$0.025	0.034
6026	HVAC Equipment	Programmable Thermostats Tier 1	SF	All	RETRO	0.000	-	0.000	0.000	0.000	6.857	10	$42.72	0.000	8.44		
6027	HVAC Equipment	Programmable Thermostats Tier 2	SF	All	RETRO	0.000	-	0.000	0.000	0.000	22.539	10	$161.72	0.000	7.33		
6028	HVAC Equipment	Programmable Thermostats Tier 3	SF	All	RETRO	0.000	-	0.000	0.000	0.000	7.653	10	$237.99	Installation of Tier 3 programmable thermostat in homes with gas heating and no AC	1.69		
6029	HVAC Equipment	Programmable Thermostats Tier 1	SF	All	RETRO	0.000	-	999.854	0.000	0.000	0.000	10	$42.72	0.000	14.85	$0.003	0.013
6030	HVAC Equipment	Programmable Thermostats Tier 2	SF	All	RETRO	0.000	-	3286.475	0.000	0.000	0.000	10	$161.72	0.000	12.89	$0.004	0.013
6031	HVAC Equipment	Programmable Thermostats Tier 3	SF	All	RETRO	16549.879	-	1158.492	0.000	0.000	0.000	10	$237.99	Installation of Tier 3 programmable thermostat in homes with electric heating and central AC	3.09	$0.016	0.025
6032	HVAC Equipment	Smartphone Behavior Application	SF	All	RETRO	3166.555	0.011	33.249	0.000	0.000	0.872	1	$5.00	Use of smartphone application to deliver behavioral savings	1.83	$0.022	0.086
6033	HVAC Equipment	Smartphone Behavior Application	SF	All	RETRO			0.000	0.000	0.000	0.000	1	$5.00		0.00		
6034	HVAC Equipment	Smartphone Behavior Application	SF	All	RETRO			0.000	0.000	0.000	0.000	1	$5.00		0.00		
6035	HVAC Equipment	ENERGY STAR Room AC	SF	All	ROB	471.193	0.092	43.193	0.067	0.067	0.000	15	$75.00	Installation of ENERGY STAR replacement room AC instead of a standard units	1.78	$0.110	0.117
6036	HVAC Equipment	ECM Furnace Fan	SF	All	RETRO	1216.000	0.603	733.000	0.073	0.073	0.000	10	$788.00	Installation of efficient fan motor in homes with furnaces	0.68	$0.085	0.094
6037	HVAC Equipment	Hot water temperature reset	SF	All	RETRO	0.000	-	-3.653	0.000	0.000	7.596	15	$600.00	Retrofitting of existing boiler with temperature reset controls	0.87	$0.000	0.007
6038	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	SF	All	NC	4877.719	-	1012.492	0.447	0.447	0.000	15	$1,827.63	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.82	$0.114	0.121
6039	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	SF	All	NC	4877.719	-	1518.738	0.670	0.670	0.000	15	$3,198.36	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.71	$0.133	0.140
6040	HVAC Equipment	GSHP - EER 19 ASHP SEER 14 Base	SF	All	NC	4877.719	-	4862.045	0.467	0.467	0.000	15	$20,313.66	Installation of EER 19 GSHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.24	$0.264	0.271
6041	HVAC Equipment	SEER21 Minisplit Heat pump	SF	All	NC	4877.719	-	1604.489	0.513	0.513	0.000	15	$2,111.74	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.00	$0.083	0.090
6042	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	SF	All	NC	4877.719	-	1015.153	0.447	0.447	1.091	15	$1,189.14	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.33	$0.070	0.078
6043	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	SF	All	NC	4877.719	-	1522.729	0.670	0.670	1.636	15	$2,125.65	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.12	$0.084	0.091
6044	HVAC Equipment	Furnace/AC - SEER 18	SF	All	NC	1204.967	-	278.069	0.239	0.239	-1.165	15	$829.14	Installation of 18 SEER air conditioner - baseline is 13 SEER AC	0.61	$0.188	0.196
6045	HVAC Equipment	Furnace/AC - SEER 21	SF	All	NC	1204.967	-	482.696	0.539	0.539	-1.357	15	$2,211.04	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.50	$0.289	0.297
6046	HVAC Equipment	ENERGY STAR Room AC	SF	All	NC	471.193	0.092	43.193	0.067	0.067	0.000	15	$75.00	Installation of ENERGY STAR replacement room AC instead of a standard units	1.78	$0.110	0.117
6047	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	SF	All	NC	1216.000	-	499.049	0.000	0.000	12.931	15	$1,427.65	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.93	$0.059	0.066
6048	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	SF	All	NC	1216.000	-	499.049	0.000	0.000	17.235	15	$1,608.58	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.01	$0.054	0.061
6049	HVAC Equipment	ECM Furnace Fan	SF	All	NC	1216.000	0.603	733.000	0.073	0.073	0.000	10	$788.00	Installation of efficient fan motor in homes with furnaces	0.68	$0.085	0.094
6050	HVAC Equipment	Boiler 92% plus AFUE	SF	All	NC	0.000	-	-260.007	0.000	0.000	29.774	15	$1,954.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.94	$0.000	0.007
6051	HVAC Equipment	Boiler 95% plus AFUE	SF	All	NC	0.000	-	-260.007	0.000	0.000	32.599	15	$2,436.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.84	$0.000	0.007
6052	HVAC Equipment	Furnace/AC - SEER 18	MF	NLI	ROB	1113.073	-	256.863	0.212	0.212	-5.702	15	$829.14	Installation of 18 SEER air conditioner - baseline is 13 SEER AC	0.16	$0.204	0.211
6053	HVAC Equipment	Furnace/AC - SEER 21	MF	NLI	ROB	1113.073	-	565.653	0.647	0.647	-6.231	15	$2,211.04	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.44	$0.247	0.254
6054	HVAC Equipment	RCA 10% improvement	MF	NLI	RETRO	1446.995	-	101.969	0.149	0.149	0.000	5	$139.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	0.89	$0.177	0.192
6055	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	MF	NLI	ROB	1216.000	-	344.238	0.139	0.139	13.534	15	$1,427.65	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	1.00	$0.090	0.098
6056	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	MF	NLI	ROB	1216.000	-	344.238	0.139	0.139	13.842	15	$1,608.58	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.90	$0.100	0.108
6057	HVAC Equipment	O&M Tune-up - furnace only	MF	NLI	RETRO	0.000	-	0.000	0.000	0.000	4.133	3	$139.00	5% increase in furnace efficiency - in homes with gas furnaces	0.58		

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
6058	HVAC Equipment	Boiler 92% plus AFUE	MF	NLI	ROB	0.000	-	-672.477	0.000	0.000	32.502	15	$1,954.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.86	$0.000	0.007
6059	HVAC Equipment	Boiler 95% plus AFUE	MF	NLI	ROB	0.000	-	-672.477	0.000	0.000	39.662	15	$2,436.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.89	$0.000	0.007
6060	HVAC Equipment	Boiler Tune-up	MF	NLI	RETRO	0.000	-	0.000	0.000	0.000	8.556	5	$139.00	Increasing boiler efficiency by 5% - in homes with gas boilers	1.86		
6061	HVAC Equipment	Furnace/AC - SEER 18	MF	LI	DI	1113.073	-	256.863	0.212	0.212	-5.702	15	$829.14	Installation of 18 SEER air conditioner - baseline is 13 SEER AC	0.08	$0.408	0.415
6062	HVAC Equipment	RCA 10% improvement	MF	LI	DI	1446.995	-	101.969	0.149	0.149	0.000	5	$139.00	Refrigerant charge and air flow adjustment - 10% improvement - in homes with gas furnace and central AC	0.45	$0.353	0.368
6063	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	MF	LI	DI	1216.000	-	344.238	0.139	0.139	13.534	15	$1,427.65	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.50	$0.181	0.188
6064	HVAC Equipment	O&M Tune-up - furnace only	MF	LI	DI	0.000	-	0.000	0.000	0.000	4.133	3	$139.00	5% increase in furnace efficiency - in homes with gas furnaces	0.29		
6065	HVAC Equipment	Boiler 92% plus AFUE	MF	LI	DI	0.000	-	-672.477	0.000	0.000	32.502	15	$1,954.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.43	$0.000	0.007
6066	HVAC Equipment	Boiler Tune-up	MF	LI	DI	0.000	-	0.000	0.000	0.000	8.556	5	$139.00	Increasing boiler efficiency by 5% - in homes with gas boilers	0.93		
6067	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	MF	All	ROB	6466.164	-	1289.862	0.606	0.606	0.000	15	$1,827.63	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.08	$0.090	0.097
6068	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	MF	All	ROB	6466.164	-	1934.793	0.908	0.908	0.000	15	$3,198.36	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	0.92	$0.104	0.112
6069	HVAC Equipment	SEER21 Minisplit Heat pump	MF	All	ROB	6466.164	-	1778.484	0.309	0.309	0.000	15	$1,052.13	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.88	$0.037	0.045
6070	HVAC Equipment	SEER21 Minisplit Heat pump	MF	All	RETRO	11054.926	-	4421.970	-0.518	-0.518	0.000	15	$2,159.34	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is electic furnace / central air conditioning	1.43	$0.031	0.038
6071	HVAC Equipment	PTHP 9.1 EER	MF	All	ROB	6466.164	-	294.568	0.149	0.149	0.000	15	$169.21	Installation of 9.3 EER packaged terminal heat pump (PTHP) - in homes with PTHPs	2.75	$0.036	0.044
6072	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	MF	All	ROB	6466.164	-	1280.671	0.606	0.606	1.791	15	$1,189.14	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.76	$0.055	0.063
6073	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	MF	All	ROB	6466.164	-	1921.007	0.908	0.908	2.687	15	$2,125.65	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.47	$0.066	0.073
6074	HVAC Equipment	Programmable Thermostats Tier 1	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	10	$1.00	Installation of Tier 1 programmable thermostat	0.00		
6075	HVAC Equipment	Programmable Thermostats Tier 2	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	10	$1.00	Installation of Tier 2 programmable thermostat	0.00		
6076	HVAC Equipment	Programmable Thermostats Tier 3	MF	All	RETRO	471.631	-	31.599	0.000	0.000	2.130	10	$126.66	Installation of Tier 3 programmable thermostat	1.04	$0.047	0.057
6077	HVAC Equipment	Programmable Thermostats Tier 1	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	10	$1.00		0.00		
6078	HVAC Equipment	Programmable Thermostats Tier 2	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	10	$1.00		0.00		
6079	HVAC Equipment	Programmable Thermostats Tier 3	MF	All	RETRO	0.000	-	0.000	0.000	0.000	2.168	10	$126.66		0.90		
6080	HVAC Equipment	Programmable Thermostats Tier 1	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	10	$1.00		0.00		
6081	HVAC Equipment	Programmable Thermostats Tier 2	MF	All	RETRO	0.000	0.000	0.000	0.000	0.000	0.000	10	$1.00		0.00		
6082	HVAC Equipment	Programmable Thermostats Tier 3	MF	All	RETRO	4687.482	-	328.124	0.000	0.000	0.000	10	$126.66		1.64	$0.030	0.040
6083	HVAC Equipment	Smartphone Behavior Application	MF	All	RETRO	1583.278	0.011	16.624	0.000	0.000	0.436	1	$5.00	Use of smartphone application to deliver behavioral savings	0.92	$0.045	0.108
6084	HVAC Equipment	Smartphone Behavior Application	MF	All	RETRO			0.000	0.000	0.000	0.000	1	$5.00		0.00		
6085	HVAC Equipment	Smartphone Behavior Application	MF	All	RETRO			0.000	0.000	0.000	0.000	1	$5.00		0.00		
6086	HVAC Equipment	PTAC 9.3 EER	MF	All	ROB	1113.073	-	153.786	0.149	0.149	0.000	15	$135.59	Installation of 9.3 EER packaged terminal air conditioner (PTAC) - in homes with PTACs	2.55	$0.056	0.063
6087	HVAC Equipment	ENERGY STAR Room AC	MF	All	ROB	471.193	0.092	43.193	0.067	0.067	0.000	15	$75.00	Installation of ENERGY STAR replacement room AC instead of a standard units	1.78	$0.110	0.117
6088	HVAC Equipment	Air-Cooled Recip Chiller COP = 2.8, IPLV = 3.41	MF	All	ROB	158416.185	-	39604.046	5.501	5.501	0.000	20	$8,481.25	Installation of efficient reciprocating chiller in apartment buildings with chillers	5.94	$0.012	0.018
6089	HVAC Equipment	CHW reset 10 deg	MF	All	RETRO	158416.185	-	16203.608	0.000	0.000	0.000	5	$158.98	Chilled water reset control strategy (10 degrees) - in apartment buildings with chillers	33.32	$0.001	0.016
6090	HVAC Equipment	ECM Furnace Fan	MF	All	RETRO	1216.000	0.603	733.000	0.073	0.073	0.000	10	$788.00	Installation of efficient fan motor in homes with furnaces	0.68	$0.085	0.094
6091	HVAC Equipment	O2 Trim Control	MF	All	RETRO	0.000	-	0.000	0.000	0.000	2.185	15	$255.00	1.1% improvement in boiler efficiency resulting from the addition of oxygen trim controls - apartment buildings with boilers	0.59		
6092	HVAC Equipment	Boiler 85% Ec	MF	All	RETRO	0.000	-	0.000	0.000	0.000	11.311	20	$7,232.27	5% increase in boiler efficiency - in apartments with gas boilers and no central AC	0.13		
6093	HVAC Equipment	Boiler turndown control	MF	All	RETRO	0.000	-	-129.352	0.000	0.000	13.229	15	$195.00	Installing boiler turndown controls - in apartment buildings with boilers	4.12	$0.000	0.007
6094	HVAC Equipment	ASHP - SEER 18 - SEER 14 base	MF	All	NC	7236.621	-	1409.333	0.656	0.656	0.000	15	$1,827.63	Installation of SEER 18 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.17	$0.082	0.089
6095	HVAC Equipment	ASHP - SEER 21 - SEER 14 base	MF	All	NC	7236.621	-	2114.000	0.984	0.984	0.000	15	$3,198.36	Installation of SEER 21 ASHP in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.01	$0.096	0.103
6096	HVAC Equipment	SEER21 Minisplit Heat pump	MF	All	NC	7236.621	-	799.400	0.255	0.255	0.000	15	$1,052.13	Installation of SEER 21 minisplit heat pump in homes with electric heating/cooling - baseline is 14 SEER ASHP	1.00	$0.083	0.090
6097	HVAC Equipment	PTHP 9.1 EER	MF	All	NC	7236.621	-	275.417	0.144	0.144	0.000	15	$169.21	Installation of 9.3 EER packaged terminal heat pump (PTHP) - in homes with PTHPs	2.61	$0.039	0.046
6098	HVAC Equipment	DFHP - SEER 18 with 95 AFUE furnace - SEER 14 base	MF	All	NC	7236.621	-	1381.658	0.656	0.656	2.895	15	$1,189.14	Installation of SEER 18/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.95	$0.050	0.057
6099	HVAC Equipment	DFHP - SEER 21 with 95 AFUE furnace - SEER 14 base	MF	All	NC	7236.621	-	2072.487	0.984	0.984	4.342	15	$2,125.65	Installation of SEER 21/95 AFUE dual fuel heat pump in homes with electric heating/cooling - baseline is 14 SEER/80 AFUE DFHP	1.64	$0.059	0.067
6100	HVAC Equipment	Furnace/AC - SEER 18	MF	All	NC	857.534	-	197.893	0.480	0.480	-14.046	15	$1,381.90	Installation of 18 SEER air conditioner - baseline is 13 SEER AC	-0.09	$0.441	0.448
6101	HVAC Equipment	Furnace/AC - SEER 21	MF	All	NC	857.534	-	556.739	0.741	0.741	-14.173	15	$2,211.04	Installation of 21 SEER air conditioner - baseline is 13 SEER AC	0.25	$0.251	0.258
6102	HVAC Equipment	PTAC 9.3 EER	MF	All	NC	857.534	-	181.102	0.144	0.144	0.000	15	$135.59	Installation of 9.3 EER packaged terminal air conditioner (PTAC) - in homes with PTACs	2.68	$0.047	0.055
6103	HVAC Equipment	ENERGY STAR Room AC	MF	All	NC	471.193	0.092	43.193	0.067	0.067	0.000	15	$75.00	Installation of ENERGY STAR replacement room AC instead of a standard units	1.78	$0.110	0.117
6104	HVAC Equipment	Air-Cooled Recip Chiller COP = 2.8, IPLV = 3.41	MF	All	NC	170996.965	-	42749.241	0.209	0.209	0.000	20	$8,481.25	Installation of efficient reciprocating chiller in apartment buildings with chillers	5.28	$0.011	0.018

DTE (Michigan) **Measure Assumption Tab**

Measure #	End-Use	Measure Name	Home Type	Income Type	Replacement Type	Base Annual Electric	% Elec Savings	Per Unit Elec Savings	Per Unit Summer NCP kW	Per Unit Winter NCP kW	Per unit Fuel Saving	EE EUL	Measure Cost	Measure Description	UCT Ratio	Utility $ / LFT- kWh Saved (-Admin)	Utility $ / LFT- kWh Saved (+Admin)
6105	HVAC Equipment	CHW reset 10 deg	MF	All	NC	170996.965	-	17174.103	0.000	0.000	0.000	5	$158.98	Chilled water reset control strategy (10 degrees) - in apartment buildings with chillers	35.32	$0.001	0.016
6106	HVAC Equipment	High efficiency 94 AFUE furnace with ECM	MF	All	NC	1216.000	-	291.664	0.216	0.216	11.432	15	$1,427.65	Installation of 94 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.95	$0.128	0.135
6107	HVAC Equipment	High efficiency 98 AFUE furnace with ECM	MF	All	NC	1216.000	-	298.293	0.216	0.216	14.898	15	$1,608.58	Installation of 98 AFUE furnace with electronically commutated motor - baseline is 80 AFUE furnace	0.99	$0.120	0.128
6108	HVAC Equipment	ECM Furnace Fan	MF	All	NC	1216.000	0.603	733.000	0.073	0.073	0.000	10	$788.00	Installation of efficient fan motor in homes with furnaces	0.68	$0.085	0.094
6109	HVAC Equipment	Boiler 92% plus AFUE	MF	All	NC	0.000	-	-560.533	0.000	0.000	27.138	15	$1,954.00	Installing 92 AFUE boilers to replace standard boilers - in homes with gas boilers	0.72	$0.000	0.007
6110	HVAC Equipment	Boiler 95% plus AFUE	MF	All	NC	0.000	-	-560.560	0.000	0.000	32.988	15	$2,436.00	Installing 95 AFUE boilers to replace standard boilers - in homes with gas boilers	0.74	$0.000	0.007
6111	HVAC Equipment	O2 Trim Control	MF	All	NC	0.000	-	0.000	0.000	0.000	1.629	15	$255.00	1.1% improvement in boiler efficiency resulting from the addition of oxygen trim controls - apartment buildings with boilers	0.44		
6112	HVAC Equipment	Boiler 85% Ec	MF	All	NC	0.000	-	0.000	0.000	0.000	8.407	20	$7,232.27	5% increase in boiler efficiency - in apartments with gas boilers and no central AC	0.10		
6113	HVAC Equipment	Boiler turndown control	MF	All	NC	0.000	-	-102.555	0.000	0.000	10.004	15	$195.00	Installing boiler turndown controls - in apartment buildings with boilers	3.09	$0.000	0.007
7001	Miscellaneous	Pump and Motor Single Speed	SF	All	ROB	2120.860	0.327	694.000	0.715	0.000	0.000	10	$85.00	Installing high efficiency single-speed pool pumps and motors in homes that have inefficient pool pumps and motors	9.68	$0.010	0.019
7002	Miscellaneous	Pump and motor w auto controls - multi speed	SF	All	ROB	2120.860	0.510	1081.000	1.592	0.000	0.000	10	$579.00	Installing high efficiency multi-speed pool pumps and motors in homes that have inefficient pool pumps and motors	2.66	$0.042	0.051
7003	Miscellaneous	Pump and Motor Single Speed	SF	All	NC	2120.860	0.327	694.000	0.715	0.000	0.000	10	$85.00	Installing high efficiency single-speed pool pumps and motors in homes that have inefficient pool pumps and motors	9.68	$0.010	0.019
7004	Miscellaneous	Pump and motor w auto controls - multi speed	SF	All	NC	2120.860	0.510	1081.000	1.592	0.000	0.000	10	$579.00	Installing high efficiency multi-speed pool pumps and motors in homes that have inefficient pool pumps and motors	2.66	$0.042	0.051
8001	Cross-Cutting	Behavior Modification: Home Energy Reports	SF	All	RETRO	8226.000	0.020	164.520	0.019	0.019	1.075	1	$6.77	Delivery of home energy reports	3.27	$0.014	0.078
8002	Cross-Cutting	Behavior Modification: Home Energy Reports	SF	All	NC	8226.000	0.020	164.520	0.019	0.019	1.075	1	$6.77	Delivery of home energy reports	3.27	$0.014	0.078
8003	Cross-Cutting	Behavior Modification: Home Energy Reports	MF	All	RETRO	4113.000	0.020	82.260	0.009	0.009	0.537	1	$6.77	Delivery of home energy reports	1.64	$0.028	0.092
8004	Cross-Cutting	Behavior Modification: Home Energy Reports	MF	All	NC	4113.000	0.020	82.260	0.009	0.009	0.537	1	$6.77	Delivery of home energy reports	1.64	$0.028	0.092

The list of sources provided below indicates where key assumptions, algorithms, parameters, etc. were obtained to calculate measure level estimates of energy and demand savings, useful lives, measure cost, and baseline/efficient saturations. The key data sources are provided by residential end-use. Data sources are recorded by measure and can be produced if needed. A list of

End Use	Energy Savings	Demand Savings	EUL	Measure Cost	Base Saturation	EE Saturation
Lighting	**MEMD** Illinois TRM GDS calculations	**MEMD** Illinois TRM GDS calculations	**MEMD**	**MEMD** Energy Information Adminstration / GDS calcuation	**2013 RBS**	**2013 RBS**
Appliances	**MEMD** Illinois TRM ENERGY STAR calculators GDS calculations	**MEMD** Illinois TRM ENERGY STAR calculators GDS calculations	**MEMD** Illinois TRM ENERGY STAR calculators	**MEMD** Illinois TRM ENERGY STAR calculators	**2013 RBS** **2013 RCASS** 2014 PA Baseline	**2013 RBS** 2014 PA Baseline GDS
Electronics	**MEMD** Hawaii TRM ENERGY STAR calculators	**MEMD** Hawaii TRM Vermont TRM ENERGY STAR calculators	**MEMD** Hawaii TRM	**MEMD** Vermont TRM GDS research / estimate	**2013 RCASS** 2014 PA Baseline	**ENERGY STAR** PA Baseline GDS
Water Heating	**MEMD** GDS calculations	**MEMD** Vermont TRM	**MEMD** Illinois TRM	**MEMD** Illinois TRM	**2013 RBS** 2014 PA Baseline	**2013 RBS** 2014 PA Baseline GDS
HVAC Equipment	**MEMD**	**MEMD**	**MEMD**	**MEMD**	**2015 RCAS** **2013 RBS** **2013 RCASS** GDS	**2015 RCAS** **2013 RBS** **2013 RCASS** GDS
HVAC Shell	**MEMD**	**MEMD**	**MEMD**	**MEMD**	**2015 RCAS** **2013 RBS** **2013 RCASS** GDS	**2015 RCAS** **2013 RBS** **2013 RCASS** GDS
Other	**MEMD**	**MEMD**	**MEMD**	**MEMD**	**2013 RCASS**	**ENERGY STAR** GDS
Cross-Cutting	**MEMD** GDS calculations	**MEMD** GDS calculations	**MEMD**	**MEMD**	**GDS**	**GDS**

List of Abbreviations

2013 RBS: DTE Energy Residential Baseline Study: First Quarter 2013

2013 RCASS: DTE Energy 2013 Residential Customer Appliance Saturation Survey

2014 PA Baseline: 2014 Pennsylvania Statewide Act 129 Residential Baseline Study

2015 RCAS: DTE Energy 2015 Residential Customer Appliance Survey

APPENDIX B ● Commercial Measure Detail

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	UCT
Computers & Office Equipment						
Energy Star Compliant Refrigerator	47.8	2	Per Unit	$30.75	16	2.0
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	631.0	2	per set	$20.00	5	12.7
Smart Strip plug outlet	17.0	1	per unit	$40.00	5	0.2
PC Network Energy Management Controls replacing no central control	135.0	1	per PC	$17.00	4	2.4
Energy Star UPS	104.8	2	per kW	$1,303.35	10	0.1
Vendor Miser for Non-Refrig Equipment	342.5	1	per unit	$116.00	5	1.0
High Efficiency Hand Dryer	965.0	1	per unit	$450.00	10	1.6
Electrically Commutated Plug Fans in data centers	1,444.5	2	per fan	$718.00	15	2.2
High Efficiency CRAC unit	162.3	1	MBH	$82.50	15	2.3
Computer Room Air Conditioner Economizer	358.0	2	MBH	$82.00	15	3.7
Computer Room Hot Aisle Cold Aisle Configuration	124.8	2	MBH	$156.00	15	0.9
Computer Room Air Side Economizer	440.3	2	MBH	$25.00	10	10.9
VFD for Process Fans -CRAC units	2,279.0	1	per HP	$200.00	15	12.7
Water Heating						
Heat Pump Water Heater	184,058.0	2	per heater	$10,600.00	15	22.9
HP Water Heater - Residential unit in Commercial Application	5,375.0	2	per heater	$1,000.00	15	8.0
Heat Pump Storage Water Heater	2,504.5	2	per heater	$433.00	10	5.0
Electric Tankless Water Heater	621.0	2	per heater	$466.00	20	1.9
Low Flow Faucet Aerator	903.0	1	per unit	$2.50	10	296.0
Low Flow Showerhead	615.0	1	per unit	$25.00	10	19.5
Hot Water (DHW) Pipe Insulation	44.7	1	Linear Ft	$10.00	20	7.1
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	126.0	2	per unit	$147.25	7	0.4
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	793.0	2	per unit	$448.06	7	0.9
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	627.0	2	per unit	$423.84	7	0.7
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	1,293.0	2	per unit	$540.00	7	1.2
ES Dishwasher, High Temp, Elec Heat, Elec Booster	12,913.5	2	per unit	$977.50	16	16.9
ES Dishwasher, High Temp, Gas Heat, Elec Booster	5,776.8	2	per unit	$759.46	16	9.7
ES Dishwasher, High Temp, Gas Heat, Gas Booster	1,698.8	2	per unit	$385.34	16	5.6
ES Dishwasher, Low Temp, Elec Heat	12,782.5	2	per unit	$255.00	16	64.2
ES Dishwasher, Low Temp, Gas Heat	584.0	2	per unit	$42.43	16	17.7
Tank Insulation (electric)	468.0	1	per square foot	$6.22	15	84.3
Pre Rinse Sprayers (electric)	1,396.0	1	each	$35.00	5	16.7
ECM Circulator Pump	4,949.4	1	per Motor	$2,266.67	15	2.7
Drain water Heat Recovery Water Heater	546.0	1	Per Unit	$631.00	25	1.4
Efficient Hot Water Pump	534.1	1	hp	$78.20	15	6.7
HVAC Condenser Heater Recovery Water Heating	3,536.5	1	ton	$254.00	15	42.2
Process Cooling Condenser Heater Recovery Water Heating	5,720.0	1	ton	$254.00	15	29.2
Pools						
Heat Pump Pool Heater	5,731.9	1	Per Unit	$4,000.00	10	1.9
High efficiency spas/hot tubs	375.0	2	Per Unit	$300.00	10	1.4
Ventilation						
Economizer	143.1	2	ton	$122.55	13	0.8
Demand-Controlled Ventilation	181.0	2	1000 sq ft cond floor area	$75.00	15	35.3
Variable Speed Drive Control, 15 HP	19,590.0	1	per Unit	$3,690.00	15	6.4
Variable Speed Drive Control, 5 HP	6,530.0	1	Per Unit	$1,230.00	15	6.4

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	UCT
Variable Speed Drive Control, 40 HP	52,240.0	1	Per Unit	$9,840.00	15	6.4
High Speed Fans	706.6	1	per fan	$675.00	7	0.9
High Volume Low Speed Fans	5,859.9	1	per fan	$5,767.40	10	1.3
Engineered CKV hood	729.7	2	100 cfm red	$139.02	15	7.5
Fan Thermostat Controller	1,586.0	1	per fan	$100.00	15	13.5
Space Cooling - Chillers						
Air-Cooled Recip Chiller	335.4	2	ton	$141.03	20	5.1
Air-Cooled Screw Chiller	332.0	2	ton	$143.92	20	4.9
Water-Cooled Centrifugal Chiller < 150 ton	251.2	2	ton	$411.03	20	1.2
Water-Cooled Centrifugal Chiller 150 - 300 ton	221.3	2	ton	$125.80	20	3.5
Water-Cooled Centrifugal Chiller > 300 ton	205.6	2	ton	$27.30	20	15.0
Water-Cooled Screw Chiller < 150 ton	248.4	2	ton	$387.99	20	1.3
Water-Cooled Screw Chiller 150 - 300 ton	225.0	2	ton	$129.11	20	3.7
Water-Cooled Screw Chiller > 300 ton	200.7	2	ton	$27.15	20	15.5
Chiller Tune Up	135.8	1	ton	$5.66	5	17.9
High Efficiency Pumps	201.4	1	per HP	$96.79	15	2.9
Efficient Chilled Water Pump	751.1	1	per HP	$33.20	15	28.1
Chilled Hot Water Reset	111.5	1	ton	$5.53	8	25.6
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	157.8	2	ton	$66.63	20	5.7
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	9.9	2	ton	$4.36	20	4.3
Water-Cooled Chiller Average 10% above IECC standard	127.0	2	ton	$101.49	20	3.1
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	8.3	2	ton	$5.49	20	2.1
VAV System Conversion	4,723.4	1	1000 sq ft cond floor area	$1,400.12	20	3.7
Motor Belt Replacement	94.7	1	per HP	$21.33	14	5.9
Water-Side Economizer	1,047.5	2	ton	$50.00	15	18.9
Improved Duct Sealing - Cooling Chiller	31.2	2	ton	$107.91	18	0.8
Integrated Building Design	161,387.7	2	per Building	$74,099.27	30	4.8
Building Operator Certification	11,767.3	2	per participant of 194,500 SF	$429.67	5	12.4
Energy Efficient Windows	172.8	2	100SF	$322.25	25	1.2
Cool Roof	44.2	2	1000 sq ft roof area	$332.44	20	0.2
Ceiling Insulation	75.3	1	1000 sq ft roof area	$50.35	30	4.5
Wall Insulation	331.9	1	1000 sq ft wall area	$4.73	30	143.3
Roof Insulation	20.2	1	1000 sq ft	$67.58	30	1.1
Window Improvements	74.5	1	100 sq ft glazing	$160.28	15	1.0
EMS install	269.1	1	1000 sq ft cond floor area	$2.97	15	80.8
EMS Optimization	363.1	1	1000 sq ft cond floor area	$19.20	20	23.2
HVAC Occupancy Sensors	90.5	2	1000 sq ft cond floor area	$97.78	15	1.1
Setback with Electric Heat	3,796.2	2	each	$71.00	9	31.3
EMS Pump Scheduling Controls	1,524.4	2	pump Hp	$1.36	15	1218.1
Web enabled EMS	601.4	2	1000 sq ft cond floor area	$19.40	15	23.5
Zoning	187.4	2	1000 sq ft cond floor area	$500.00	15	0.6
Retrocommissioning	2.6	1	sq ft	$0.30	7	4.0
Commissioning	4.5	1	sq ft	$1.16	7	1.8
Space Cooling - Unitary & Split AC						
AC <65k	289.5	2	ton	$108.53	15	3.7
AC 65k - 135k	50.5	2	ton	$323.71	15	0.6
AC 135k - 240k	46.0	2	ton	$166.48	15	1.1
AC 240k - 760k	42.5	2	ton	$118.39	15	1.4
AC >760k	36.4	2	ton	$123.39	15	1.2
Air Source Heat Pump - Cooling	74.3	2	ton	$131.25	15	1.0

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
Ductless (mini split) - Cooling	126.1	1	ton	$952.30	15	0.3
Water Loop Heat Pump (WLHP) - Cooling	7.2	2	ton	$5.02	15	2.4
Ground Source Heat Pump - Cooling	302.2	2	ton	$927.66	15	0.4
Packaged Terminal Air Conditioner (PTAC) - Cooling	101.7	2	ton	$179.42	15	1.1
WLHP System (Cooling) New Construction	293.7	2	1000 sq ft cond floor area	$1,000.00	20	0.3
DX Condenser Coil Cleaning	51.2	1	ton	$32.40	3	1.3
Room A/C	158.0	2	per unit	$74.75	15	8.6
Improved Duct Sealing - Cooling AC	31.2	2	ton	$107.91	18	0.8
Integrated Building Design	161,387.7	2	per Building	$74,099.27	30	4.8
Building Operator Certification	11,767.3	2	per participant of 194,500 SF	$429.67	5	12.4
Energy Efficient Windows	172.8	2	100SF	$322.25	25	1.2
Cool Roof	44.2	2	1000 sq ft roof area	$332.44	20	0.2
Ceiling Insulation	75.3	1	1000 sq ft roof area	$50.35	30	4.5
Wall Insulation	331.9	1	1000 sq ft wall area	$4.73	30	143.3
Roof Insulation	20.2	1	1000 sq ft	$67.58	30	1.1
Window Improvements	74.5	1	100 sq ft glazing	$160.28	15	1.0
Programmable Thermostats	66.2	1	1000 sq ft cond floor area	$55.54	9	0.7
EMS install	269.1	1	1000 sq ft cond floor area	$2.97	15	80.8
EMS Optimization	363.1	1	1000 sq ft cond floor area	$19.20	20	23.2
Hotel Guest Room Occupancy Control System	557.0	2	per unit	$125.00	8	3.3
HVAC Occupancy Sensors	90.5	2	1000 sq ft cond floor area	$97.78	15	1.1
Setback with Electric Heat	3,796.2	2	each	$71.00	9	31.3
EMS Pump Scheduling Controls	1,524.4	2	pump Hp	$1.36	15	1218.1
Web enabled EMS	601.4	2	1000 sq ft cond floor area	$19.40	15	23.5
Zoning	187.4	2	1000 sq ft cond floor area	$500.00	15	0.6
Retrocommissioning	2.6	1	sq ft	$0.30	7	4.0
Commissioning	4.5	1	sq ft	$1.16	7	1.8
Cooking						
HE Steamer	12,914.0	2	each	$4,150.00	12	3.7
HE Combination Oven	18,432.0	2	each	$16,884.00	12	1.3
HE Convection Ovens	1,879.0	2	each	$471.00	12	4.7
HE Holding Cabinet	3,299.3	2	each	$1,783.00	12	2.0
HE Fryer	1,166.0	2	each	$1,706.00	12	0.7
HE Griddle	2,594.0	2	each	$3,604.00	12	0.8
Induction Cooktops	784.0	2	Per Unit	$3,000.00	11	2.0
Interior Lighting						
Lamp & Ballast Retrofit (HPT8 Replacing T12)	54.2	2	per fixture	$34.15	15	2.0
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	24.7	2	ɛr fixture, Replacing standard T8	$34.00	15	0.9
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	73.4	2	r fixture, Replacing standard T12	$37.09	15	2.5
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	42.0	2	ĸture, Replacing standard T8 4ft l	$37.09	15	1.5
T5 HP Retrofits	80.7	2	per fixture	$107.00	15	1.0
Light Tube	344.3	2	per fixture	$500.00	14	0.8
High Intensity Fluorescent Fixture (replacing HID)	4,160.0	2	kW saved	$1,491.00	12	3.3
High Intensity Fluorescent Fixture (replacing HID) - New Construction	4,160.0	2	kW saved	$941.46	12	5.2
42W 8 lamp Hi Bay CFL	345.0	2	per fixture, Replacing 400W HID	$496.40	12	0.8
HID Fixture Upgrade - Pulse Start Metal Halide	768.5	2	per fixture	$223.63	13	4.3
Interior induction Lighting	4.2	2	per watt reduced	$1.53	16	4.0
CFL Fixture	157.5	2	per fixture	$45.00	12	3.8
CFL Screw-in	84.7	2	per lamp	$1.36	2	13.4
CFL Screw in Specialty	132.8	2	per lamp	$4.58	2	6.2

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	UCT
CFL Reflector Flood	133.5	2	per lamp	$6.00	2	4.8
LED Screw In (replacing Incandescent)	134.8	2	per lamp	$12.69	9	9.1
LED Screw In (replacing CFL)	12.0	2	per lamp	$11.61	9	0.9
LED High bay lighting	4,160.0	2	kW saved	$2,900.00	16	2.1
LED low bay lighting	2,669.0	2	kW saved	$2,900.00	18	1.3
LED Downlight	141.5	2	per fixture	$12.74	15	14.2
LED Specialty (replacing Incandescent)	80.6	2	per lamp	$12.79	9	5.4
LED Specialty (replacing CFL)	16.1	2	per lamp	$10.17	9	1.4
LED Troffer	32.3	2	per fixture	$125.00	18	0.5
LED Tube Lighting	53.9	2	per lamp	$35.00	18	2.2
LED Grow Light	4.4	2	per watt reduced	$1.53	11	3.1
Interior Non Highbay/Lowbay LED Fixtures	2.7	2	per watt reduced	$2.90	18	1.3
Illuminated Signs to LED	5.7	2	per watt reduced	$4.00	10	1.3
LED Lighting in Refrigeration	460.0	2	per door	$356.00	16	1.4
LED Exit Sign	201.0	2	per fixture	$25.00	15	9.0
Long Day Lighting Dairy	6.2	2	per watt controlled	$1.79	16	4.5
Central Lighting Control	8,340.6	1	10,000 SF	$2,700.00	12	3.4
Daylight Sensor Controls	10,409.1	1	10,000 SF	$4,000.00	12	2.9
Daylight Sensor Controls - New Construction	8,810.0	1	10,000 SF	$4,000.00	12	2.4
Occupancy Sensor	504.4	2	per sensor	$226.47	10	1.5
Occupancy Sensor & Daylight Sensor	639.0	2	per sensor	$277.50	10	2.2
Switching Controls for Multilevel Lighting (Non-HID)	6,000.0	1	10,000 SF	$4,000.00	12	1.7
Lighting Power Density - Interior	2,669.0	2	per kW reduced	$220.00	15	15.6
Stairwell Bi-Level Control	4,809.0	2	per kW controlled	$825.00	9	4.3
Occupancy Sensors for LED Refrigerator Lighting	195.0	2	per door	$20.00	16	10.6
Exterior Lighting						
LED Fuel Pump Canopy Fixture	135.7	2	Per unit	$343.00	21	0.4
LED Auto Traffic Signals	275.0	2	per lamp	$50.00	6	4.1
LED Pedestrian Signals	150.0	2	per lamp	$100.00	8	1.4
Exterior HID replacement with CFLs	1,021.4	2	per fixture	$596.67	12	1.2
Exterior HID replacement with LEDs	519.5	2	per fixture	$753.67	12	0.5
Garage HID replacement with LEDs	1,053.7	2	per fixture	$753.67	12	1.3
Exterior Linear Fluorescent	4,319.0	2	per kW reduced	$2,500.00	12	1.2
Lighting Power Density - Exterior	4,319.0	2	per kW reduced	$220.00	12	14.2
Lighting Power Density - Parking Garage	8,760.0	2	per kW reduced	$220.00	12	36.9
Exterior BiLevel Controls	530.5	2	per fixture	$444.33	10	0.8
Garage BiLevel Controls	927.5	2	per fixture	$632.00	11	1.6
Sports Field Lighting HiLo Control	149.0	2	per fixture	$532.00	10	0.2
Refrigeration						
Vending Miser for Refrigerated Vending Machines	702.5	1	per unit	$238.75	8	1.5
Evaporator Fan Motor Controls	760.3	1	per controller	$621.00	5	0.5
Zero-Energy Doors	1,360.0	2	per door	$290.00	10	3.7
Discus and Scroll Compressors	1,500.0	2	per Unit	$825.00	13	1.9
Floating Head Pressure Control	1,264.0	1	per ton	$120.00	15	8.9
ENERGY STAR Commercial Solid Door Refrigerators	665.8	2	per unit	$600.00	12	1.0
ENERGY STAR Commercial Solid Door Freezers	1,737.3	2	per unit	$450.00	12	3.6
ENERGY STAR Commercial Glass Door Refrigerators	754.0	2	per unit	$600.00	12	1.2
ENERGY STAR Commercial Glass Door Freezers	3,671.0	2	per unit	$450.00	12	7.7
Energy Star Ice Machines	1,314.1	2	per unit	$1,426.00	9	0.6
Strip Curtains	269.5	1	per square foot	$12.42	4	7.6
Anti Sweat Heater Controls	1,489.0	1	per door	$340.00	15	3.7
Efficient Refrigeration Condenser	120.0	2	per ton	$35.00	15	10.8
Door Gaskets - Cooler and Freezer	98.0	2	per linear foot	$9.61	4	3.7

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	UCT
Reach-in Refrigerated display case door retrofit	1,014.0	1	Linear Ft	$1,010.00	12	1.4
Refrigeration Savings due to Lighting Savings	1.2	2	per lighting Watt reduced	$1.00	12	1.5
ECM Case Motors	1,131.8	2	per Motor	$200.00	15	6.1
Efficient low-temp compressor	875.0	2	per Unit	$552.00	13	1.6
Automatic High Speed Doors	968.3	2	SF	$150.00	12	6.1
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	1,625.0	2	per door	$156.00	8	7.4
Refrigerant charging correction	75.3	2	ton	$38.36	2	1.1
Walk-in Cooler Evaporator Motor Reduction	1,462.1	2	per motor removed	$1,000.00	15	1.6
Night Covers	16.7	1	LF of case - hr	$37.54	5	0.3
Refrigeration Suction Line Insulation	10.8	1	LF	$4.32	15	2.8
Compressed Air						
Efficient Air Compressors	780.5	2	per HP	$150.00	15	5.5
Automatic Drains	2,097.0	2	per drain	$355.00	5	2.5
Cycling Dryers	12.8	2	per SCFM	$30.00	10	0.4
Low Pressure Drop-Filters	64.7	1	per HP	$22.00	10	2.4
Air-Entraining Air Nozzles	21,142.6	1	per nozzle	$95.25	15	293.7
Receiver Capacity Addition	9,158.8	1	per Unit	$2,000.00	10	4.3
Compressed Air Audits & Leak Repair	624.0	1	per SCFM	$16.00	1	3.5
Compressed Air Pressure Flow Controller replacing no flow controller	73.9	1	per HP	$37.00	10	1.6
High Efficiency Air Dryers	48.6	2	per SCFM	$32.33	15	1.6
Air Compressor Outdoor Air Intake	109.8	1	per HP	$5.00	20	28.5
Variable Displacement Air Compressor	442.0	1	per HP	$340.00	13	1.3
Compressed Air Storage Tank	422.8	1	per HP	$36.00	25	17.0
Compressed Air Replacement with Air Blowers	5,587.7	1	per HP	$930.00	15	11.8
Space Heating						
Air Source Heat Pump - Heating	74.3	2	ton	$131.25	15	1.0
Ground Source Heat Pump - Heating	1,208.7	2	ton	$3,710.66	15	0.3
Ductless (mini split) - Heating	126.1	1	ton	$952.30	15	0.2
VFD Pumps	1,732.2	1	per CHW pump hp	$212.29	10	5.3
ECM motors on furnaces	720.0	1	per Furnace	$1,250.00	20	0.7
Water Loop Heat Pump (WLHP) - Heating	28.9	2	ton	$20.09	15	2.3
WLHP System (Heating) New Construction	1,174.9	2	1000 sq ft cond floor area	$4,000.00	20	0.3
Integrated Building Design	161,387.7	2	per Building	$74,099.27	30	4.8
Building Operator Certification	11,767.3	2	per participant of 194,500 SF	$429.67	5	12.4
Energy Efficient Windows	172.8	2	100SF	$322.25	25	1.2
Cool Roof	44.2	2	1000 sq ft roof area	$332.44	20	0.2
Ceiling Insulation	75.3	1	1000 sq ft roof area	$50.35	30	4.5
Wall Insulation	331.9	1	1000 sq ft wall area	$4.73	30	143.3
Roof Insulation	20.2	1	1000 sq ft	$67.58	30	1.1
Window Improvements	74.5	1	100 sq ft glazing	$160.28	15	1.0
EMS install	269.1	1	1000 sq ft cond floor area	$2.97	15	80.8
EMS Optimization	363.1	1	1000 sq ft cond floor area	$19.20	20	23.2
Hotel Guest Room Occupancy Control System	557.0	2	per unit	$125.00	8	3.3
HVAC Occupancy Sensors	90.5	2	1000 sq ft cond floor area	$97.78	15	1.1
Setback with Electric Heat	3,796.2	2	each	$71.00	9	31.3
EMS Pump Scheduling Controls	1,524.4	2	pump Hp	$1.36	15	1218.1
Web enabled EMS	601.4	2	1000 sq ft cond floor area	$19.40	15	23.5
Web enabled EMS with Electric Heat	10,511.5	2	1000 sq ft cond floor area	$141.99	15	63.7
Zoning	187.4	2	1000 sq ft cond floor area	$500.00	15	0.6
Retrocommissioning	2.6	1	sq ft	$0.30	7	4.0
Commissioning	4.5	1	sq ft	$1.16	7	1.8

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	UCT
Infrared Heater	25.9	2	kBtu/hr input capacity	$2.70	15	19.2
Other						
NEMA Premium Transformer, single-phase	0.2	2	1% of NEMA Premium efficiency p	$0.24	30	2.3
NEMA Premium Transformer, three-phase	0.2	2	1% of NEMA Premium efficiency p	$0.18	30	1.6
High Efficiency Transformer, single-phase	0.4	2	).01% of additional efficiency per	$0.46	30	1.8
High Efficiency Transformer, three-phase	0.4	2	).01% of additional efficiency per	$0.44	30	3.7
Optimized Snow and Ice Melt Controls (electric)	0.1	1	SF	$15.15	15	0.0
Engine Block Heater Timer	576.0	2	per engine block	$50.00	5	18.4
Parking Garage Exhaust Fan CO Control	2,413.0	2	per HP	$900.00	15	4.9

Consumers Energy Commercial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Smart Strip plug outlet	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%
PC Network Energy Management Controls replacing no central control	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Energy Star UPS	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Vendor Miser for Non-Refrig Equipment	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
High Efficiency Hand Dryer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Electrically Commutated Plug Fans in data centers	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
High Efficiency CRAC unit	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Computer Room Air Conditioner Economizer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Computer Room Hot Aisle Cold Aisle Configuration	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Computer Room Air Side Economizer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
VFD for Process Fans -CRAC units	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Water Heating									
Heat Pump Water Heater	24.9%	24.9%	24.9%	24.7%	24.9%	24.9%	24.9%	24.9%	24.9%
HP Water Heater - Residential unit in Commercial Application	24.9%	24.9%	24.9%	24.7%	24.9%	24.9%	24.9%	24.9%	24.9%
Heat Pump Storage Water Heater	24.9%	24.9%	24.9%	24.7%	24.9%	24.9%	24.9%	24.9%	24.9%
Electric Tankless Water Heater	24.9%	24.9%	24.9%	24.7%	24.9%	24.9%	24.9%	24.9%	24.9%
Low Flow Faucet Aerator	100.0%	96.0%	79.0%	98.0%	50.0%	60.5%	22.5%	42.0%	77.0%
Low Flow Showerhead	0.0%	0.0%	0.0%	0.0%	20.0%	2.0%	0.0%	33.0%	13.0%
Hot Water (DHW) Pipe Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, Low Temp, Elec Heat	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, Low Temp, Gas Heat	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
Tank Insulation (electric)	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Pre Rinse Sprayers (electric)	0.0%	0.0%	10.0%	0.0%	10.0%	10.0%	62.5%	10.0%	0.0%
ECM Circulator Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Drain water Heat Recovery Water Heater	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Efficient Hot Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Condenser Heater Recovery Water Heating	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Process Cooling Condenser Heater Recovery Water Heating	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Pools									
Heat Pump Pool Heater	0.0%	0.0%	0.0%	0.0%	42.5%	42.5%	0.0%	42.5%	42.5%
High efficiency spas/hot tubs	0.0%	0.0%	0.0%	0.0%	15.0%	15.0%	0.0%	15.0%	15.0%
Ventilation									
Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Demand-Controlled Ventilation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

Base Case Factor:

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Variable Speed Drive Control, 15 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 5 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 40 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
High Speed Fans	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
High Volume Low Speed Fans	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Engineered CKV hood	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Fan Thermostat Controller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water-Cooled Centrifugal Chiller < 150 ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Centrifugal Chiller 150 - 300 ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Centrifugal Chiller > 300 ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Screw Chiller < 150 ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Screw Chiller 150 - 300 ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Screw Chiller > 300 ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Chiller Tune Up	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Chilled Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chilled Hot Water Reset	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Chiller Average 10% above IECC standard	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
VAV System Conversion	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%
Motor Belt Replacement	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Water-Side Economizer	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%
Improved Duct Sealing - Cooling Chiller	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Integrated Building Design	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Building Operator Certification	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Efficient Windows	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cool Roof	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Wall Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Roof Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Window Improvements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS install	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
EMS Optimization	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
HVAC Occupancy Sensors	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	50.0%	50.0%
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Commissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Cooling - Unitary and Split AC									
AC <65k	13.1%	15.7%	15.3%	15.5%	-0.3%	13.1%	15.7%	12.4%	10.9%
AC 65k - 135k	13.1%	15.7%	15.3%	15.5%	-0.3%	13.1%	15.7%	12.4%	10.9%
AC 135k - 240k	13.1%	15.7%	15.3%	15.5%	-0.3%	13.1%	15.7%	12.4%	10.9%
AC 240k - 760k	13.1%	15.7%	15.3%	15.5%	-0.3%	13.1%	15.7%	12.4%	10.9%
AC >760k	13.1%	15.7%	15.3%	15.5%	-0.3%	13.1%	15.7%	12.4%	10.9%
Air Source Heat Pump - Cooling	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%

Consumers Energy Commercial Measure Database - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Ductless (mini split) - Cooling	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Water Loop Heat Pump (WLHP) - Cooling	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Ground Source Heat Pump - Cooling	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Packaged Terminal Air Conditioner (PTAC) - Cooling	13.0%	0.0%	2.0%	1.0%	80.0%	13.0%	0.0%	16.5%	24.0%
WLHP System (Cooling) New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
DX Condenser Coil Cleaning	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Room A/C	11.6%	11.6%	11.6%	11.6%	11.6%	11.6%	11.6%	11.6%	11.6%
Improved Duct Sealing - Cooling AC	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Integrated Building Design	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Building Operator Certification	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Efficient Windows	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cool Roof	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Wall Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Roof Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Window Improvements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Programmable Thermostats	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
EMS install	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
EMS Optimization	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	50.0%	50.0%
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Commissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cooking									
HE Steamer	0.0%	0.0%	23.0%	34.0%	23.0%	23.0%	23.0%	23.0%	23.0%
HE Combination Oven	0.0%	0.0%	4.7%	6.7%	4.7%	4.7%	4.7%	4.7%	4.7%
HE Convection Ovens	0.0%	0.0%	4.7%	6.7%	4.7%	4.7%	4.7%	4.7%	4.7%
HE Holding Cabinet	0.0%	0.0%	18.0%	36.4%	18.0%	18.0%	18.0%	18.0%	18.0%
HE Fryer	0.0%	0.0%	26.0%	1.0%	26.0%	26.0%	26.0%	26.0%	26.0%
HE Griddle	0.0%	0.0%	19.0%	9.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Induction Cooktops	0.0%	0.0%	4.7%	6.7%	4.7%	4.7%	4.7%	4.7%	4.7%
Interior Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	9.5%	16.2%	17.6%	3.7%	2.9%	3.8%	6.2%	10.1%	9.6%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	6.3%	6.1%	9.7%	11.1%	3.4%	12.6%	11.0%	11.3%	7.6%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	9.5%	16.2%	17.6%	3.7%	2.9%	3.8%	6.2%	10.1%	9.6%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	6.3%	6.1%	9.7%	11.1%	3.4%	12.6%	11.0%	11.3%	7.6%
T5 HP Retrofits	2.4%	8.6%	0.0%	0.0%	4.3%	5.1%	1.1%	0.0%	0.0%
Light Tube	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
High Intensity Fluorescent Fixture (replacing HID)	7.2%	0.3%	0.0%	0.9%	0.0%	0.3%	0.0%	1.5%	3.9%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	7.2%	0.3%	0.0%	0.9%	0.0%	0.3%	0.0%	1.5%	3.9%
42W 8 lamp Hi Bay CFL	7.2%	0.3%	0.0%	0.9%	0.0%	0.3%	0.0%	1.5%	3.9%
HID Fixture Upgrade - Pulse Start Metal Halide	7.2%	0.3%	0.0%	0.9%	0.0%	0.3%	0.0%	1.5%	3.9%
Interior induction Lighting	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CFL Fixture	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
CFL Screw-in	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%

Consumers Energy Commercial Measure Database - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
CFL Screw in Specialty	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
CFL Reflector Flood	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
LED Screw In (replacing Incandescent)	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
LED Screw In (replacing CFL)	0.3%	2.4%	0.5%	1.9%	8.7%	3.7%	3.1%	0.5%	1.1%
LED High bay lighting	7.2%	0.3%	0.0%	0.9%	0.0%	0.3%	0.0%	1.5%	3.9%
LED low bay lighting	6.3%	6.1%	9.7%	11.1%	3.4%	12.6%	11.0%	11.3%	7.6%
LED Downlight	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
LED Specialty (replacing Incandescent)	0.5%	0.5%	0.1%	1.3%	6.2%	0.3%	1.2%	0.4%	1.4%
LED Specialty (replacing CFL)	0.3%	2.4%	0.5%	1.9%	8.7%	3.7%	3.1%	0.5%	1.1%
LED Troffer	6.3%	6.1%	9.7%	11.1%	3.4%	12.6%	11.0%	11.3%	7.6%
LED Tube Lighting	6.3%	6.1%	9.7%	11.1%	3.4%	12.6%	11.0%	11.3%	7.6%
LED Grow Light	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Interior Non Highbay/Lowbay LED Fixtures	6.3%	6.1%	9.7%	11.1%	3.4%	12.6%	11.0%	11.3%	7.6%
Illuminated Signs to LED	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
LED Lighting in Refrigeration	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
LED Exit Sign	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Long Day Lighting Dairy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.0%
Central Lighting Control	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Daylight Sensor Controls	22.9%	22.9%	22.9%	22.9%	22.9%	22.9%	22.9%	22.9%	22.9%
Daylight Sensor Controls - New Construction	32.9%	86.4%	100.0%	95.8%	100.0%	99.2%	100.0%	84.4%	83.0%
Occupancy Sensor	45.7%	74.8%	84.5%	67.1%	19.6%	74.1%	70.6%	74.3%	53.2%
Occupancy Sensor & Daylight Sensor	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Switching Controls for Multilevel Lighting (Non-HID)	63.9%	98.4%	100.0%	95.6%	100.0%	98.6%	99.9%	92.4%	80.5%
Lighting Power Density - Interior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stairwell Bi-Level Control	3.9%	4.2%	4.0%	4.1%	3.8%	4.2%	3.5%	4.1%	4.1%
Occupancy Sensors for LED Refrigerator Lighting	0.9%	1.0%	0.9%	0.9%	0.9%	1.0%	0.8%	0.9%	0.9%
Exterior Lighting									
LED Fuel Pump Canopy Fixture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%
LED Auto Traffic Signals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	22.5%
LED Pedestrian Signals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	22.5%
Exterior HID replacement with CFLs	29.8%	12.8%	12.2%	28.4%	21.9%	24.0%	24.3%	30.5%	15.5%
Exterior HID replacement with LEDs	29.8%	12.8%	12.2%	28.4%	21.9%	24.0%	24.3%	30.5%	15.5%
Garage HID replacement with LEDs	29.8%	12.8%	12.2%	28.4%	21.9%	24.0%	24.3%	30.5%	15.5%
Exterior Linear Fluorescent	0.0%	9.8%	39.6%	2.5%	5.6%	0.2%	14.8%	0.4%	0.3%
Lighting Power Density - Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	29.8%	12.8%	12.2%	28.4%	21.9%	24.0%	24.3%	30.5%	15.5%
Exterior BiLevel Controls	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%
Garage BiLevel Controls	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%
Sports Field Lighting HiLo Control	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Evaporator Fan Motor Controls	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Zero-Energy Doors	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Discus and Scroll Compressors	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Floating Head Pressure Control	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
ENERGY STAR Commercial Solid Door Refrigerators	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
ENERGY STAR Commercial Solid Door Freezers	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
ENERGY STAR Commercial Glass Door Refrigerators	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
ENERGY STAR Commercial Glass Door Freezers	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Energy Star Ice Machines	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%

Consumers Energy Commercial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Strip Curtains	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Anti Sweat Heater Controls	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Efficient Refrigeration Condenser	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Door Gaskets - Cooler and Freezer	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Reach-in Refrigerated display case door retrofit	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Refrigeration Savings due to Lighting Savings	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
ECM Case Motors	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Efficient low-temp compressor	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Automatic High Speed Doors	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Refrigerant charging correction	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Walk-in Cooler Evaporator Motor Reduction	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%
Compressed Air									
Efficient Air Compressors	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%
Automatic Drains	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Cycling Dryers	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Low Pressure Drop-Filters	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Air-Entraining Air Nozzles	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Receiver Capacity Addition	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Compressed Air Audits & Leak Repair	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Compressed Air Pressure Flow Controller replacing no flow controller	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
High Efficiency Air Dryers	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%
Air Compressor Outdoor Air Intake	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Variable Displacement Air Compressor	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%
Compressed Air Storage Tank	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Compressed Air Replacement with Air Blowers	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Space Heating									
Air Source Heat Pump - Heating	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Ground Source Heat Pump - Heating	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Ductless (mini split) - Heating	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
VFD Pumps	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
ECM motors on furnaces	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water Loop Heat Pump (WLHP) - Heating	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
WLHP System (Heating) New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Building Operator Certification	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Efficient Windows	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cool Roof	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Wall Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Roof Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Window Improvements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS install	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
EMS Optimization	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS with Electric Heat	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Zoning	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	50.0%	50.0%

Consumers Energy Commercial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Commissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Infrared Heater	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Other									
NEMA Premium Transformer, single-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NEMA Premium Transformer, three-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
High Efficiency Transformer, single-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
High Efficiency Transformer, three-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Optimized Snow and Ice Melt Controls (electric)	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Engine Block Heater Timer	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Parking Garage Exhaust Fan CO Control	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

Consumers Energy Commercial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Smart Strip plug outlet	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
PC Network Energy Management Controls replacing no central control	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%
Energy Star UPS	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
Vendor Miser for Non-Refrig Equipment	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
High Efficiency Hand Dryer	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%
Electrically Commutated Plug Fans in data centers	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%
High Efficiency CRAC unit	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Computer Room Air Conditioner Economizer	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%
Computer Room Hot Aisle Cold Aisle Configuration	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Computer Room Air Side Economizer	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%
VFD for Process Fans -CRAC units	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%
Water Heating									
Heat Pump Water Heater	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%
HP Water Heater - Residential unit in Commercial Application	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%
Heat Pump Storage Water Heater	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%
Electric Tankless Water Heater	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Low Flow Faucet Aerator	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%
Low Flow Showerhead	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Hot Water (DHW) Pipe Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%
ES Dishwasher, Low Temp, Elec Heat	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%
ES Dishwasher, Low Temp, Gas Heat	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Tank Insulation (electric)	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%
Pre Rinse Sprayers (electric)	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%
ECM Circulator Pump	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Drain water Heat Recovery Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Efficient Hot Water Pump	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%
HVAC Condenser Heater Recovery Water Heating	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Process Cooling Condenser Heater Recovery Water Heating	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Pools									
Heat Pump Pool Heater	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
High efficiency spas/hot tubs	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ventilation									
Economizer	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Demand-Controlled Ventilation	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Variable Speed Drive Control, 15 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 5 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%

Consumers Energy Commercial Measure Database - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Variable Speed Drive Control, 40 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
High Speed Fans	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
High Volume Low Speed Fans	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Engineered CKV hood	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Fan Thermostat Controller	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water-Cooled Centrifugal Chiller < 150 ton	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%
Water-Cooled Centrifugal Chiller 150 - 300 ton	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%
Water-Cooled Centrifugal Chiller > 300 ton	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%
Water-Cooled Screw Chiller < 150 ton	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%
Water-Cooled Screw Chiller 150 - 300 ton	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%
Water-Cooled Screw Chiller > 300 ton	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%
Chiller Tune Up	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
High Efficiency Pumps	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%
Efficient Chilled Water Pump	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
Chilled Hot Water Reset	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Water-Cooled Chiller Average 10% above IECC standard	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
VAV System Conversion	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Motor Belt Replacement	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Water-Side Economizer	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Improved Duct Sealing - Cooling Chiller	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Building Operator Certification	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roof	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Wall Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Roof Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Commissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Space Cooling - Unitary and Split AC									
AC <65k	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
AC 65k - 135k	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%
AC 135k - 240k	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%
AC 240k - 760k	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
AC >760k	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Air Source Heat Pump - Cooling	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
Ductless (mini split) - Cooling	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
Water Loop Heat Pump (WLHP) - Cooling	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Ground Source Heat Pump - Cooling	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%

Consumers Energy Commercial Measure Database - Electric

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Packaged Terminal Air Conditioner (PTAC) - Cooling	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%
WLHP System (Cooling) New Construction	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
DX Condenser Coil Cleaning	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
Room A/C	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%
Improved Duct Sealing - Cooling AC	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Building Operator Certification	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roof	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Wall Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Roof Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Programmable Thermostats	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Hotel Guest Room Occupancy Control System	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Commissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Cooking									
HE Steamer	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%
HE Combination Oven	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%
HE Convection Ovens	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
HE Holding Cabinet	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%
HE Fryer	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%
HE Griddle	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%
Induction Cooktops	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Interior Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
T5 HP Retrofits	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%
Light Tube	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%
High Intensity Fluorescent Fixture (replacing HID)	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
42W 8 lamp Hi Bay CFL	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%
HID Fixture Upgrade - Pulse Start Metal Halide	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%
Interior induction Lighting	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
CFL Fixture	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%
CFL Screw-in	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%
CFL Screw in Specialty	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%
CFL Reflector Flood	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%
LED Screw In (replacing Incandescent)	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%
LED Screw In (replacing CFL)	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%
LED High bay lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%

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LED low bay lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
LED Downlight	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%
LED Specialty (replacing Incandescent)	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%
LED Specialty (replacing CFL)	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
LED Troffer	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
LED Tube Lighting	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%
LED Grow Light	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Interior Non Highbay/Lowbay LED Fixtures	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%
Illuminated Signs to LED	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%
LED Lighting in Refrigeration	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%
LED Exit Sign	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%
Long Day Lighting Dairy	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%
Central Lighting Control	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Daylight Sensor Controls	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Daylight Sensor Controls - New Construction	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Occupancy Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Occupancy Sensor & Daylight Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Switching Controls for Multilevel Lighting (Non-HID)	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Lighting Power Density - Interior	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Stairwell Bi-Level Control	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%
Occupancy Sensors for LED Refrigerator Lighting	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Exterior Lighting									
LED Fuel Pump Canopy Fixture	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%
LED Auto Traffic Signals	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Pedestrian Signals	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Exterior HID replacement with CFLs	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%
Exterior HID replacement with LEDs	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage HID replacement with LEDs	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Exterior Linear Fluorescent	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%
Lighting Power Density - Exterior	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Lighting Power Density - Parking Garage	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Exterior BiLevel Controls	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage BiLevel Controls	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%
Sports Field Lighting HiLo Control	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%
Evaporator Fan Motor Controls	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Zero-Energy Doors	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Discus and Scroll Compressors	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Floating Head Pressure Control	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%
ENERGY STAR Commercial Solid Door Refrigerators	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%
ENERGY STAR Commercial Solid Door Freezers	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%
ENERGY STAR Commercial Glass Door Refrigerators	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%
ENERGY STAR Commercial Glass Door Freezers	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%
Energy Star Ice Machines	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Strip Curtains	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%
Anti Sweat Heater Controls	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%
Efficient Refrigeration Condenser	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Door Gaskets - Cooler and Freezer	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%
Reach-in Refrigerated display case door retrofit	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Refrigeration Savings due to Lighting Savings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
ECM Case Motors	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%
Efficient low-temp compressor	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Automatic High Speed Doors	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Refrigerant charging correction	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Walk-in Cooler Evaporator Motor Reduction	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Compressed Air									
Efficient Air Compressors	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%
Automatic Drains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cycling Dryers	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%
Low Pressure Drop-Filters	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Air-Entraining Air Nozzles	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Receiver Capacity Addition	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Compressed Air Audits & Leak Repair	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Compressed Air Pressure Flow Controller replacing no flow controller	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
High Efficiency Air Dryers	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%
Air Compressor Outdoor Air Intake	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
Variable Displacement Air Compressor	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%
Compressed Air Storage Tank	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Compressed Air Replacement with Air Blowers	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%
Space Heating									
Air Source Heat Pump - Heating	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Ground Source Heat Pump - Heating	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%
Ductless (mini split) - Heating	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
VFD Pumps	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%
ECM motors on furnaces	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%
Water Loop Heat Pump (WLHP) - Heating	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
WLHP System (Heating) New Construction	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Building Operator Certification	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roof	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Wall Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Roof Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Hotel Guest Room Occupancy Control System	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Commissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Infrared Heater	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other									
NEMA Premium Transformer, single-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
NEMA Premium Transformer, three-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
High Efficiency Transformer, single-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%

Consumers Energy Commercial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
High Efficiency Transformer, three-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Optimized Snow and Ice Melt Controls (electric)	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Engine Block Heater Timer	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Parking Garage Exhaust Fan CO Control	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%

Consumers Energy Commercial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	76.1%	76.1%	76.1%	76.1%	76.1%	76.1%	76.1%	76.1%	76.1%
Smart Strip plug outlet	83.6%	83.6%	83.6%	83.6%	83.6%	83.6%	83.6%	83.6%	83.6%
PC Network Energy Management Controls replacing no central control	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Energy Star UPS	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
Vendor Miser for Non-Refrig Equipment	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%
High Efficiency Hand Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electrically Commutated Plug Fans in data centers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency CRAC unit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Conditioner Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Hot Aisle Cold Aisle Configuration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Side Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Fans -CRAC units	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heating									
Heat Pump Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HP Water Heater - Residential unit in Commercial Application	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Heat Pump Storage Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Tankless Water Heater	98.9%	98.9%	98.9%	98.9%	98.9%	98.9%	98.9%	98.9%	98.9%
Low Flow Faucet Aerator	95.1%	86.4%	24.4%	85.2%	40.6%	72.6%	80.6%	92.1%	87.6%
Low Flow Showerhead	75.0%	100.0%	100.0%	20.0%	58.1%	77.9%	100.0%	94.4%	81.3%
Hot Water (DHW) Pipe Insulation	77.8%	93.8%	100.0%	71.4%	100.0%	83.3%	100.0%	100.0%	87.5%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, Low Temp, Elec Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, Low Temp, Gas Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Tank Insulation (electric)	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
Pre Rinse Sprayers (electric)	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%
ECM Circulator Pump	85.7%	100.0%	100.0%	88.9%	100.0%	66.7%	100.0%	100.0%	100.0%
Drain water Heat Recovery Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Hot Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
HVAC Condenser Heater Recovery Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Cooling Condenser Heater Recovery Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pools									
Heat Pump Pool Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High efficiency spas/hot tubs	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Ventilation									
Economizer	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%

Consumers Energy Commercial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Demand-Controlled Ventilation	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%
Variable Speed Drive Control, 15 HP	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Variable Speed Drive Control, 5 HP	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Variable Speed Drive Control, 40 HP	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
High Speed Fans	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Volume Low Speed Fans	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Engineered CKV hood	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Fan Thermostat Controller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Screw Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Centrifugal Chiller < 150 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Centrifugal Chiller 150 - 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Centrifugal Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Screw Chiller < 150 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Screw Chiller 150 - 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Screw Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chiller Tune Up	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
High Efficiency Pumps	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Efficient Chilled Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Chilled Hot Water Reset	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Chiller Average 10% above IECC standard	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VAV System Conversion	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Motor Belt Replacement	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Side Economizer	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%
Improved Duct Sealing - Cooling Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	53.0%	40.0%	38.0%	24.0%	48.0%	12.0%	32.0%	7.0%	29.0%
Cool Roof	100.0%	100.0%	93.0%	99.0%	97.0%	100.0%	97.0%	100.0%	99.0%
Ceiling Insulation	53.8%	28.0%	54.0%	47.0%	23.0%	33.0%	31.0%	39.0%	51.0%
Wall Insulation	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%
Roof Insulation	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%
Window Improvements	53.0%	40.0%	38.0%	24.0%	48.0%	12.0%	32.0%	7.0%	29.0%
EMS install	100.0%	82.8%	100.0%	95.5%	75.6%	98.9%	100.0%	54.5%	65.3%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Commissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Unitary and Split AC									
AC <65k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 65k - 135k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 135k - 240k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 240k - 760k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
AC >760k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air Source Heat Pump - Cooling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ductless (mini split) - Cooling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Loop Heat Pump (WLHP) - Cooling	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Ground Source Heat Pump - Cooling	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Packaged Terminal Air Conditioner (PTAC) - Cooling	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
WLHP System (Cooling) New Construction	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
DX Condenser Coil Cleaning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Room A/C	100.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Improved Duct Sealing - Cooling AC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Cool Roof	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ceiling Insulation	53.8%	28.0%	54.0%	47.0%	23.0%	33.0%	31.0%	39.0%	51.0%
Wall Insulation	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%
Roof Insulation	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%
Window Improvements	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Programmable Thermostats	39.5%	39.5%	39.5%	39.5%	39.5%	39.5%	39.5%	39.5%	39.5%
EMS install	100.0%	82.8%	100.0%	95.5%	75.6%	98.9%	100.0%	54.5%	65.3%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Commissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cooking									
HE Steamer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Combination Oven	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Convection Ovens	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Holding Cabinet	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
HE Fryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Griddle	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Induction Cooktops	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	74.3%	79.2%	71.5%	77.8%	70.0%	76.6%	72.3%	84.3%	78.7%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	74.3%	79.2%	71.5%	77.8%	70.0%	76.6%	72.3%	84.3%	78.7%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	74.3%	79.2%	71.5%	77.8%	70.0%	76.6%	72.3%	84.3%	78.7%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	74.3%	79.2%	71.5%	77.8%	70.0%	76.6%	72.3%	84.3%	78.7%
T5 HP Retrofits	74.3%	79.2%	71.5%	77.8%	70.0%	76.6%	72.3%	84.3%	78.7%
Light Tube	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
High Intensity Fluorescent Fixture (replacing HID)	4.5%	3.1%	5.0%	3.1%	5.1%	1.3%	4.3%	1.9%	3.8%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	4.5%	3.1%	5.0%	3.1%	5.1%	1.3%	4.3%	1.9%	3.8%
42W 8 lamp Hi Bay CFL	4.5%	3.1%	5.0%	3.1%	5.1%	1.3%	4.3%	1.9%	3.8%
HID Fixture Upgrade - Pulse Start Metal Halide	4.5%	3.1%	5.0%	3.1%	5.1%	1.3%	4.3%	1.9%	3.8%
Interior induction Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Fixture	48.4%	6.4%	5.3%	50.1%	19.3%	11.7%	22.7%	28.9%	53.3%

Consumers Energy Commercial Measure Database - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
CFL Screw-in	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	48.4%	6.4%	5.3%	50.1%	19.3%	11.7%	22.7%	28.9%	53.3%
CFL Reflector Flood	48.4%	6.4%	5.3%	50.1%	19.3%	11.7%	22.7%	28.9%	53.3%
LED Screw In (replacing Incandescent)	48.4%	6.4%	5.3%	50.1%	19.3%	11.7%	22.7%	28.9%	53.3%
LED Screw In (replacing CFL)	43.6%	19.6%	43.1%	40.8%	77.0%	53.5%	38.3%	58.3%	46.7%
LED High bay lighting	100.0%	91.1%	100.0%	100.0%	100.0%	100.0%	100.0%	97.0%	100.0%
LED low bay lighting	99.6%	88.2%	95.2%	91.7%	97.4%	99.8%	95.5%	100.0%	96.9%
LED Downlight	48.4%	6.4%	5.3%	50.1%	19.3%	11.7%	22.7%	28.9%	53.3%
LED Specialty (replacing Incandescent)	48.4%	6.4%	5.3%	50.1%	19.3%	11.7%	22.7%	28.9%	53.3%
LED Specialty (replacing CFL)	43.6%	19.6%	43.1%	40.8%	77.0%	53.5%	38.3%	58.3%	46.7%
LED Troffer	100.0%	91.1%	100.0%	100.0%	100.0%	100.0%	100.0%	97.0%	100.0%
LED Tube Lighting	100.0%	91.1%	100.0%	100.0%	100.0%	100.0%	100.0%	97.0%	100.0%
LED Grow Light	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
Interior Non Highbay/Lowbay LED Fixtures	99.6%	88.2%	95.2%	91.7%	97.4%	99.8%	95.5%	100.0%	96.9%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Lighting in Refrigeration	82.8%	88.0%	75.0%	86.5%	85.1%	80.0%	83.5%	72.7%	82.8%
LED Exit Sign	42.1%	27.9%	19.2%	48.3%	13.1%	16.7%	2.6%	55.3%	38.9%
Long Day Lighting Dairy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Central Lighting Control	96.2%	90.4%	99.2%	88.4%	99.5%	73.4%	82.0%	65.2%	87.6%
Daylight Sensor Controls	96.2%	90.4%	99.2%	88.4%	99.5%	73.4%	82.0%	65.2%	87.6%
Daylight Sensor Controls - New Construction	96.2%	90.4%	99.2%	88.4%	99.5%	73.4%	82.0%	65.2%	87.6%
Occupancy Sensor	96.2%	90.4%	99.2%	88.4%	99.5%	73.4%	82.0%	65.2%	87.6%
Occupancy Sensor & Daylight Sensor	96.2%	90.4%	99.2%	88.4%	99.5%	73.4%	82.0%	65.2%	87.6%
Switching Controls for Multilevel Lighting (Non-HID)	96.2%	90.4%	99.2%	88.4%	99.5%	73.4%	82.0%	65.2%	87.6%
Lighting Power Density - Interior	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Stairwell Bi-Level Control	96.2%	96.2%	96.2%	96.2%	96.2%	96.2%	96.2%	96.2%	96.2%
Occupancy Sensors for LED Refrigerator Lighting	82.8%	88.0%	75.0%	86.5%	85.1%	80.0%	83.5%	72.7%	82.8%
Exterior Lighting									
LED Fuel Pump Canopy Fixture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
LED Auto Traffic Signals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
LED Pedestrian Signals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Exterior HID replacement with CFLs	89.3%	48.3%	76.0%	87.8%	71.2%	72.2%	87.8%	91.9%	93.9%
Exterior HID replacement with LEDs	89.3%	48.3%	76.0%	87.8%	71.2%	72.2%	87.8%	91.9%	93.9%
Garage HID replacement with LEDs	89.3%	48.3%	76.0%	87.8%	71.2%	72.2%	87.8%	91.9%	93.9%
Exterior Linear Fluorescent	89.3%	48.3%	76.0%	87.8%	71.2%	72.2%	87.8%	91.9%	93.9%
Lighting Power Density - Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior BiLevel Controls	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%
Garage BiLevel Controls	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%
Sports Field Lighting HiLo Control	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%
Evaporator Fan Motor Controls	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%
Zero-Energy Doors	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
Discus and Scroll Compressors	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%
Floating Head Pressure Control	98.6%	98.6%	98.6%	98.6%	98.6%	98.6%	98.6%	98.6%	98.6%
ENERGY STAR Commercial Solid Door Refrigerators	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Solid Door Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Glass Door Refrigerators	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%
ENERGY STAR Commercial Glass Door Freezers	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%

Consumers Energy Commercial Measure Database - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Energy Star Ice Machines	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%
Strip Curtains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Anti Sweat Heater Controls	94.2%	94.2%	94.2%	94.2%	94.2%	94.2%	94.2%	94.2%	94.2%
Efficient Refrigeration Condenser	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%
Door Gaskets - Cooler and Freezer	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Reach-in Refrigerated display case door retrofit	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%
Refrigeration Savings due to Lighting Savings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Case Motors	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
Efficient low-temp compressor	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Automatic High Speed Doors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigerant charging correction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Walk-in Cooler Evaporator Motor Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air									
Efficient Air Compressors	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Automatic Drains	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cycling Dryers	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Low Pressure Drop-Filters	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Air-Entraining Air Nozzles	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Receiver Capacity Addition	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Compressed Air Audits & Leak Repair	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Pressure Flow Controller replacing no flow controller	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
High Efficiency Air Dryers	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Air Compressor Outdoor Air Intake	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Variable Displacement Air Compressor	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Compressed Air Storage Tank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Replacement with Air Blowers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Heating									
Air Source Heat Pump - Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ground Source Heat Pump - Heating	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Ductless (mini split) - Heating	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
VFD Pumps	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
ECM motors on furnaces	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Water Loop Heat Pump (WLHP) - Heating	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
WLHP System (Heating) New Construction	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Integrated Building Design	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Cool Roof	98.3%	98.3%	98.3%	98.3%	98.3%	98.3%	98.3%	98.3%	98.3%
Ceiling Insulation	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
Wall Insulation	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%	51.7%
Roof Insulation	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%	69.5%
Window Improvements	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
EMS install	100.0%	82.8%	100.0%	95.5%	75.6%	98.9%	100.0%	54.5%	65.3%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Commissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Infrared Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Other									
NEMA Premium Transformer, single-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
NEMA Premium Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
High Efficiency Transformer, single-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
High Efficiency Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
Optimized Snow and Ice Melt Controls (electric)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Smart Strip plug outlet	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
PC Network Energy Management Controls replacing no central control	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Energy Star UPS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Vendor Miser for Non-Refrig Equipment	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Hand Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electrically Commutated Plug Fans in data centers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency CRAC unit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Conditioner Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Hot Aisle Cold Aisle Configuration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Side Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Fans -CRAC units	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heating									
Heat Pump Water Heater	25.0%	25.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
HP Water Heater - Residential unit in Commercial Application	25.0%	25.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Heat Pump Storage Water Heater	25.0%	25.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Electric Tankless Water Heater	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Low Flow Faucet Aerator	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Showerhead	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Hot Water (DHW) Pipe Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, Low Temp, Elec Heat	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, Low Temp, Gas Heat	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Tank Insulation (electric)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Pre Rinse Sprayers (electric)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
ECM Circulator Pump	10.0%	5.0%	80.0%	10.0%	20.0%	80.0%	80.0%	15.0%	5.0%
Drain water Heat Recovery Water Heater	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Efficient Hot Water Pump	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
HVAC Condenser Heater Recovery Water Heating	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Process Cooling Condenser Heater Recovery Water Heating	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Pools									
Heat Pump Pool Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High efficiency spas/hot tubs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ventilation									
Economizer	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Demand-Controlled Ventilation	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%

Consumers Energy Commercial Measure Database - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Variable Speed Drive Control, 15 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Variable Speed Drive Control, 5 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Variable Speed Drive Control, 40 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
High Speed Fans	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
High Volume Low Speed Fans	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Engineered CKV hood	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Fan Thermostat Controller	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Air-Cooled Screw Chiller	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Centrifugal Chiller < 150 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Centrifugal Chiller 150 - 300 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Centrifugal Chiller > 300 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Screw Chiller < 150 ton	0.0%	0.0%	0.0%	80.0%	0.0%	80.0%	0.0%	80.0%	0.0%
Water-Cooled Screw Chiller 150 - 300 ton	0.0%	0.0%	0.0%	95.0%	0.0%	95.0%	0.0%	95.0%	0.0%
Water-Cooled Screw Chiller > 300 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Chiller Tune Up	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
High Efficiency Pumps	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Efficient Chilled Water Pump	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Chilled Hot Water Reset	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Chiller Average 10% above IECC standard	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
VAV System Conversion	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Motor Belt Replacement	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Side Economizer	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Improved Duct Sealing - Cooling Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roof	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Retrocommissioning	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Commissioning	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Space Cooling - Unitary and Split AC									
AC <65k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 65k - 135k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 135k - 240k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 240k - 760k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC >760k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%

Consumers Energy Commercial Measure Database - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Ductless (mini split) - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Water Loop Heat Pump (WLHP) - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Ground Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Packaged Terminal Air Conditioner (PTAC) - Cooling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
WLHP System (Cooling) New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
DX Condenser Coil Cleaning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Room A/C	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Duct Sealing - Cooling AC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roof	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Programmable Thermostats	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	90.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Retrocommissioning	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Commissioning	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Cooking									
HE Steamer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Combination Oven	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Convection Ovens	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Holding Cabinet	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Fryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Griddle	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Induction Cooktops	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
T5 HP Retrofits	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Light Tube	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Intensity Fluorescent Fixture (replacing HID)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
42W 8 lamp Hi Bay CFL	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
HID Fixture Upgrade - Pulse Start Metal Halide	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior induction Lighting	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
CFL Fixture	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw-in	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

Convertible Factor:
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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
CFL Reflector Flood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Screw In (replacing Incandescent)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Screw In (replacing CFL)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED High bay lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED low bay lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Downlight	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Specialty (replacing Incandescent)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Specialty (replacing CFL)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Troffer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Tube Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Grow Light	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Non Highbay/Lowbay LED Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Lighting in Refrigeration	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
LED Exit Sign	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Long Day Lighting Dairy	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Central Lighting Control	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Daylight Sensor Controls	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Daylight Sensor Controls - New Construction	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Occupancy Sensor	90.0%	10.0%	10.0%	20.0%	10.0%	10.0%	0.0%	50.0%	20.0%
Occupancy Sensor & Daylight Sensor	90.0%	10.0%	10.0%	20.0%	10.0%	10.0%	0.0%	50.0%	20.0%
Switching Controls for Multilevel Lighting (Non-HID)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Lighting Power Density - Interior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stairwell Bi-Level Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Occupancy Sensors for LED Refrigerator Lighting	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Exterior Lighting									
LED Fuel Pump Canopy Fixture	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
LED Auto Traffic Signals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Pedestrian Signals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replacement with CFLs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replacement with LEDs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LEDs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior Linear Fluorescent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior BiLevel Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage BiLevel Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sports Field Lighting HiLo Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Evaporator Fan Motor Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zero-Energy Doors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Discus and Scroll Compressors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Floating Head Pressure Control	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
ENERGY STAR Commercial Solid Door Refrigerators	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Solid Door Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Glass Door Refrigerators	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Glass Door Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star Ice Machines	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Strip Curtains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Anti Sweat Heater Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Refrigeration Condenser	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Door Gaskets - Cooler and Freezer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Reach-in Refrigerated display case door retrofit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigeration Savings due to Lighting Savings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Case Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient low-temp compressor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic High Speed Doors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigerant charging correction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Walk-in Cooler Evaporator Motor Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air									
Efficient Air Compressors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Drains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cycling Dryers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Pressure Drop-Filters	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Entraining Air Nozzles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Receiver Capacity Addition	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Audits & Leak Repair	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Pressure Flow Controller replacing no flow controller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Air Dryers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air Compressor Outdoor Air Intake	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Displacement Air Compressor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Storage Tank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Replacement with Air Blowers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Heating									
Air Source Heat Pump - Heating	77.0%	77.0%	77.0%	67.0%	77.0%	60.0%	77.0%	60.0%	77.0%
Ground Source Heat Pump - Heating	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ductless (mini split) - Heating	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
VFD Pumps	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ECM motors on furnaces	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Loop Heat Pump (WLHP) - Heating	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
WLHP System (Heating) New Construction	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roof	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	90.0%	90.0%	90.0%	90.0%	90.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Retrocommissioning	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%

Consumers Energy Commercial Measure Database - Electric

Convertible Factor:
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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Commissioning	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Infrared Heater	77.0%	77.0%	77.0%	67.0%	77.0%	60.0%	77.0%	60.0%	77.0%

Consumers Energy Commercial Measure Database - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Other									
NEMA Premium Transformer, single-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
NEMA Premium Transformer, three-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Efficiency Transformer, single-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Efficiency Transformer, three-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Optimized Snow and Ice Melt Controls (electric)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Commercial Measure Database - Electric

Electric Measure Sources

Source Number	Source
1	Michigan Master Database of Deemed Savings - 2016 - Non-Weather Sensitive Commercial
2	Michigan Master Database of Deemed Savings - 2016 - Weather Sensitive
3	Michigan Master Database of Deemed Savings - 2016 Work Papers
4	ENERGY STAR Qualified Office Equipment Calculator
5	Vermont TRM - Manual No. 2014-87
6	Drain Water Heat Recovery Characterization and Modeling - Final Report, C. Zaloum, M. Lafrance, J Gusdorf, 2007
7	California Energy Commission Codes and Standards Enhancement (CASE) Initative: Analysis of Standards Options for Residential Swimming Pool & Portable Spa Equipment, July 2013
8	Mid-Atlantic TRM Version 4.0 June 2014
9	DC DDOE Natural Gas Efficiency Potential, Dec 2012 Completed by GDS Associates, Inc.
10	GDS Previous Study or GDS Engineering Estimate based upon past project experience
11	Big Ass Fan Company Calculations, http://www.todaysfacilitymanager.com/articles/the-hvac-factor-high-volume-low-speed-fans.php
12	Pacific NW Natitional Labs - HVAC Occupancy Sensor Study
13	https://kindledgrowlights.com/led-technology/led-cost-savings/
14	Energy Star Website. http://www.energystar.gov/products/commercial_food_service_equipment/commercial_ice_makers
15	2011 Michigan Statewide Commercial Baseline Study
16	2013 DTE Energy Commercial Baseline Study
17	2011 DTE Commercial Baseline Study
18	2011 Delaware Commercial Baseline Study
19	DTE Non-Residential Potential Study 2010
20	;2010 Maryland Commercial Baseline Study
21	US DOE, EERE Consumer's Guide to Energy Efficiency and Renewable Energy, "Solar Swimming Pool Heaters" http://apps1.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13230
22	Building Commissioning - A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions. Lawrence Berkeley National Laboratory. Report Prepared for: California Energy Commission Public Interest Energy Research (PIER) - July 21, 2009

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Computers & Office Equipment					
Energy Star Compliant Refrigerator	3	3	1	3	16
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	4	10	4	3	15
Smart Strip plug outlet	1	1	1	3	10
PC Network Energy Management Controls replacing no central control	1	1	1	3	16
Energy Star UPS	1	1	1	3	10
Vendor Miser for Non-Refrig Equipment	1	1	1	3	17
High Efficiency Hand Dryer	1	1	1	3	10
Electrically Commutated Plug Fans in data centers	1	1	1	3	10
High Efficiency CRAC unit	1	1	1	3	10
Computer Room Air Conditioner Economizer	1	1	1	3	10
Computer Room Hot Aisle Cold Aisle Configuration	1	1	1	3	10
Computer Room Air Side Economizer	1	1	1	3	10
VFD for Process Fans -CRAC units	1	1	1	3	10
Water Heating					
Heat Pump Water Heater	1	1	1	3	15
HP Water Heater - Residential unit in Commercial Application	1	1	1	3	15
Heat Pump Storage Water Heater	1	1	1	3	10
Electric Tankless Water Heater	1	1	1	3	15
Low Flow Faucet Aerator	1	1	1	3	16
Low Flow Showerhead	1	1	1	3	16
Hot Water (DHW) Pipe Insulation	1	1	1	3	15
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	1	1	1	3	19
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	1	1	1	3	19
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	1	1	1	3	19
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	1	1	1	3	19
ES Dishwasher, High Temp, Elec Heat, Elec Booster	1	1	1	3	19
ES Dishwasher, High Temp, Gas Heat, Elec Booster	1	1	1	3	19
ES Dishwasher, High Temp, Gas Heat, Gas Booster	1	1	1	3	19
ES Dishwasher, Low Temp, Elec Heat	1	1	1	3	19
ES Dishwasher, Low Temp, Gas Heat	1	1	1	3	19
Tank Insulation (electric)	1	1	1	3	16

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Pre Rinse Sprayers (electric)	1	1	1	3	10
ECM Circulator Pump	1	1	1	3	10
Drain water Heat Recovery Water Heater	6	5	5	3	15
Efficient Hot Water Pump	2	2	2	3	20
HVAC Condenser Heater Recovery Water Heating	1	1	1	3	15
Process Cooling Condenser Heater Recovery Water Heating	1	1	1	3	15
Pools					
Heat Pump Pool Heater	7	7	7	3	16
High efficiency spas/hot tubs	7	7	7	3	16
Ventilation					
Economizer	2	2	2	10	15
Demand-Controlled Ventilation	2	2	2	3	15
Variable Speed Drive Control, 15 HP	1	1	1	3	10
Variable Speed Drive Control, 5 HP	1	1	1	3	10
Variable Speed Drive Control, 40 HP	1	1	1	3	10
High Speed Fans	1	1	1	3	10
High Volume Low Speed Fans	1	1	1	3	10
Engineered CKV hood	2	2	2	3	10
Fan Thermostat Controller	2	2	2	3	10
Space Cooling - Chillers					
Air-Cooled Recip Chiller	2	2	2	3	10
Air-Cooled Screw Chiller	2	2	2	3	10
Water-Cooled Centrifugal Chiller < 150 ton	2	2	2	3	10
Water-Cooled Centrifugal Chiller 150 - 300 ton	2	2	2	3	10
Water-Cooled Centrifugal Chiller > 300 ton	2	2	2	3	10
Water-Cooled Screw Chiller < 150 ton	2	2	2	3	10
Water-Cooled Screw Chiller 150 - 300 ton	2	2	2	3	10
Water-Cooled Screw Chiller > 300 ton	2	2	2	3	10
Chiller Tune Up	2	2	2	10	15
High Efficiency Pumps	1	1	1	3	20
Efficient Chilled Water Pump	2	2	2	3	20
Chilled Hot Water Reset	2	2	2	3	20
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	2	2	2	3	10
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	2	2	2	3	10
Water-Cooled Chiller Average 10% above IECC standard	2	2	2	3	10
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	2	2	2	3	10
VAV System Conversion	2	2	2	3	10
Motor Belt Replacement	1	1	1	3	16
Water-Side Economizer	1	1	1	3	10

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Improved Duct Sealing - Cooling Chiller	2	2	2	3	16
Integrated Building Design	10	10	10	3	16
Building Operator Certification	1	1	1	3	10
Energy Efficient Windows	2	2	2	3	15
Cool Roof	2	2	2	3	15
Ceiling Insulation	2	2	2	3	15
Wall Insulation	2	2	2	3	15
Roof Insulation	2	2	2	3	16
Window Improvements	2	2	2	3	15
EMS install	2	2	2	3	16
EMS Optimization	2	2	2	3	16
HVAC Occupancy Sensors	2	2	2	13	10
Setback with Electric Heat	2	2	2	3	10
EMS Pump Scheduling Controls	2	2	2	3	10
Web enabled EMS	2	2	2	3	10
Zoning	10	10	10	3	10
Retrocommissioning	10	10	10	3	10
Commissioning	22	22	22	3	10
Space Cooling - Unitary & Split AC					
AC <65k	2	2	2	3	10
AC 65k - 135k	2	2	2	3	10
AC 135k - 240k	2	2	2	3	10
AC 240k - 760k	2	2	2	3	10
AC >760k	2	2	2	3	10
Air Source Heat Pump - Cooling	2	2	2	3	10
Ductless (mini split) - Cooling	2	2	2	3	15
Water Loop Heat Pump (WLHP) - Cooling	2	2	2	3	10
Ground Source Heat Pump - Cooling	2	2	2	3	10
Packaged Terminal Air Conditioner (PTAC) - Cooling	2	2	2	3	10
WLHP System (Cooling) New Construction	2	2	2	3	10
DX Condenser Coil Cleaning	2	2	2	3	10
Room A/C	1	1	1	3	10
Improved Duct Sealing - Cooling AC	2	2	2	3	16
Integrated Building Design	10	10	10	3	16
Building Operator Certification	1	1	1	3	10
Energy Efficient Windows	2	2	2	3	15
Cool Roof	2	2	2	3	15
Ceiling Insulation	2	2	2	3	15
Wall Insulation	2	2	2	3	15
Roof Insulation	2	2	2	3	16
Window Improvements	2	2	2	3	15
Programmable Thermostats	2	2	2	3	16

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
EMS install	2	2	2	3	16
EMS Optimization	2	2	2	3	16
Hotel Guest Room Occupancy Control System	1	1	1	3	15
HVAC Occupancy Sensors	2	2	2	13	10
Setback with Electric Heat	2	2	2	3	10
EMS Pump Scheduling Controls	2	2	2	3	10
Web enabled EMS	2	2	2	3	10
Zoning	10	10	10	3	10
Retrocommissioning	10	10	10	3	10
Commissioning	22	22	22	3	10
Cooking					
HE Steamer	1	1	1	3	15
HE Combination Oven	1	1	1	3	15
HE Convection Ovens	1	1	1	3	15
HE Holding Cabinet	1	1	1	3	15
HE Fryer	1	1	1	3	15
HE Griddle	1	1	1	3	15
Induction Cooktops	10	10	10	3	15
Interior Lighting					
Lamp & Ballast Retrofit (HPT8 Replacing T12)	1	1	1	3	16
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	1	1	1	3	16
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	1	1	1	3	16
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	1	1	1	3	16
T5 HP Retrofits	1	1	1	3	16
Light Tube	1	1	1	10	16
High Intensity Fluorescent Fixture (replacing HID)	1	1	1	3	16
High Intensity Fluorescent Fixture (replacing HID) - New Construction	1	1	1	3	16
42W 8 lamp Hi Bay CFL	1	1	1	3	16
HID Fixture Upgrade - Pulse Start Metal Halide	1	1	1	3	16
Interior induction Lighting	1	1	1	3	16
CFL Fixture	1	1	1	3	16
CFL Screw-in	1	1	1	3	16
CFL Screw in Specialty	1	1	1	3	16
CFL Reflector Flood	1	1	1	3	16
LED Screw In (replacing Incandescent)	1	1	1	3	16
LED Screw In (replacing CFL)	1	1	1	3	16
LED High bay lighting	1	1	1	3	16
LED low bay lighting	1	1	1	3	16
LED Downlight	1	1	1	3	16

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
LED Specialty (replacing Incandescent)	1	1	1	3	16
LED Specialty (replacing CFL)	1	1	1	3	16
LED Troffer	1	1	1	3	16
LED Tube Lighting	1	1	1	3	16
LED Grow Light	1	1	1	15	16
Interior Non Highbay/Lowbay LED Fixtures	1	1	1	3	16
Illuminated Signs to LED	1	1	1	3	15
LED Lighting in Refrigeration	1	1	1	3	15
LED Exit Sign	1	1	1	3	16
Long Day Lighting Dairy	1	1	1	3	10
Central Lighting Control	1	1	1	3	16
Daylight Sensor Controls	1	1	1	3	16
Daylight Sensor Controls - New Construction	1	1	1	3	16
Occupancy Sensor	1	1	1	3	16
Occupancy Sensor & Daylight Sensor	1	1	1	3	16
Switching Controls for Multilevel Lighting (Non-HID)	1	1	1	3	16
Lighting Power Density - Interior	1	1	1	3	10
Stairwell Bi-Level Control	1	1	1	3	16
Occupancy Sensors for LED Refrigerator Lighting	1	1	1	3	15
Exterior Lighting					
LED Fuel Pump Canopy Fixture	8	8	8	3	10
LED Auto Traffic Signals	1	1	1	3	18
LED Pedestrian Signals	1	1	1	3	18
Exterior HID replacement with CFLs	1	1	1	3	15
Exterior HID replacement with LEDs	1	1	1	3	10
Garage HID replacement with LEDs	1	1	1	3	10
Exterior Linear Fluorescent	1	1	1	3	10
Lighting Power Density - Exterior	1	1	1	3	10
Lighting Power Density - Parking Garage	1	1	1	3	10
Exterior BiLevel Controls	1	1	1	3	16
Garage BiLevel Controls	1	1	1	3	16
Sports Field Lighting HiLo Control	1	1	1	3	16
Refrigeration					
Vending Miser for Refrigerated Vending Machines	1	1	1	3	16
Evaporator Fan Motor Controls	1	1	1	3	16
Zero-Energy Doors	5	5	5	3	16
Discus and Scroll Compressors	5	5	5	3	16
Floating Head Pressure Control	1	1	1	3	16
ENERGY STAR Commercial Solid Door Refrigerators	1	1	1	3	15
ENERGY STAR Commercial Solid Door Freezers	1	1	1	3	15

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
ENERGY STAR Commercial Glass Door Refrigerators	1	1	1	3	15
ENERGY STAR Commercial Glass Door Freezers	1	1	1	3	15
Energy Star Ice Machines	1	1	1	14	15
Strip Curtains	1	1	1	3	10
Anti Sweat Heater Controls	1	1	1	3	16
Efficient Refrigeration Condenser	1	1	1	3	16
Door Gaskets - Cooler and Freezer	1	1	1	3	15
Reach-in Refrigerated display case door retrofit	1	1	1	3	15
Refrigeration Savings due to Lighting Savings	1	1	1	3	15
ECM Case Motors	1	1	1	3	16
Efficient low-temp compressor	5	5	5	3	10
Automatic High Speed Doors	1	1	1	3	10
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	1	1	1	3	10
Refrigerant charging correction	2	2	2	3	10
Walk-in Cooler Evaporator Motor Reduction	1	1	1	3	10
Night Covers	1	1	1	3	10
Refrigeration Suction Line Insulation	1	1	1	3	10
Compressed Air					
Efficient Air Compressors	1	1	1	3	10
Automatic Drains	1	1	1	3	10
Cycling Dryers	1	1	1	3	10
Low Pressure Drop-Filters	1	1	1	3	10
Air-Entraining Air Nozzles	1	1	1	3	10
Receiver Capacity Addition	5	5	5	3	10
Compressed Air Audits & Leak Repair	1	1	1	3	10
Compressed Air Pressure Flow Controller replacing no flow controller	1	1	1	3	10
High Efficiency Air Dryers	1	1	1	3	10
Air Compressor Outdoor Air Intake	1	1	1	3	10
Variable Displacement Air Compressor	1	1	1	3	10
Compressed Air Storage Tank	1	1	1	3	10
Compressed Air Replacement with Air Blowers	1	1	1	3	10
Space Heating					
Air Source Heat Pump - Heating	2	2	2	3	10
Ground Source Heat Pump - Heating	2	2	2	3	10
Ductless (mini split) - Heating	2	2	2	3	10
VFD Pumps	1	1	1	3	20
ECM motors on furnaces	1	1	1	3	20
Water Loop Heat Pump (WLHP) - Heating	2	2	2	3	10
WLHP System (Heating) New Construction	2	2	2	3	10
Integrated Building Design	10	10	10	3	16

Consumers Energy Commercial Measure Database - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Building Operator Certification	1	1	1	3	10
Energy Efficient Windows	2	2	2	3	15
Cool Roof	2	2	2	3	15
Ceiling Insulation	2	2	2	3	15
Wall Insulation	2	2	2	3	15
Roof Insulation	2	2	2	3	16
Window Improvements	2	2	2	3	15
EMS install	2	2	2	3	16
EMS Optimization	2	2	2	3	16
Hotel Guest Room Occupancy Control System	1	1	1	3	15
HVAC Occupancy Sensors	2	2	2	13	10
Setback with Electric Heat	2	2	2	3	10
EMS Pump Scheduling Controls	2	2	2	3	10
Web enabled EMS	2	2	2	3	10
Web enabled EMS with Electric Heat	2	2	2	3	10
Zoning	10	10	10	3	10
Retrocommissioning	10	10	10	3	10
Commissioning	22	22	22	3	10
Infrared Heater	2	2	2	3	10
Other					
NEMA Premium Transformer, single-phase	1	1	1	3	10
NEMA Premium Transformer, three-phase	1	1	1	3	10
High Efficiency Transformer, single-phase	1	1	1	3	10
High Efficiency Transformer, three-phase	1	1	1	3	10
Optimized Snow and Ice Melt Controls (electric)	1	1	1	3	10
Engine Block Heater Timer	1	1	1	3	10
Parking Garage Exhaust Fan CO Control	1	1	1	3	10

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**Direct Utility Test**
Computers & Office Equipment						
Energy Star Compliant Refrigerator	47.80	2	Per Unit	$30.75	16	1.8
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	631.00	2	per set	$20.00	5	11.5
Smart Strip plug outlet	16.97	1	per unit	$40.00	5	0.2
PC Network Energy Management Controls replacing no central control	135.00	1	per PC	$17.00	4	2.3
Energy Star UPS	104.79	2	per kW	$1,303.35	10	0.1
Vendor Miser for Non-Refrig Equipment	342.50	1	per unit	$100.00	5	1.1
High Efficiency Hand Dryer	965.00	1	per unit	$450.00	10	1.5
Electrically Commutated Plug Fans in data centers	1444.50	2	per fan	$718.00	15	2.1
High Efficiency CRAC unit	162.33	1	MBH	$82.50	15	2.1
Computer Room Air Conditioner Economizer	358.00	2	MBH	$82.00	15	3.8
Computer Room Hot Aisle Cold Aisle Configuration	124.75	2	MBH	$156.00	15	0.8
Computer Room Air Side Economizer	440.33	2	MBH	$25.00	10	11.1
VFD for Process Fans -CRAC units	2279.00	1	per HP	$200.00	15	11.6
Water Heating						
Heat Pump Water Heater	184058.00	2	per heater	$10,600.00	15	20.0
HP Water Heater - Residential unit in Commercial Application	5375.00	2	per heater	$1,000.00	15	6.7
Heat Pump Storage Water Heater	2504.50	2	per heater	$433.00	10	4.5
Electric Tankless Water Heater	621.00	2	per heater	$466.00	20	1.7
Low Flow Faucet Aerator	903.00	1	per unit	$2.50	10	275.5
Low Flow Showerhead	615.00	1	per unit	$25.00	10	18.3
Hot Water (DHW) Pipe Insulation	44.74	1	Linear Ft	$10.00	20	6.1
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	126.00	2	per unit	$139.30	7	0.4
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	793.00	2	per unit	$442.03	7	0.9
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	627.00	2	per unit	$437.97	7	0.7
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	1293.00	2	per unit	$540.00	7	1.1
ES Dishwasher, High Temp, Elec Heat, Elec Booster	12913.50	2	per unit	$977.50	16	15.1
ES Dishwasher, High Temp, Gas Heat, Elec Booster	5776.75	2	per unit	$735.88	16	9.0
ES Dishwasher, High Temp, Gas Heat, Gas Booster	1698.75	2	per unit	$354.61	16	5.5
ES Dishwasher, Low Temp, Elec Heat	12782.50	2	per unit	$255.00	16	57.4
ES Dishwasher, Low Temp, Gas Heat	584.00	2	per unit	$83.61	16	54.0
Tank Insulation (electric)	468.00	1	per square foot	$6.22	15	77.7
Pre Rinse Sprayers (electric)	1396.00	1	each	$35.00	5	15.0
ECM Circulator Pump	4949.40	1	per Motor	$2,266.67	15	2.4
Drain water Heat Recovery Water Heater	546.00	1	Per Unit	$631.00	25	1.2
Efficient Hot Water Pump	525.50	1	hp	$78.20	15	5.8
HVAC Condenser Heater Recovery Water Heating	3536.50	1	ton	$254.00	15	30.4
Process Cooling Condenser Heater Recovery Water Heating	5720.00	1	ton	$254.00	15	25.6
Pools						
Heat Pump Pool Heater	5731.86	1	Per Unit	$4,000.00	10	1.6
High efficiency spas/hot tubs	375.00	2	Per Unit	$300.00	10	1.2
Ventilation						
Economizer	136.60	2	ton	$122.55	13	0.8
Demand-Controlled Ventilation	181.00	2	1000 sq ft cond floor area	$75.00	15	34.9
Variable Speed Drive Control, 15 HP	19590.00	1	per Unit	$3,690.00	15	5.7
Variable Speed Drive Control, 5 HP	6530.00	1	Per Unit	$1,230.00	15	5.7

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	Direct Utility Test
Variable Speed Drive Control, 40 HP	52240.00	1	Per Unit	$9,840.00	15	5.7
High Speed Fans	706.60	1	per fan	$675.00	7	0.8
High Volume Low Speed Fans	5859.90	1	per fan	$5,767.40	10	1.0
Engineered CKV hood	727.20	2	100 cfm red	$124.62	15	6.9
Space Cooling - Chillers						
Air-Cooled Recip Chiller	343.80	2	ton	$141.03	20	4.0
Air-Cooled Screw Chiller	344.80	2	ton	$143.92	20	3.9
Water-Cooled Centrifugal Chiller < 150 ton	255.80	2	ton	$411.03	20	0.9
Water-Cooled Centrifugal Chiller 150 - 300 ton	225.80	2	ton	$125.80	20	2.8
Water-Cooled Centrifugal Chiller > 300 ton	209.70	2	ton	$27.30	20	11.7
Water-Cooled Screw Chiller < 150 ton	257.10	2	ton	$387.99	20	1.1
Water-Cooled Screw Chiller 150 - 300 ton	232.10	2	ton	$129.11	20	2.9
Water-Cooled Screw Chiller > 300 ton	207.60	2	ton	$27.15	20	12.2
Chiller Tune Up	141.70	1	ton	$5.66	5	14.5
High Efficiency Pumps	201.40	1	per HP	$96.79	15	2.4
Efficient Chilled Water Pump	772.20	1	per HP	$33.20	15	25.5
Chilled Hot Water Reset	116.90	1	ton	$5.53	8	26.8
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	157.80	2	ton	$66.63	20	4.3
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	9.86	2	ton	$4.36	20	3.4
Water-Cooled Chiller Average 10% above IECC standard	127.00	2	ton	$101.49	20	2.3
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	8.31	2	ton	$5.49	20	1.8
VAV System Conversion	4945.40	1	1000 sq ft cond floor area	$1,395.76	20	3.7
Motor Belt Replacement	94.70	1	per HP	$21.33	14	5.0
Water-Side Economizer	1047.50	2	ton	$50.00	15	18.3
Improved Duct Sealing - Cooling Chiller	37.60	2	ton	$107.91	18	0.6
Integrated Building Design	322775.40	2	per Building	$75,580.52	30	8.3
Building Operator Certification	11767.25	2	per participant of 194,500 SF	$396.27	5	11.6
Energy Efficient Windows	170.35	2	100SF	$272.96	25	0.9
Cool Roof	51.25	2	1000 sq ft roof area	$332.44	20	0.1
Ceiling Insulation	65.50	1	1000 sq ft roof area	$47.16	30	2.7
Wall Insulation	364.80	1	1000 sq ft wall area	$4.57	30	130.5
Roof Insulation	22.10	1	1000 sq ft	$54.88	30	1.0
Window Improvements	85.30	1	100 sq ft glazing	$286.16	15	0.4
EMS install	269.45	1	1000 sq ft cond floor area	$2.94	15	80.9
EMS Optimization	358.90	1	1000 sq ft cond floor area	$18.62	20	23.5
HVAC Occupancy Sensors	99.25	2	1000 sq ft cond floor area	$107.59	15	1.8
Setback with Electric Heat	3451.55	2	each	$71.00	9	28.1
EMS Pump Scheduling Controls	1524.40	2	pump Hp	$1.32	15	1298.3
Web enabled EMS	670.75	2	1000 sq ft cond floor area	$19.10	15	23.1
Zoning	187.35	2	1000 sq ft cond floor area	$500.00	15	0.6
Retrocommissioning	2.55	1	sq ft	$0.30	7	3.9
Commissioning	4.50	1	sq ft	$1.16	7	1.8
Space Cooling - Unitary & Split AC						
AC <65k	290.80	2	ton	$108.53	15	3.0
AC 65k - 135k	58.50	2	ton	$323.71	15	0.4
AC 135k - 240k	56.10	2	ton	$166.48	15	0.9
AC 240k - 760k	51.60	2	ton	$118.39	15	1.1
AC >760k	44.10	2	ton	$123.39	15	0.9
Air Source Heat Pump - Cooling	75.70	2	ton	$131.25	15	1.2
Ductless (mini split) - Cooling	127.60	1	ton	$834.32	15	0.3
Water Loop Heat Pump (WLHP) - Cooling	7.12	2	ton	$5.02	15	3.9

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	Direct Utility Test
Ground Source Heat Pump - Cooling	2740.20	2	ton	$927.66	15	2.9
Packaged Terminal Air Conditioner (PTAC) - Cooling	102.00	2	ton	$179.42	15	0.9
WLHP System (Cooling) New Construction	370.46	2	1000 sq ft cond floor area	$1,000.00	20	0.5
DX Condenser Coil Cleaning	58.60	1	ton	$32.40	3	1.0
Room A/C	158.00	2	per unit	$74.75	15	5.9
Improved Duct Sealing - Cooling AC	37.60	2	ton	$107.91	18	0.6
Integrated Building Design	322775.40	2	per Building	$75,580.52	30	8.3
Building Operator Certification	11767.25	2	per participant of 194,500 SF	$396.27	5	11.6
Energy Efficient Windows	170.35	2	100SF	$272.96	25	0.9
Cool Roof	51.25	2	1000 sq ft roof area	$332.44	20	0.1
Ceiling Insulation	65.50	1	1000 sq ft roof area	$47.16	30	2.7
Wall Insulation	364.80	1	1000 sq ft wall area	$4.57	30	130.5
Roof Insulation	22.10	1	1000 sq ft	$54.88	30	1.0
Window Improvements	85.30	1	100 sq ft glazing	$286.16	15	0.4
Programmable Thermostats	77.10	1	1000 sq ft cond floor area	$58.99	9	0.8
EMS install	269.45	1	1000 sq ft cond floor area	$2.94	15	80.9
EMS Optimization	358.90	1	1000 sq ft cond floor area	$18.62	20	23.5
Hotel Guest Room Occupancy Control System	557.00	2	per unit	$125.00	8	3.0
HVAC Occupancy Sensors	99.25	2	1000 sq ft cond floor area	$107.59	15	1.8
Setback with Electric Heat	3451.55	2	each	$71.00	9	28.1
EMS Pump Scheduling Controls	1524.40	2	pump Hp	$1.32	15	1298.3
Web enabled EMS	670.75	2	1000 sq ft cond floor area	$19.10	15	23.1
Zoning	187.35	2	1000 sq ft cond floor area	$500.00	15	0.6
Retrocommissioning	2.55	1	sq ft	$0.30	7	3.9
Commissioning	4.50	1	sq ft	$1.16	7	1.8
Cooking						
HE Steamer	12914.00	2	each	$4,150.00	12	3.2
HE Combination Oven	18432.00	2	each	$16,884.00	12	1.1
HE Convection Ovens	1879.00	2	each	$471.00	12	4.1
HE Holding Cabinet	3299.30	2	each	$1,783.00	12	1.8
HE Fryer	1166.00	2	each	$1,706.00	12	0.7
HE Griddle	2594.00	2	each	$3,604.00	12	0.7
Induction Cooktops	784.00	2	Per Unit	$3,000.00	11	1.3
Lighting						
Lamp & Ballast Retrofit (HPT8 Replacing T12)	54.20	2	per fixture	$34.15	15	1.8
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	24.70	2	ɛr fixture, Replacing standard T8	$34.00	15	1.1
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	73.40	2	r fixture, Replacing standard T12	$37.09	15	2.2
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	42.00	2	ĸture, Replacing standard T8 4ft l	$37.09	15	1.3
T5 HP Retrofits	80.70	2	per fixture	$107.00	15	1.1
Light Tube	344.30	2	per fixture	$500.00	14	0.7
High Intensity Fluorescent Fixture (replacing HID)	4160.00	2	kW saved	$1,491.00	12	2.8
High Intensity Fluorescent Fixture (replacing HID) - New Construction	4160.00	2	kW saved	$941.46	12	4.5
42W 8 lamp Hi Bay CFL	345.00	2	per fixture, Replacing 400W HID	$496.40	12	0.7
HID Fixture Upgrade - Pulse Start Metal Halide	768.50	2	per fixture	$223.63	13	3.7
Interior induction Lighting	4.16	2	Watt Reduced	$1.53	16	3.4
CFL Fixture	157.50	2	per fixture	$45.00	12	3.4
CFL Screw-in	84.74	2	per lamp	$1.36	2	11.6
CFL Screw in Specialty	132.80	2	per lamp	$4.58	2	5.4
CFL Reflector Flood	133.50	2	per lamp	$6.00	2	4.1
LED Screw In (replacing Incandescent)	134.80	2	per lamp	$16.45	9	6.3
LED Screw In (replacing CFL)	12.00	2	per lamp	$13.41	9	0.7

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	Direct Utility Test
LED High bay lighting	4160.00	2	kW saved	$2,900.00	16	1.8
LED low bay lighting	2669.00	2	kW saved	$2,900.00	18	1.2
LED Downlight	141.50	2	per fixture	$12.74	15	12.5
LED Specialty (replacing Incandescent)	80.55	2	per lamp	$12.79	9	4.8
LED Specialty (replacing CFL)	16.13	2	per lamp	$10.17	9	1.2
LED Troffer	32.33	2	per fixture	$125.00	18	0.4
LED Tube Lighting	53.86	2	per lamp	$35.00	18	2.0
LED Grow Light	4.38	2	per watt reduced	$1.53	11	2.7
Interior Non Highbay/Lowbay LED Fixtures	2.67	2	per watt reduced	$2.90	18	1.2
Illuminated Signs to LED	5.71	2	per watt reduced	$4.00	10	1.1
LED Lighting in Refrigeration	460.00	2	per door	$356.00	16	1.3
LED Exit Sign	201.00	2	per fixture	$25.00	15	8.3
LED Fuel Pump Canopy Fixture	135.67	2	Per unit	$343.00	21	0.4
LED Auto Traffic Signals	275.00	2	per lamp	$50.00	6	3.4
LED Pedestrian Signals	150.00	2	per lamp	$100.00	8	1.2
Exterior HID replacement with CFLs	1021.43	2	per fixture	$596.67	12	1.3
Exterior HID replacement with LEDs	519.47	2	per fixture	$753.67	12	0.5
Garage HID replacement with LEDs	1053.67	2	per fixture	$753.67	12	1.2
Exterior Linear Fluorescent	4319.00	2	per kW reduced	$2,500.00	12	1.3
Long Day Lighting Dairy	6.21	2	per watt controlled	$1.79	16	4.0
Lighting Controls						
Central Lighting Control	8340.63	1	10,000 SF	$3,700.00	12	2.2
Daylight Sensor Controls	10409.10	1	10,000 SF	$4,000.00	12	2.5
Daylight Sensor Controls - New Construction	8810.00	1	10,000 SF	$4,000.00	12	2.2
Occupancy Sensor	504.43	2	per sensor	$226.47	10	1.5
Occupancy Sensor & Daylight Sensor	639.00	2	per sensor	$277.50	10	1.9
Switching Controls for Multilevel Lighting (Non-HID)	6000.00	1	10,000 SF	$4,000.00	12	1.5
Lighting Power Density - Interior	2669.00	2	per kW reduced	$220.00	15	13.7
Lighting Power Density - Exterior	4319.00	2	per kW reduced	$220.00	12	14.6
Lighting Power Density - Parking Garage	8760.00	2	per kW reduced	$220.00	12	34.5
Stairwell Bi-Level Control	4809.00	2	per kW controlled	$825.00	9	4.0
Occupancy Sensors for LED Refrigerator Lighting	195.00	2	per door	$20.00	16	10.0
Exterior BiLevel Controls	530.53	2	per fixture	$444.33	10	0.8
Garage BiLevel Controls	927.49	2	per fixture	$632.00	11	1.4
Sports Field Lighting HiLo Control	149.00	2	per fixture	$532.00	10	0.2
Refrigeration						
Vending Miser for Refrigerated Vending Machines	702.50	1	per unit	$238.75	8	1.6
Evaporator Fan Motor Controls	760.30	1	per controller	$621.00	5	0.5
Zero-Energy Doors	1360.00	2	per door	$290.00	10	3.5
Discus and Scroll Compressors	1500.00	2	per Unit	$825.00	13	1.8
Floating Head Pressure Control	1264.00	1	per ton	$120.00	15	9.1
ENERGY STAR Commercial Solid Door Refrigerators	665.75	2	per unit	$600.00	12	1.0
ENERGY STAR Commercial Solid Door Freezers	1737.25	2	per unit	$450.00	12	3.4
ENERGY STAR Commercial Glass Door Refrigerators	754.00	2	per unit	$600.00	12	1.1
ENERGY STAR Commercial Glass Door Freezers	3671.00	2	per unit	$450.00	12	7.1
Energy Star Ice Machines	1314.10	2	per unit	$1,426.00	9	0.6
Strip Curtains	269.50	1	per square foot	$12.42	4	6.9
Anti Sweat Heater Controls	1489.00	1	per door	$340.00	15	3.8
Efficient Refrigeration Condenser	120.00	2	per ton	$35.00	15	7.7
Door Gaskets - Cooler and Freezer	98.00	2	per linear foot	$9.61	4	3.3
Reach-in Refrigerated display case door retrofit	1014.00	1	Linear Ft	$1,010.00	12	1.3
Refrigeration Savings due to Lighting Savings	1.24	2	per lighting Watt reduced	$1.00	12	1.3
ECM Case Motors	1131.75	2	per Motor	$200.00	15	5.7

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**Direct Utility Test**
Efficient low-temp compressor	875.00	2	per Unit	$552.00	13	1.5
Automatic High Speed Doors	968.30	2	SF	$150.00	12	5.6
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	1625.00	2	per door	$156.00	8	6.7
Refrigerant charging correction	86.10	2	ton	$38.36	2	0.8
Walk-in Cooler Evaporator Motor Reduction	1462.10	2	per motor removed	$1,000.00	15	1.5
Night Covers	15.60	1	LF of case - hr	$37.54	5	0.3
Refrigeration Suction Line Insulation	10.82	1	LF	$4.32	15	2.6
Compressed Air						
Efficient Air Compressors	780.54	2	per HP	$150.00	15	5.5
Automatic Drains	2097.00	2	per drain	$355.00	5	2.5
Cycling Dryers	12.81	2	per SCFM	$30.00	10	0.4
Low Pressure Drop-Filters	64.70	1	per HP	$22.00	10	2.4
Air-Entraining Air Nozzles	21142.56	1	per nozzle	$95.25	15	293.7
Receiver Capacity Addition	9158.76	1	per Unit	$2,000.00	10	4.3
Compressed Air Audits & Leak Repair	624.00	1	per SCFM	$16.00	1	3.5
Compressed Air Pressure Flow Controller replacing no flow controller	73.94	1	per HP	$37.00	10	1.6
High Efficiency Air Dryers	48.63	2	per SCFM	$32.33	15	1.6
Air Compressor Outdoor Air Intake	109.80	1	per HP	$5.00	20	28.5
Variable Displacement Air Compressor	442.00	1	per HP	$340.00	13	1.3
Compressed Air Storage Tank	422.76	1	per HP	$36.00	25	17.0
Compressed Air Replacement with Air Blowers	5587.70	1	per HP	$930.00	15	11.8
Space Heating						
Air Source Heat Pump - Heating	75.70	2	ton	$131.25	15	1.1
Ground Source Heat Pump - Heating	10960.80	2	ton	$3,710.66	15	2.6
Ductless (mini split) - Heating	127.60	1	ton	$834.32	15	0.3
VFD Pumps	1708.90	1	per CHW pump hp	$212.29	10	5.4
ECM motors on furnaces	1034.00	1	per Furnace	$1,359.07	20	0.9
Water Loop Heat Pump (WLHP) - Heating	28.48	2	ton	$20.09	15	1.9
WLHP System (Heating) New Construction	1481.84	2	1000 sq ft cond floor area	$4,000.00	20	0.4
Integrated Building Design	322775.40	2	per Building	$75,580.52	30	8.3
Building Operator Certification	11767.25	2	per participant of 194,500 SF	$396.27	5	11.6
Energy Efficient Windows	170.35	2	100SF	$272.96	25	0.9
Cool Roof	51.25	2	1000 sq ft roof area	$332.44	20	0.1
Ceiling Insulation	65.50	1	1000 sq ft roof area	$47.16	30	2.7
Wall Insulation	364.80	1	1000 sq ft wall area	$4.57	30	130.5
Roof Insulation	22.10	1	1000 sq ft	$54.88	30	1.0
Window Improvements	85.30	1	100 sq ft glazing	$286.16	15	0.4
EMS install	269.45	1	1000 sq ft cond floor area	$2.94	15	80.9
EMS Optimization	358.90	1	1000 sq ft cond floor area	$18.62	20	23.5
Hotel Guest Room Occupancy Control System	557.00	2	per unit	$125.00	8	3.0
HVAC Occupancy Sensors	99.25	2	1000 sq ft cond floor area	$107.59	15	1.8
Setback with Electric Heat	3451.55	2	each	$71.00	9	28.1
EMS Pump Scheduling Controls	1524.40	2	pump Hp	$1.32	15	1298.3
Web enabled EMS	670.75	2	1000 sq ft cond floor area	$19.10	15	23.1
Web enabled EMS with Electric Heat	9571.00	2	1000 sq ft cond floor area	$141.99	15	57.7
Zoning	187.35	2	1000 sq ft cond floor area	$500.00	15	0.6
Retrocommissioning	2.55	1	sq ft	$0.30	7	3.9
Commissioning	4.50	1	sq ft	$1.16	7	1.8
Other						
NEMA Premium Transformer, single-phase	0.16	2	1% of NEMA Premium efficiency	$0.24	30	1.6
NEMA Premium Transformer, three-phase	0.24	2	1% of NEMA Premium efficiency	$0.18	30	1.5
High Efficiency Transformer, single-phase	0.39	2	0.01% of additional efficiency per	$0.46	30	1.4

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	Annual kWh Savings	Cost Type: 1=Full 2=Inc.	Cost/Unit Descriptor	Cost/Unit	Effective Measure Life	Direct Utility Test
High Efficiency Transformer, three-phase	0.44	2	).01% of additional efficiency per	$0.44	30	2.5
Optimized Snow and Ice Melt Controls (electric)	0.12	1	SF	$15.15	15	0.0
Engine Block Heater Timer	576.00	2	per engine block	$50.00	5	13.1
Parking Garage Exhaust Fan CO Control	2413.00	2	per HP	$900.00	15	4.7

DTE Energy Commercial Measure Assumptions - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Smart Strip plug outlet	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%	26.0%
PC Network Energy Management Controls replacing no central control	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Energy Star UPS	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Vendor Miser for Non-Refrig Equipment	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
High Efficiency Hand Dryer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Electrically Commutated Plug Fans in data centers	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
High Efficiency CRAC unit	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Computer Room Air Conditioner Economizer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Computer Room Hot Aisle Cold Aisle Configuration	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Computer Room Air Side Economizer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
VFD for Process Fans -CRAC units	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Water Heating									
Heat Pump Water Heater	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%
High Efficiency Electric Water Heater	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%
Solar Storage Water Heater	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%
Electric Tankless Water Heater	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%
Low Flow Faucet Aerator	100.0%	96.0%	79.0%	98.0%	50.0%	60.5%	22.5%	42.0%	77.0%
Low Flow Showerhead	0.0%	0.0%	0.0%	0.0%	20.0%	2.0%	0.0%	33.0%	13.0%
Hot Water (DHW) Pipe Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	0.0%	0.0%	0.3%	0.0%	3.8%	4.4%	0.0%	1.3%	0.0%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, Low Temp, Elec Heat	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
ES Dishwasher, Low Temp, Gas Heat	0.0%	0.8%	2.0%	0.4%	1.0%	2.0%	3.0%	2.0%	2.0%
Tank Insulation (electric)	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Pre Rinse Sprayers (electric)	0.0%	0.0%	10.0%	0.0%	10.0%	10.0%	62.5%	10.0%	0.0%
ECM Circulator Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Drain water Heat Recovery Water Heater	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Efficient Hot Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Condenser Heater Recovery Water Heating	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Process Cooling Condenser Heater Recovery Water Heating	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Pools									
Heat Pump Pool Heater	42.5%	42.5%	42.5%	42.5%	42.5%	42.5%	42.5%	42.5%	42.5%
High efficiency spas/hot tubs	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ventilation									
Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Demand-Controlled Ventilation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Speed Drive Control, 15 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%

DTE Energy Commercial Measure Assumptions - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Variable Speed Drive Control, 5 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 40 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
High Speed Fans	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
High Volume Low Speed Fans	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Engineered CKV hood	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Air-Cooled Screw Chiller	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Water-Cooled Centrifugal Chiller < 150 ton	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%
Water-Cooled Centrifugal Chiller 150 - 300 ton	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%
Water-Cooled Centrifugal Chiller > 300 ton	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%
Water-Cooled Screw Chiller < 150 ton	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Water-Cooled Screw Chiller 150 - 300 ton	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Water-Cooled Screw Chiller > 300 ton	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Chiller Tune Up	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Chilled Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chilled Hot Water Reset	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Water-Cooled Chiller Average 10% above IECC standard	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%	10.8%
VAV System Conversion	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%
Motor Belt Replacement	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Water-Side Economizer	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%	50.4%
Improved Duct Sealing - Cooling Chiller	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Integrated Building Design	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Building Operator Certification	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Efficient Windows	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cool Roof	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Wall Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Roof Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Window Improvements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
HVAC Occupancy Sensors	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	50.0%	50.0%
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Commissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Cooling - Unitary and Split AC									
AC <65k	9.8%	18.2%	14.2%	14.8%	0.6%	8.8%	15.6%	6.9%	32.2%
AC 65k - 135k	9.8%	18.2%	14.2%	14.8%	0.6%	8.8%	15.6%	6.9%	32.2%
AC 135k - 240k	9.8%	18.2%	14.2%	14.8%	0.6%	8.8%	15.6%	6.9%	32.2%
AC 240k - 760k	9.8%	18.2%	14.2%	14.8%	0.6%	8.8%	15.6%	6.9%	32.2%
AC >760k	9.8%	18.2%	14.2%	14.8%	0.6%	8.8%	15.6%	6.9%	32.2%
Air Source Heat Pump - Cooling	0.5%	0.0%	0.0%	3.0%	0.0%	7.0%	0.0%	5.5%	1.5%
Ductless (mini split) - Cooling	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.5%	0.0%
Water Loop Heat Pump (WLHP) - Cooling	0.2%	0.0%	0.0%	1.2%	0.0%	2.8%	0.0%	2.2%	0.6%

DTE Energy Commercial Measure Assumptions - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Ground Source Heat Pump - Cooling	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	1.0%
Packaged Terminal Air Conditioner (PTAC) - Cooling	13.0%	0.0%	2.0%	1.0%	80.0%	13.0%	0.0%	16.5%	24.0%
WLHP System (Cooling) New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
DX Condenser Coil Cleaning	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Room A/C	1.0%	0.0%	0.0%	5.0%	11.0%	24.0%	10.0%	17.0%	8.0%
Improved Duct Sealing - Cooling AC	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Integrated Building Design	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Building Operator Certification	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Efficient Windows	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cool Roof	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Wall Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Roof Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Window Improvements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Programmable Thermostats	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	50.0%	50.0%	50.0%	50.0%	0.0%	50.0%	50.0%	50.0%	50.0%
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Commissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cooking									
HE Steamer	0.0%	0.0%	34.0%	34.0%	0.0%	34.0%	34.0%	34.0%	0.0%
HE Combination Oven	0.0%	0.0%	6.7%	6.7%	0.0%	6.7%	6.7%	6.7%	0.0%
HE Convection Ovens	0.0%	0.0%	6.7%	6.7%	0.0%	6.7%	6.7%	6.7%	0.0%
HE Holding Cabinet	0.0%	0.0%	36.4%	36.4%	0.0%	36.4%	36.4%	36.4%	0.0%
HE Fryer	0.0%	0.0%	1.0%	1.0%	0.0%	1.0%	1.0%	1.0%	0.0%
HE Griddle	0.0%	0.0%	9.0%	9.0%	0.0%	9.0%	9.0%	9.0%	0.0%
Induction Cooktops	0.0%	0.0%	6.7%	6.7%	0.0%	6.7%	6.7%	6.7%	0.0%
Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
T5 HP Retrofits	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
Light Tube	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
High Intensity Fluorescent Fixture (replacing HID)	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
42W 8 lamp Hi Bay CFL	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
HID Fixture Upgrade - Pulse Start Metal Halide	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
Interior induction Lighting	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
CFL Fixture	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
CFL Screw-in	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
CFL Screw in Specialty	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
CFL Reflector Flood	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%

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LED Screw In (replacing Incandescent)	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
LED Screw In (replacing CFL)	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
LED High bay lighting	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
LED low bay lighting	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
LED Downlight	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
LED Specialty (replacing Incandescent)	1.3%	1.2%	1.2%	1.2%	1.3%	1.2%	0.8%	1.3%	1.2%
LED Specialty (replacing CFL)	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%
LED Troffer	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
LED Tube Lighting	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
LED Grow Light	0.0%	8.7%	8.7%	0.0%	0.0%	0.0%	0.0%	0.0%	8.7%
Interior Non Highbay/Lowbay LED Fixtures	9.7%	8.7%	8.7%	9.7%	9.7%	9.7%	9.7%	9.7%	8.7%
Illuminated Signs to LED	0.0%	0.7%	0.7%	0.7%	0.1%	0.1%	3.4%	0.0%	0.7%
LED Lighting in Refrigeration	0.0%	0.5%	0.2%	0.3%	2.6%	0.1%	1.3%	0.1%	0.6%
LED Exit Sign	0.9%	0.9%	0.9%	0.9%	0.8%	0.9%	0.8%	0.9%	0.9%
LED Fuel Pump Canopy Fixture	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%
LED Auto Traffic Signals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	28.7%
LED Pedestrian Signals	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	28.7%
Exterior HID replacement with CFLs	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	11.1%
Exterior HID replacement with LEDs	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	11.1%
Garage HID replacement with LEDs	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	11.1%
Exterior Linear Fluorescent	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	2.6%
Long Day Lighting Dairy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.0%
Lighting Controls									
Central Lighting Control	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Daylight Sensor Controls	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%
Daylight Sensor Controls - New Construction	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%	92.9%
Occupancy Sensor	67.9%	67.9%	67.9%	67.9%	67.9%	67.9%	67.9%	67.9%	67.9%
Occupancy Sensor & Daylight Sensor	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Switching Controls for Multilevel Lighting (Non-HID)	77.9%	77.9%	77.9%	77.9%	77.9%	77.9%	77.9%	77.9%	77.9%
Lighting Power Density - Interior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	38.0%
Lighting Power Density - Parking Garage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	38.0%
Stairwell Bi-Level Control	3.9%	4.2%	4.0%	4.1%	3.8%	4.2%	3.5%	4.1%	4.1%
Occupancy Sensors for LED Refrigerator Lighting	0.9%	1.0%	0.9%	0.9%	0.9%	1.0%	0.8%	0.9%	0.9%
Exterior BiLevel Controls	44.5%	44.5%	44.5%	44.5%	44.5%	44.5%	44.5%	44.5%	13.5%
Garage BiLevel Controls	44.5%	44.5%	44.5%	44.5%	44.5%	44.5%	44.5%	44.5%	13.5%
Sports Field Lighting HiLo Control	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Evaporator Fan Motor Controls	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Zero-Energy Doors	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Discus and Scroll Compressors	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Floating Head Pressure Control	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
ENERGY STAR Commercial Solid Door Refrigerators	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
ENERGY STAR Commercial Solid Door Freezers	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
ENERGY STAR Commercial Glass Door Refrigerators	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
ENERGY STAR Commercial Glass Door Freezers	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
Energy Star Ice Machines	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Strip Curtains	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Anti Sweat Heater Controls	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%

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Efficient Refrigeration Condenser	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Door Gaskets - Cooler and Freezer	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Reach-in Refrigerated display case door retrofit	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Refrigeration Savings due to Lighting Savings	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
ECM Case Motors	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Efficient low-temp compressor	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%	17.3%
Automatic High Speed Doors	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Refrigerant charging correction	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Walk-in Cooler Evaporator Motor Reduction	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%
Night Covers	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Refrigeration Suction Line Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Compressed Air									
Efficient Air Compressors	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%
Automatic Drains	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Cycling Dryers	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Low Pressure Drop-Filters	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Air-Entraining Air Nozzles	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Receiver Capacity Addition	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Compressed Air Audits & Leak Repair	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Compressed Air Pressure Flow Controller replacing no flow controller	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
High Efficiency Air Dryers	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%	7.2%
Air Compressor Outdoor Air Intake	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Variable Displacement Air Compressor	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%	36.0%
Compressed Air Storage Tank	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Compressed Air Replacement with Air Blowers	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Space Heating									
Air Source Heat Pump - Heating	0.5%	0.0%	0.0%	3.0%	0.0%	7.0%	0.0%	5.5%	1.5%
Ground Source Heat Pump - Heating	0.2%	0.0%	0.0%	1.2%	0.0%	2.8%	0.0%	2.2%	0.6%
Ductless (mini split) - Heating	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.5%	0.0%
VFD Pumps	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
ECM motors on furnaces	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Water Loop Heat Pump (WLHP) - Heating	0.2%	0.0%	0.0%	1.2%	0.0%	2.8%	0.0%	2.2%	0.6%
WLHP System (Heating) New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Building Operator Certification	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Efficient Windows	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Cool Roof	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Ceiling Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Wall Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Roof Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Window Improvements	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS with Electric Heat	100.0%	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%
Zoning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%

DTE Energy Commercial Measure Assumptions - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Commissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Other									
NEMA Premium Transformer, single-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NEMA Premium Transformer, three-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Transformer, single-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Transformer, three-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Optimized Snow and Ice Melt Controls (electric)	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Engine Block Heater Timer	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Parking Garage Exhaust Fan CO Control	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

DTE Energy Commercial Measure Assumptions - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Smart Strip plug outlet	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
PC Network Energy Management Controls replacing no central control	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%
Energy Star UPS	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
Vendor Miser for Non-Refrig Equipment	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
High Efficiency Hand Dryer	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%	68.7%
Electrically Commutated Plug Fans in data centers	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%
High Efficiency CRAC unit	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Computer Room Air Conditioner Economizer	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%
Computer Room Hot Aisle Cold Aisle Configuration	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Computer Room Air Side Economizer	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%	46.9%
VFD for Process Fans -CRAC units	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%	42.8%
Water Heating									
Heat Pump Water Heater	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%
High Efficiency Electric Water Heater	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Solar Storage Water Heater	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Electric Tankless Water Heater	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Low Flow Faucet Aerator	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%
Low Flow Showerhead	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Hot Water (DHW) Pipe Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%	37.6%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%	25.1%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%	32.7%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%	28.4%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%	26.2%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%
ES Dishwasher, Low Temp, Elec Heat	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%	33.2%
ES Dishwasher, Low Temp, Gas Heat	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Tank Insulation (electric)	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%
Pre Rinse Sprayers (electric)	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%
ECM Circulator Pump	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Drain water Heat Recovery Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Efficient Hot Water Pump	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%
HVAC Condenser Heater Recovery Water Heating	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Process Cooling Condenser Heater Recovery Water Heating	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Pools									
Heat Pump Pool Heater	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
High efficiency spas/hot tubs	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ventilation									
Economizer	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Demand-Controlled Ventilation	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Variable Speed Drive Control, 15 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 5 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 40 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%

DTE Energy Commercial Measure Assumptions - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
High Speed Fans	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
High Volume Low Speed Fans	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Engineered CKV hood	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water-Cooled Centrifugal Chiller < 150 ton	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%
Water-Cooled Centrifugal Chiller 150 - 300 ton	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%	29.4%
Water-Cooled Centrifugal Chiller > 300 ton	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%
Water-Cooled Screw Chiller < 150 ton	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%	25.5%
Water-Cooled Screw Chiller 150 - 300 ton	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%	26.9%
Water-Cooled Screw Chiller > 300 ton	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%
Chiller Tune Up	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
High Efficiency Pumps	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%
Efficient Chilled Water Pump	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
Chilled Hot Water Reset	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Water-Cooled Chiller Average 10% above IECC standard	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
VAV System Conversion	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Motor Belt Replacement	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Water-Side Economizer	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Improved Duct Sealing - Cooling Chiller	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Building Operator Certification	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roof	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Wall Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Roof Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Commissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Space Cooling - Unitary and Split AC									
AC <65k	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
AC 65k - 135k	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%
AC 135k - 240k	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%
AC 240k - 760k	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
AC >760k	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Air Source Heat Pump - Cooling	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
Ductless (mini split) - Cooling	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
Water Loop Heat Pump (WLHP) - Cooling	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Ground Source Heat Pump - Cooling	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%
Packaged Terminal Air Conditioner (PTAC) - Cooling	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%	6.7%
WLHP System (Cooling) New Construction	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%

DTE Energy Commercial Measure Assumptions - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
DX Condenser Coil Cleaning	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
Room A/C	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%
Improved Duct Sealing - Cooling AC	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Building Operator Certification	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roof	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Wall Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Roof Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Programmable Thermostats	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Hotel Guest Room Occupancy Control System	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Commissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Cooking									
HE Steamer	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%	66.4%
HE Combination Oven	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%	47.8%
HE Convection Ovens	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
HE Holding Cabinet	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%	62.9%
HE Fryer	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%	6.4%
HE Griddle	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%	15.2%
Induction Cooktops	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
T5 HP Retrofits	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%
Light Tube	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%
High Intensity Fluorescent Fixture (replacing HID)	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
42W 8 lamp Hi Bay CFL	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%
HID Fixture Upgrade - Pulse Start Metal Halide	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%
Interior induction Lighting	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
CFL Fixture	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%
CFL Screw-in	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%
CFL Screw in Specialty	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%
CFL Reflector Flood	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%
LED Screw In (replacing Incandescent)	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%
LED Screw In (replacing CFL)	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%	31.6%
LED High bay lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
LED low bay lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
LED Downlight	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%
LED Specialty (replacing Incandescent)	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%
LED Specialty (replacing CFL)	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%

DTE Energy Commercial Measure Assumptions - Electric

Savings Factor:
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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
LED Troffer	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
LED Tube Lighting	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%
LED Grow Light	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Interior Non Highbay/Lowbay LED Fixtures	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%
Illuminated Signs to LED	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%
LED Lighting in Refrigeration	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%	51.2%
LED Exit Sign	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%
LED Fuel Pump Canopy Fixture	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%	73.5%
LED Auto Traffic Signals	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Pedestrian Signals	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Exterior HID replacement with CFLs	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%
Exterior HID replacement with LEDs	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage HID replacement with LEDs	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Exterior Linear Fluorescent	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%
Long Day Lighting Dairy	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%
Lighting Controls									
Central Lighting Control	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Daylight Sensor Controls	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Daylight Sensor Controls - New Construction	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Occupancy Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Occupancy Sensor & Daylight Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Switching Controls for Multilevel Lighting (Non-HID)	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Lighting Power Density - Interior	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Lighting Power Density - Exterior	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Lighting Power Density - Parking Garage	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Stairwell Bi-Level Control	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%
Occupancy Sensors for LED Refrigerator Lighting	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Exterior BiLevel Controls	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage BiLevel Controls	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%
Sports Field Lighting HiLo Control	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%
Evaporator Fan Motor Controls	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Zero-Energy Doors	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Discus and Scroll Compressors	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Floating Head Pressure Control	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%	9.2%
ENERGY STAR Commercial Solid Door Refrigerators	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%	31.9%
ENERGY STAR Commercial Solid Door Freezers	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%	29.7%
ENERGY STAR Commercial Glass Door Refrigerators	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%	30.2%
ENERGY STAR Commercial Glass Door Freezers	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%	33.7%
Energy Star Ice Machines	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Strip Curtains	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%	80.2%
Anti Sweat Heater Controls	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%
Efficient Refrigeration Condenser	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%
Door Gaskets - Cooler and Freezer	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%	99.7%
Reach-in Refrigerated display case door retrofit	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Refrigeration Savings due to Lighting Savings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Case Motors	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%
Efficient low-temp compressor	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Automatic High Speed Doors	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%

DTE Energy Commercial Measure Assumptions - Electric

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Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Refrigerant charging correction	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Walk-in Cooler Evaporator Motor Reduction	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Night Covers	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Refrigeration Suction Line Insulation	60.1%	60.1%	60.1%	60.1%	60.1%	60.1%	60.1%	60.1%	60.1%
Compressed Air									
Efficient Air Compressors	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%	30.6%
Automatic Drains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cycling Dryers	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%	29.3%
Low Pressure Drop-Filters	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Air-Entraining Air Nozzles	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Receiver Capacity Addition	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Compressed Air Audits & Leak Repair	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Compressed Air Pressure Flow Controller replacing no flow controller	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
High Efficiency Air Dryers	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%	21.6%
Air Compressor Outdoor Air Intake	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%
Variable Displacement Air Compressor	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%	9.7%
Compressed Air Storage Tank	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Compressed Air Replacement with Air Blowers	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%	78.7%
Space Heating									
Air Source Heat Pump - Heating	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Ground Source Heat Pump - Heating	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%
Ductless (mini split) - Heating	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
VFD Pumps	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%
ECM motors on furnaces	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%
Water Loop Heat Pump (WLHP) - Heating	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
WLHP System (Heating) New Construction	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Building Operator Certification	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roof	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Wall Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Roof Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Hotel Guest Room Occupancy Control System	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web enabled EMS with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zoning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Commissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Other									
NEMA Premium Transformer, single-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
NEMA Premium Transformer, three-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
High Efficiency Transformer, single-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
High Efficiency Transformer, three-phase	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Optimized Snow and Ice Melt Controls (electric)	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%

DTE Energy Commercial Measure Assumptions - Electric

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Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Engine Block Heater Timer	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Parking Garage Exhaust Fan CO Control	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%

DTE Energy Commercial Measure Assumptions - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%	79.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Smart Strip plug outlet	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
PC Network Energy Management Controls replacing no central control	88.0%	88.0%	88.0%	94.0%	88.0%	88.0%	88.0%	88.0%	88.0%
Energy Star UPS	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
Vendor Miser for Non-Refrig Equipment	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%
High Efficiency Hand Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electrically Commutated Plug Fans in data centers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency CRAC unit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Conditioner Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Hot Aisle Cold Aisle Configuration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Side Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Fans -CRAC units	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heating									
Heat Pump Water Heater	100.0%	92.3%	94.4%	87.5%	97.3%	100.0%	100.0%	90.9%	100.0%
High Efficiency Electric Water Heater	100.0%	92.3%	94.4%	87.5%	97.3%	100.0%	100.0%	90.9%	100.0%
Solar Storage Water Heater	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Electric Tankless Water Heater	100.0%	92.3%	94.4%	87.5%	97.3%	100.0%	100.0%	90.9%	100.0%
Low Flow Faucet Aerator	99.0%	87.0%	95.0%	74.0%	77.0%	69.0%	92.0%	84.5%	79.0%
Low Flow Showerhead	93.0%	100.0%	100.0%	69.0%	63.0%	85.0%	100.0%	86.0%	100.0%
Hot Water (DHW) Pipe Insulation	94.4%	95.1%	84.6%	92.6%	71.9%	88.2%	91.7%	86.7%	100.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ES Dishwasher, Low Temp, Elec Heat	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ES Dishwasher, Low Temp, Gas Heat	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Tank Insulation (electric)	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
Pre Rinse Sprayers (electric)	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%
ECM Circulator Pump	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Drain water Heat Recovery Water Heater	94.4%	90.2%	100.0%	94.1%	100.0%	88.2%	97.2%	100.0%	100.0%
Efficient Hot Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
HVAC Condenser Heater Recovery Water Heating	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Process Cooling Condenser Heater Recovery Water Heating	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Pools									
Heat Pump Pool Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High efficiency spas/hot tubs	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Ventilation									
Economizer	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%
Demand-Controlled Ventilation	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%	99.3%

DTE Energy Commercial Measure Assumptions - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Variable Speed Drive Control, 15 HP	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Variable Speed Drive Control, 5 HP	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Variable Speed Drive Control, 40 HP	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
High Speed Fans	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Volume Low Speed Fans	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Engineered CKV hood	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Air-Cooled Screw Chiller	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Centrifugal Chiller < 150 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Centrifugal Chiller 150 - 300 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Centrifugal Chiller > 300 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Screw Chiller < 150 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Screw Chiller 150 - 300 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Screw Chiller > 300 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Chiller Tune Up	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
High Efficiency Pumps	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Efficient Chilled Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Chilled Hot Water Reset	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Chiller Average 10% above IECC standard	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VAV System Conversion	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Motor Belt Replacement	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Side Economizer	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%
Improved Duct Sealing - Cooling Chiller	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Integrated Building Design	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	53.0%	40.0%	38.0%	24.0%	48.0%	12.0%	32.0%	7.0%	29.0%
Cool Roof	100.0%	100.0%	93.0%	99.0%	97.0%	100.0%	97.0%	100.0%	99.0%
Ceiling Insulation	53.8%	28.0%	54.0%	47.0%	23.0%	33.0%	31.0%	39.0%	51.0%
Wall Insulation	40.0%	40.0%	47.0%	42.0%	16.0%	56.0%	44.0%	24.0%	40.0%
Roof Insulation	29.2%	62.5%	29.2%	16.7%	25.0%	20.8%	50.0%	41.7%	54.2%
Window Improvements	53.0%	40.0%	38.0%	24.0%	48.0%	12.0%	32.0%	7.0%	29.0%
EMS install	72.0%	92.0%	51.0%	90.0%	93.0%	87.0%	100.0%	99.5%	100.0%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Commissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Unitary and Split AC									
AC <65k	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
AC 65k - 135k	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
AC 135k - 240k	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
AC 240k - 760k	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
AC >760k	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Air Source Heat Pump - Cooling	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Ductless (mini split) - Cooling	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%

DTE Energy Commercial Measure Assumptions - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Water Loop Heat Pump (WLHP) - Cooling	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Ground Source Heat Pump - Cooling	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Packaged Terminal Air Conditioner (PTAC) - Cooling	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
WLHP System (Cooling) New Construction	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
DX Condenser Coil Cleaning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Room A/C	100.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Improved Duct Sealing - Cooling AC	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%	56.0%
Integrated Building Design	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Cool Roof	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ceiling Insulation	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
Wall Insulation	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Roof Insulation	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Window Improvements	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Programmable Thermostats	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
EMS install	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Commissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cooking									
HE Steamer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Combination Oven	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Convection Ovens	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Holding Cabinet	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
HE Fryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Griddle	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Induction Cooktops	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
T5 HP Retrofits	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Light Tube	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
High Intensity Fluorescent Fixture (replacing HID)	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
42W 8 lamp Hi Bay CFL	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
HID Fixture Upgrade - Pulse Start Metal Halide	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Interior induction Lighting	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
CFL Fixture	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
CFL Screw-in	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
CFL Screw in Specialty	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
CFL Reflector Flood	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%

DTE Energy Commercial Measure Assumptions - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
LED Screw In (replacing Incandescent)	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
LED Screw In (replacing CFL)	75.0%	48.0%	14.0%	48.0%	98.0%	63.0%	54.0%	75.5%	65.0%
LED High bay lighting	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
LED low bay lighting	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
LED Downlight	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
LED Specialty (replacing Incandescent)	22.0%	49.0%	16.0%	43.0%	2.0%	33.0%	46.0%	59.5%	24.0%
LED Specialty (replacing CFL)	75.0%	48.0%	14.0%	48.0%	98.0%	63.0%	54.0%	75.5%	65.0%
LED Troffer	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
LED Tube Lighting	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
LED Grow Light	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
Interior Non Highbay/Lowbay LED Fixtures	91.0%	81.0%	84.0%	79.0%	48.0%	70.0%	92.0%	40.0%	43.0%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Lighting in Refrigeration	82.8%	88.0%	75.0%	86.5%	85.1%	80.0%	83.5%	72.7%	82.8%
LED Exit Sign	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
LED Fuel Pump Canopy Fixture	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LED Auto Traffic Signals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Pedestrian Signals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replacement with CFLs	99.0%	90.0%	93.0%	82.0%	66.0%	94.0%	94.0%	99.3%	91.0%
Exterior HID replacement with LEDs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LEDs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior Linear Fluorescent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Long Day Lighting Dairy	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lighting Controls									
Central Lighting Control	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Daylight Sensor Controls	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Daylight Sensor Controls - New Construction	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Occupancy Sensor	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Occupancy Sensor & Daylight Sensor	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Switching Controls for Multilevel Lighting (Non-HID)	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Lighting Power Density - Interior	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Lighting Power Density - Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stairwell Bi-Level Control	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Occupancy Sensors for LED Refrigerator Lighting	82.8%	88.0%	75.0%	86.5%	85.1%	80.0%	83.5%	72.7%	82.8%
Exterior BiLevel Controls	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Garage BiLevel Controls	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Sports Field Lighting HiLo Control	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%	94.7%
Evaporator Fan Motor Controls	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%
Zero-Energy Doors	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%
Discus and Scroll Compressors	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Floating Head Pressure Control	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
ENERGY STAR Commercial Solid Door Refrigerators	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Solid Door Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Glass Door Refrigerators	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%
ENERGY STAR Commercial Glass Door Freezers	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%
Energy Star Ice Machines	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%	97.9%
Strip Curtains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Anti Sweat Heater Controls	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%	88.0%

DTE Energy Commercial Measure Assumptions - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Efficient Refrigeration Condenser	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
Door Gaskets - Cooler and Freezer	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Reach-in Refrigerated display case door retrofit	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%	65.5%
Refrigeration Savings due to Lighting Savings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Case Motors	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Efficient low-temp compressor	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Automatic High Speed Doors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigerant charging correction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Walk-in Cooler Evaporator Motor Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Night Covers	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Refrigeration Suction Line Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air									
Efficient Air Compressors	75.0%	75.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	60.0%
Automatic Drains	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Cycling Dryers	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Low Pressure Drop-Filters	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Air-Entraining Air Nozzles	83.0%	83.0%	0.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.3%
Receiver Capacity Addition	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Compressed Air Audits & Leak Repair	100.0%	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Pressure Flow Controller replacing no flow controller	83.0%	83.0%	0.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.3%
High Efficiency Air Dryers	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Air Compressor Outdoor Air Intake	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Variable Displacement Air Compressor	75.0%	75.0%	0.0%	75.0%	75.0%	75.0%	75.0%	75.0%	60.0%
Compressed Air Storage Tank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Replacement with Air Blowers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Heating									
Air Source Heat Pump - Heating	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Ground Source Heat Pump - Heating	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Ductless (mini split) - Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
VFD Pumps	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
ECM motors on furnaces	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Water Loop Heat Pump (WLHP) - Heating	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
WLHP System (Heating) New Construction	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Integrated Building Design	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Cool Roof	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ceiling Insulation	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
Wall Insulation	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Roof Insulation	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%
Window Improvements	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
EMS install	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Energy Commercial Measure Assumptions - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Commissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Other									
NEMA Premium Transformer, single-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
NEMA Premium Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
High Efficiency Transformer, single-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
High Efficiency Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
Optimized Snow and Ice Melt Controls (electric)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Energy Commercial Measure Assumptions - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Computers & Office Equipment									
Energy Star Compliant Refrigerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Smart Strip plug outlet	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
PC Network Energy Management Controls replacing no central control	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Energy Star UPS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Vendor Miser for Non-Refrig Equipment	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Hand Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electrically Commutated Plug Fans in data centers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency CRAC unit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Conditioner Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Hot Aisle Cold Aisle Configuration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Computer Room Air Side Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Fans -CRAC units	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heating									
Heat Pump Water Heater	25.0%	25.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
High Efficiency Electric Water Heater	25.0%	25.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Solar Storage Water Heater	25.0%	25.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Electric Tankless Water Heater	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Low Flow Faucet Aerator	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Showerhead	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Hot Water (DHW) Pipe Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ES Dishwasher, High Temp, Elec Heat, Elec Booster	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, High Temp, Gas Heat, Elec Booster	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, High Temp, Gas Heat, Gas Booster	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, Low Temp, Elec Heat	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
ES Dishwasher, Low Temp, Gas Heat	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Tank Insulation (electric)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Pre Rinse Sprayers (electric)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
ECM Circulator Pump	10.0%	5.0%	80.0%	10.0%	20.0%	80.0%	80.0%	15.0%	5.0%
Drain water Heat Recovery Water Heater	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Efficient Hot Water Pump	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
HVAC Condenser Heater Recovery Water Heating	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Process Cooling Condenser Heater Recovery Water Heating	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
Pools									
Heat Pump Pool Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High efficiency spas/hot tubs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ventilation									
Economizer	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Demand-Controlled Ventilation	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Variable Speed Drive Control, 15 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%

DTE Energy Commercial Measure Assumptions - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Variable Speed Drive Control, 5 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Variable Speed Drive Control, 40 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
High Speed Fans	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
High Volume Low Speed Fans	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Engineered CKV hood	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Space Cooling - Chillers									
Air-Cooled Recip Chiller	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Air-Cooled Screw Chiller	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Centrifugal Chiller < 150 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Centrifugal Chiller 150 - 300 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Centrifugal Chiller > 300 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Screw Chiller < 150 ton	0.0%	0.0%	0.0%	80.0%	0.0%	80.0%	0.0%	80.0%	0.0%
Water-Cooled Screw Chiller 150 - 300 ton	0.0%	0.0%	0.0%	95.0%	0.0%	95.0%	0.0%	95.0%	0.0%
Water-Cooled Screw Chiller > 300 ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Chiller Tune Up	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
High Efficiency Pumps	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Efficient Chilled Water Pump	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Chilled Hot Water Reset	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Chiller Average 10% above IECC standard	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
VAV System Conversion	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Motor Belt Replacement	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Water-Side Economizer	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Improved Duct Sealing - Cooling Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roof	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%
Retrocommissioning	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Commissioning	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Space Cooling - Unitary and Split AC									
AC <65k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 65k - 135k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 135k - 240k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC 240k - 760k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
AC >760k	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Ductless (mini split) - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Water Loop Heat Pump (WLHP) - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%

DTE Energy Commercial Measure Assumptions - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Ground Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Packaged Terminal Air Conditioner (PTAC) - Cooling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
WLHP System (Cooling) New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
DX Condenser Coil Cleaning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Room A/C	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Duct Sealing - Cooling AC	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roof	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Programmable Thermostats	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	90.0%	0.0%	0.0%	0.0%	0.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Retrocommissioning	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Commissioning	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Cooking									
HE Steamer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Combination Oven	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Convection Ovens	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Holding Cabinet	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Fryer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HE Griddle	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Induction Cooktops	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting									
Lamp & Ballast Retrofit (HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
T5 HP Retrofits	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Light Tube	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Intensity Fluorescent Fixture (replacing HID)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Intensity Fluorescent Fixture (replacing HID) - New Construction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
42W 8 lamp Hi Bay CFL	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
HID Fixture Upgrade - Pulse Start Metal Halide	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior induction Lighting	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
CFL Fixture	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw-in	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Reflector Flood	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Screw In (replacing Incandescent)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Energy Commercial Measure Assumptions - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
LED Screw In (replacing CFL)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED High bay lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED low bay lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Downlight	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Specialty (replacing Incandescent)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Specialty (replacing CFL)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Troffer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Tube Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Grow Light	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Non Highbay/Lowbay LED Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Lighting in Refrigeration	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
LED Exit Sign	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Fuel Pump Canopy Fixture	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
LED Auto Traffic Signals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Pedestrian Signals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replacement with CFLs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replacement with LEDs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LEDs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior Linear Fluorescent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Long Day Lighting Dairy	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Controls									
Central Lighting Control	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Daylight Sensor Controls	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Daylight Sensor Controls - New Construction	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Occupancy Sensor	90.0%	10.0%	10.0%	20.0%	10.0%	10.0%	0.0%	50.0%	20.0%
Occupancy Sensor & Daylight Sensor	90.0%	10.0%	10.0%	20.0%	10.0%	10.0%	0.0%	50.0%	20.0%
Switching Controls for Multilevel Lighting (Non-HID)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Lighting Power Density - Interior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stairwell Bi-Level Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Occupancy Sensors for LED Refrigerator Lighting	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Exterior BiLevel Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage BiLevel Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Sports Field Lighting HiLo Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigeration									
Vending Miser for Refrigerated Vending Machines	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Evaporator Fan Motor Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zero-Energy Doors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Discus and Scroll Compressors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Floating Head Pressure Control	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
ENERGY STAR Commercial Solid Door Refrigerators	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Solid Door Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Glass Door Refrigerators	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ENERGY STAR Commercial Glass Door Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star Ice Machines	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Strip Curtains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Anti Sweat Heater Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Refrigeration Condenser	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Door Gaskets - Cooler and Freezer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Energy Commercial Measure Assumptions - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Reach-in Refrigerated display case door retrofit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigeration Savings due to Lighting Savings	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Case Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient low-temp compressor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic High Speed Doors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigerant charging correction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Walk-in Cooler Evaporator Motor Reduction	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Night Covers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Refrigeration Suction Line Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air									
Efficient Air Compressors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Drains	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cycling Dryers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Pressure Drop-Filters	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Entraining Air Nozzles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Receiver Capacity Addition	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Audits & Leak Repair	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Pressure Flow Controller replacing no flow controller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Air Dryers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air Compressor Outdoor Air Intake	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Displacement Air Compressor	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Storage Tank	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Replacement with Air Blowers	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Heating									
Air Source Heat Pump - Heating	77.0%	77.0%	77.0%	67.0%	77.0%	60.0%	77.0%	60.0%	77.0%
Ground Source Heat Pump - Heating	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ductless (mini split) - Heating	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
VFD Pumps	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ECM motors on furnaces	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Loop Heat Pump (WLHP) - Heating	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
WLHP System (Heating) New Construction	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Operator Certification	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roof	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Hotel Guest Room Occupancy Control System	0.0%	0.0%	0.0%	0.0%	90.0%	90.0%	90.0%	90.0%	90.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web enabled EMS with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%	71.0%
Retrocommissioning	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%	77.0%
Commissioning	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%

DTE Energy Commercial Measure Assumptions - Electric

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

Measure Name	Warehouse	Retail	Grocery	Office	Lodging	Health	Restaurant	Education	Other
Other									
NEMA Premium Transformer, single-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
NEMA Premium Transformer, three-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Efficiency Transformer, single-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Efficiency Transformer, three-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Optimized Snow and Ice Melt Controls (electric)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Energy Commercial Measure Assumptions - Electric

Electric Measure Sources

Source Number	Source
1	Michigan Master Database of Deemed Savings - 2016 - Non-Weather Sensitive Commercial
2	Michigan Master Database of Deemed Savings - 2016 - Weather Sensitive
3	Michigan Master Database of Deemed Savings - 2016 Work Papers
4	ENERGY STAR Qualified Office Equipment Calculator
5	Vermont TRM - Manual No. 2014-87
6	Drain Water Heat Recovery Characterization and Modeling - Final Report, C. Zaloum, M. Lafrance, J Gusdorf, 2007
7	California Energy Commission Codes and Standards Enhancement (CASE) Initative: Analysis of Standards Options for Residential Swimming Pool & Portable Spa Equipment, July 2013
8	Mid-Atlantic TRM Version 4.0 June 2014
9	DC DDOE Natural Gas Efficiency Potential, Dec 2012 Completed by GDS Associates, Inc.
10	GDS Previous Study or GDS Engineering Estimate based upon past project experience
11	Big Ass Fan Company Calculations, http://www.todaysfacilitymanager.com/articles/the-hvac-factor-high-volume-low-speed-fans.php
12	Pacific NW Natitional Labs - HVAC Occupancy Sensor Study
13	https://kindledgrowlights.com/led-technology/led-cost-savings/
14	Energy Star Website. http://www.energystar.gov/products/commercial_food_service_equipment/commercial_ice_makers
15	2011 Michigan Statewide Commercial Baseline Study
16	2013 DTE Energy Commercial Baseline Study
17	2011 DTE Commercial Baseline Study
18	2011 Delaware Commercial Baseline Study
19	DTE Non-Residential Potential Study 2010
20	;2010 Maryland Commercial Baseline Study
21	US DOE, EERE Consumer's Guide to Energy Efficiency and Renewable Energy, "Solar Swimming Pool Heaters" http://apps1.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13230
22	Building Commissioning - A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions. Lawrence Berkeley National Laboratory. Report Prepared for: California Energy Commission Public Interest Energy Research (PIER) - July 21, 2009

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Computers & Office Equipment					
Energy Star Compliant Refrigerator	3	3	1	3	16
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	4	10	4	3	15
Smart Strip plug outlet	1	1	1	3	10
PC Network Energy Management Controls replacing no central control	1	1	1	3	16
Energy Star UPS	1	1	1	3	10
Vendor Miser for Non-Refrig Equipment	1	1	1	3	17
High Efficiency Hand Dryer	1	1	1	3	10
Electrically Commutated Plug Fans in data centers	1	1	1	3	10
High Efficiency CRAC unit	1	1	1	3	10
Computer Room Air Conditioner Economizer	1	1	1	3	10
Computer Room Hot Aisle Cold Aisle Configuration	1	1	1	3	10
Computer Room Air Side Economizer	1	1	1	3	10
VFD for Process Fans -CRAC units	1	1	1	3	10
Water Heating					
Heat Pump Water Heater	1	1	1	3	15
HP Water Heater - Residential unit in Commercial Application	1	1	1	3	15
Heat Pump Storage Water Heater	1	1	1	3	10
Electric Tankless Water Heater	1	1	1	3	15
Low Flow Faucet Aerator	1	1	1	3	16
Low Flow Showerhead	1	1	1	3	16
Hot Water (DHW) Pipe Insulation	1	1	1	3	15
Clothes Washer ENERGY STAR, Gas water heater, Gas dryer	1	1	1	3	19
Clothes Washer ENERGY STAR, Gas water heater, Electric dryer	1	1	1	3	19
Clothes Washer ENERGY STAR, Electric Water heater, Gas Dryer	1	1	1	3	19
Clothes Washer ENERGY STAR, Electric Water heater, Electric Dryer	1	1	1	3	19
ES Dishwasher, High Temp, Elec Heat, Elec Booster	1	1	1	3	19
ES Dishwasher, High Temp, Gas Heat, Elec Booster	1	1	1	3	19
ES Dishwasher, High Temp, Gas Heat, Gas Booster	1	1	1	3	19
ES Dishwasher, Low Temp, Elec Heat	1	1	1	3	19
ES Dishwasher, Low Temp, Gas Heat	1	1	1	3	19
Tank Insulation (electric)	1	1	1	3	16
Pre Rinse Sprayers (electric)	1	1	1	3	10
ECM Circulator Pump	1	1	1	3	10
Drain water Heat Recovery Water Heater	6	5	5	3	15

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Efficient Hot Water Pump	2	2	2	3	20
HVAC Condenser Heater Recovery Water Heating	1	1	1	3	15
Process Cooling Condenser Heater Recovery Water Heating	1	1	1	3	15
Pools					
Heat Pump Pool Heater	7	7	7	3	16
High efficiency spas/hot tubs	7	7	7	3	16
Ventilation					
Economizer	2	2	2	10	15
Demand-Controlled Ventilation	2	2	2	3	15
Variable Speed Drive Control, 15 HP	1	1	1	3	10
Variable Speed Drive Control, 5 HP	1	1	1	3	10
Variable Speed Drive Control, 40 HP	1	1	1	3	10
High Speed Fans	1	1	1	3	10
High Volume Low Speed Fans	1	1	1	3	10
Engineered CKV hood	2	2	2	3	10
Space Cooling - Chillers					
Air-Cooled Recip Chiller	2	2	2	3	10
Air-Cooled Screw Chiller	2	2	2	3	10
Water-Cooled Centrifugal Chiller < 150 ton	2	2	2	3	10
Water-Cooled Centrifugal Chiller 150 - 300 ton	2	2	2	3	10
Water-Cooled Centrifugal Chiller > 300 ton	2	2	2	3	10
Water-Cooled Screw Chiller < 150 ton	2	2	2	3	10
Water-Cooled Screw Chiller 150 - 300 ton	2	2	2	3	10
Water-Cooled Screw Chiller > 300 ton	2	2	2	3	10
Chiller Tune Up	2	2	2	10	15
High Efficiency Pumps	1	1	1	3	20
Efficient Chilled Water Pump	2	2	2	3	20
Chilled Hot Water Reset	2	2	2	3	20
Air-Cooled Chiller Average Minimum Qualifying 1.04 kW/ton	2	2	2	3	10
Air-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	2	2	2	3	10
Water-Cooled Chiller Average 10% above IECC standard	2	2	2	3	10
Water-Cooled Chiller Average 0.01 kW/ton IPLV Reduction	2	2	2	3	10
VAV System Conversion	2	2	2	3	10
Motor Belt Replacement	1	1	1	3	16
Water-Side Economizer	1	1	1	3	10
Improved Duct Sealing - Cooling Chiller	2	2	2	3	16
Integrated Building Design	10	10	10	3	16
Building Operator Certification	1	1	1	3	10
Energy Efficient Windows	2	2	2	3	15
Cool Roof	2	2	2	3	15
Ceiling Insulation	2	2	2	3	15

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Wall Insulation	2	2	2	3	15
Roof Insulation	2	2	2	3	16
Window Improvements	2	2	2	3	15
EMS install	2	2	2	3	16
EMS Optimization	2	2	2	3	16
HVAC Occupancy Sensors	2	2	2	13	10
Setback with Electric Heat	2	2	2	3	10
EMS Pump Scheduling Controls	2	2	2	3	10
Web enabled EMS	2	2	2	3	10
Zoning	10	10	10	3	10
Retrocommissioning	10	10	10	3	10
Commissioning	22	22	22	3	10
Space Cooling - Unitary & Split AC					
AC <65k	2	2	2	3	10
AC 65k - 135k	2	2	2	3	10
AC 135k - 240k	2	2	2	3	10
AC 240k - 760k	2	2	2	3	10
AC >760k	2	2	2	3	10
Air Source Heat Pump - Cooling	2	2	2	3	10
Ductless (mini split) - Cooling	2	2	2	3	15
Water Loop Heat Pump (WLHP) - Cooling	2	2	2	3	10
Ground Source Heat Pump - Cooling	2	2	2	3	10
Packaged Terminal Air Conditioner (PTAC) - Cooling	2	2	2	3	10
WLHP System (Cooling) New Construction	2	2	2	3	10
DX Condenser Coil Cleaning	2	2	2	3	10
Room A/C	1	1	1	3	10
Improved Duct Sealing - Cooling AC	2	2	2	3	16
Integrated Building Design	10	10	10	3	16
Building Operator Certification	1	1	1	3	10
Energy Efficient Windows	2	2	2	3	15
Cool Roof	2	2	2	3	15
Ceiling Insulation	2	2	2	3	15
Wall Insulation	2	2	2	3	15
Roof Insulation	2	2	2	3	16
Window Improvements	2	2	2	3	15
Programmable Thermostats	2	2	2	3	16
EMS install	2	2	2	3	16
EMS Optimization	2	2	2	3	16
Hotel Guest Room Occupancy Control System	1	1	1	3	15
HVAC Occupancy Sensors	2	2	2	3	10
Setback with Electric Heat	2	2	2	3	10
EMS Pump Scheduling Controls	2	2	2	3	10
Web enabled EMS	2	2	2	3	10
Zoning	10	10	10	3	10

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Retrocommissioning	10	10	10	3	10
Commissioning	22	22	22	3	10
Cooking					
HE Steamer	1	1	1	3	15
HE Combination Oven	1	1	1	3	15
HE Convection Ovens	1	1	1	3	15
HE Holding Cabinet	1	1	1	3	15
HE Fryer	1	1	1	3	15
HE Griddle	1	1	1	3	15
Induction Cooktops	10	10	10	3	15
Lighting					
Lamp & Ballast Retrofit (HPT8 Replacing T12)	1	1	1	3	16
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	1	1	1	3	16
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	1	1	1	3	16
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	1	1	1	3	16
T5 HP Retrofits	1	1	1	3	16
Light Tube	1	1	1	10	16
High Intensity Fluorescent Fixture (replacing HID)	1	1	1	3	16
High Intensity Fluorescent Fixture (replacing HID) - New Construction	1	1	1	3	16
42W 8 lamp Hi Bay CFL	1	1	1	3	16
HID Fixture Upgrade - Pulse Start Metal Halide	1	1	1	3	16
Interior induction Lighting	1	1	1	3	16
CFL Fixture	1	1	1	3	16
CFL Screw-in	1	1	1	3	16
CFL Screw in Specialty	1	1	1	3	16
CFL Reflector Flood	1	1	1	3	16
LED Screw In (replacing Incandescent)	1	1	1	3	16
LED Screw In (replacing CFL)	1	1	1	3	16
LED High bay lighting	1	1	1	3	16
LED low bay lighting	1	1	1	3	16
LED Downlight	1	1	1	3	16
LED Specialty (replacing Incandescent)	1	1	1	3	16
LED Specialty (replacing CFL)	1	1	1	3	16
LED Troffer	1	1	1	3	16
LED Tube Lighting	1	1	1	3	16
LED Grow Light	1	1	1	15	16
Interior Non Highbay/Lowbay LED Fixtures	1	1	1	3	16
Illuminated Signs to LED	1	1	1	3	15
LED Lighting in Refrigeration	1	1	1	3	15
LED Exit Sign	1	1	1	3	16
LED Fuel Pump Canopy Fixture	8	8	8	3	10
LED Auto Traffic Signals	1	1	1	3	18

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
LED Pedestrian Signals	1	1	1	3	18
Exterior HID replacement with CFLs	1	1	1	3	15
Exterior HID replacement with LEDs	1	1	1	3	10
Garage HID replacement with LEDs	1	1	1	3	10
Exterior Linear Fluorescent	1	1	1	3	10
Long Day Lighting Dairy	1	1	1	3	10
Lighting Controls					
Central Lighting Control	1	1	1	3	16
Daylight Sensor Controls	1	1	1	3	16
Daylight Sensor Controls - New Construction	1	1	1	3	16
Occupancy Sensor	1	1	1	3	16
Occupancy Sensor & Daylight Sensor	1	1	1	3	16
Switching Controls for Multilevel Lighting (Non-HID)	1	1	1	3	16
Lighting Power Density - Interior	1	1	1	3	10
Lighting Power Density - Exterior	1	1	1	3	10
Lighting Power Density - Parking Garage	1	1	1	3	10
Stairwell Bi-Level Control	1	1	1	3	16
Occupancy Sensors for LED Refrigerator Lighting	1	1	1	3	15
Exterior BiLevel Controls	1	1	1	3	16
Garage BiLevel Controls	1	1	1	3	16
Sports Field Lighting HiLo Control	1	1	1	3	16
Refrigeration					
Vending Miser for Refrigerated Vending Machines	1	1	1	3	16
Evaporator Fan Motor Controls	1	1	1	3	16
Zero-Energy Doors	5	5	5	3	16
Discus and Scroll Compressors	5	5	5	3	16
Floating Head Pressure Control	1	1	1	3	16
ENERGY STAR Commercial Solid Door Refrigerators	1	1	1	3	15
ENERGY STAR Commercial Solid Door Freezers	1	1	1	3	15
ENERGY STAR Commercial Glass Door Refrigerators	1	1	1	3	15
ENERGY STAR Commercial Glass Door Freezers	1	1	1	3	15
Energy Star Ice Machines	1	1	1	14	15
Strip Curtains	1	1	1	3	10
Anti Sweat Heater Controls	1	1	1	3	16
Efficient Refrigeration Condenser	1	1	1	3	16
Door Gaskets - Cooler and Freezer	1	1	1	3	15
Reach-in Refrigerated display case door retrofit	1	1	1	3	15
Refrigeration Savings due to Lighting Savings	1	1	1	3	15
ECM Case Motors	1	1	1	3	16
Efficient low-temp compressor	5	5	5	3	10
Automatic High Speed Doors	1	1	1	3	10

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Automatic Door Closers for Refrigerated Walk-in Coolers/Freezers	1	1	1	3	10
Refrigerant charging correction	2	2	2	3	10
Walk-in Cooler Evaporator Motor Reduction	1	1	1	3	10
Night Covers	2	2	2	3	16
Refrigeration Suction Line Insulation	1	1	1	3	10
Compressed Air					
Efficient Air Compressors	1	1	1	3	10
Automatic Drains	1	1	1	3	10
Cycling Dryers	1	1	1	3	10
Low Pressure Drop-Filters	1	1	1	3	10
Air-Entraining Air Nozzles	1	1	1	3	10
Receiver Capacity Addition	5	5	5	3	10
Compressed Air Audits & Leak Repair	1	1	1	3	10
Compressed Air Pressure Flow Controller replacing no flow controller	1	1	1	3	10
High Efficiency Air Dryers	1	1	1	3	10
Air Compressor Outdoor Air Intake	1	1	1	3	10
Variable Displacement Air Compressor	1	1	1	3	10
Compressed Air Storage Tank	1	1	1	3	10
Compressed Air Replacement with Air Blowers	1	1	1	3	10
Space Heating					
Air Source Heat Pump - Heating	2	2	2	3	10
Ground Source Heat Pump - Heating	2	2	2	3	10
Ductless (mini split) - Heating	2	2	2	3	10
VFD Pumps	1	1	1	3	20
ECM motors on furnaces	1	1	1	3	20
Water Loop Heat Pump (WLHP) - Heating	2	2	2	3	10
WLHP System (Heating) New Construction	2	2	2	3	10
Integrated Building Design	10	10	10	3	16
Building Operator Certification	1	1	1	3	10
Energy Efficient Windows	2	2	2	3	15
Cool Roof	2	2	2	3	15
Ceiling Insulation	2	2	2	3	15
Wall Insulation	2	2	2	3	15
Roof Insulation	2	2	2	3	16
Window Improvements	2	2	2	3	15
EMS install	2	2	2	3	16
EMS Optimization	2	2	2	3	16
Hotel Guest Room Occupancy Control System	1	1	1	3	15
HVAC Occupancy Sensors	2	2	2	3	10
Setback with Electric Heat	2	2	2	3	10
EMS Pump Scheduling Controls	2	2	2	3	10
Web enabled EMS	2	2	2	3	10
Web enabled EMS with Electric Heat	2	2	2	3	10

DTE Energy Commercial Measure Assumptions - Electric

Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources

Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/ Unit	Effective Measure Life	Savings Factor	Remaining Factor
Zoning	10	10	10	3	10
Retrocommissioning	10	10	10	3	10
Commissioning	22	22	22	3	10
Other					
NEMA Premium Transformer, single-phase	1	1	1	3	10
NEMA Premium Transformer, three-phase	1	1	1	3	10
High Efficiency Transformer, single-phase	1	1	1	3	10
High Efficiency Transformer, three-phase	1	1	1	3	10
Optimized Snow and Ice Melt Controls (electric)	1	1	1	3	10
Engine Block Heater Timer	1	1	1	3	10
Parking Garage Exhaust Fan CO Control	1	1	1	3	10

APPENDIX C ● Industrial Measure Detail

Consumers Energy Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
Computers & Office Equipment						
Energy Star Compliant Single Door Refrigerator	47.80	2	Per Unit	$30.75	16	1.8
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	631.00	2	per set	$20.00	5	11.5
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	16.97	1	per unit	$40.00	5	0.2
PC Network Energy Management Controls replacing no central control	135.00	1	per PC	$17.00	4	2.3
Energy Star UPS	104.79	2	per kW	$1,303.35	10	0.1
High Efficiency CRAC Unit	162.33	1	MBH	$82.50	15	2.1
Water Heating						
Heat Pump Water Heater	184058.00	2	per heater	$10,600.00	15	29.5
Electric Tankless Water Heater	621.00	2	$/Unit	$466.00	20	2.5
Efficient Hot Water Pump	525.50	1	$/Unit	$78.00	15	9.2
Solar Storage Water Heating	2504.50	1	$/unit	$433.00	10	5.0
High Efficiency Electric Water Heater	5375.00	1	$/unit	$1,000.00	15	8.0
HVAC Condenser Heater Recovery Water Heating	3536.50	1	$/unit	$254.00	15	58.7
Low Flow Faucet Aerator	903.00	1	per unit	$2.50	10	389.1
Low Flow Showerhead	615.00	1	per unit	$25.00	10	19.5
Hot Water (DHW) Pipe Insulation	44.74	1	linear ft	$10.00	20	8.2
Tank Insulation (electric)	468.00	1	per square foot	$6.22	15	106.8
Drain Water Heat Recovery Water Heater	546.00	1	$/unit	$631.00	25	1.8
ECM Circulator Pump	4949.40	1	$/unit	$2,266.67	15	3.4
Process Cooling Condenser Heat Recovery	5720.00	2	$/unit	$254.00	15	39.9
Building Envelope						
Integrated Building Design	322775.43	2	per Building	$75,580.52	30	13.3
Energy Efficient Windows	172.80	2	100SF	$272.96	25	1.6
Cool Roofing	44.20	2	1000 sq ft roof area	$332.44	20	0.2
Ceiling Insulation	75.30	1	1000 sq ft roof area	$47.16	20	6.7
Window Improvements	85.30	1	100 sq ft glazing	$286.16	15	0.5
Wall Insulation	331.90	1	1000 sq ft wall area	$4.57	20	206.3
Roof Insulation	20.20	1	1000 sq ft	$54.88	20	2.0
Improved Duct Sealing	31.20	2	ton	$108.00	18	0.4
Ventilation						
Economizer	143.10	2	ton	$123.00	13	0.8
Variable Speed Drive Control, 15 HP	19590.00	1	per Unit	$3,690.00	15	8.1
Variable Speed Drive Control, 5 HP	6530.00	1	per Unit	$1,230.00	15	8.1
Variable Speed Drive Control, 40 HP	52240.00	1	per Unit	$9,840.00	15	8.1
High Speed Fans	706.60	1	ton	$675.00	7	0.9
High Volume Low Speed Fans	5859.90	1	per motor	$5,767.00	10	1.7
Destratification Fan (HVLS)	16.60	1	)00 sq ft cond floor are	$12.75	15	1.4
Engineered CKV Hood	727.20	2	per	$124.62	15	8.0
Space Cooling - Chillers						
Air-Cooled Recip Chiller	335.40	2	ton	$141.03	20	6.8
Air-Cooled Screw Chiller	332.00	2	ton	$143.92	20	6.6
Water Side Economizer	1047.50	2	ton	$50.00	15	25.5
VAV System Conversion	4723.40	1	ton	$1,396.00	20	4.7
Water-Cooled Centrifugal Chiller > 300 ton	205.60	2	ton	$27.30	20	20.2
Motor Belt Replacement	94.70	1	ton	$21.00	14	8.1
Chilled Hot Water Reset	111.50	1	ton	$6.00	8	35.5
Water-Cooled Screw Chiller > 300 ton	200.70	2	ton	$27.15	20	21.2

Consumers Energy Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
Chiller Tune Up	135.80	1	ton	$6.00	5	28.3
Efficient Chilled Water Pump	751.10	1	ton	$33.00	15	38.0
High Efficiency Pumps	201.40	1	per hp	$97.00	15	3.9
HVAC Controls						
Programmable Thermostats	77.10	1	)00 sq ft cond floor are	$58.99	9	0.4
EMS install	269.10	1	)00 sq ft cond floor are	$2.94	15	123.4
EMS Optimization	363.10	1	1000 sq ft	$18.62	20	36.1
HVAC Occupancy Sensors	99.30	2	per unit	$107.58	15	3.4
Zoning	187.35	2	)00 sq ft cond floor are	$500.00	15	0.6
Setback with Electric Heat	3792.20	2	)00 sq ft cond floor are	$71.00	9	51.7
EMS Pump Scheduling	1524.41	2	)00 sq ft cond floor are	$1.32	15	1712.9
Web Enabled EMS	601.38	2	)00 sq ft cond floor are	$19.10	15	32.0
Retrocommissioning	2.55	1	)00 sq ft cond floor are	$0.30	7	5.6
Space Cooling - Unitary and Split AC						
AC 240K - 760 K	42.50	2	ton	$118.39	15	2.4
Ductless (mini split) - Cooling	126.10	1	ton	$834.32	15	0.3
Ground Source Heat Pump - Cooling	302.20	2	ton	$927.66	15	0.5
Water Loop Heat Pump (WLHP) - Cooling	7.20	2	ton	$5.02	15	4.4
Air Source Heat Pump - Cooling	74.30	2	ton	$131.25	15	1.6
DX Condenser Coil Cleaning	51.20	1	ton	$32.00	3	1.6
Room AC	158.00	2	ton	$74.75	15	8.6
Lighting						
Lamp & Ballast Retrofit (HPT8 Replacing T12)	54.20	2	per fixture	$34.15	15	2.8
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	24.70	2	Replacing standard T	$34.00	15	0.8
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	73.40	2	Replacing standard T1	$37.09	15	2.1
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	42.00	2	$/unit	$22.98	15	1.2
T5 HP replacing T12	80.70	2	per fixture	$107.00	15	1.3
Exterior HID replaced with LED	519.47	2	per fixture	$754.00	12	0.5
Garage HID replacement with LED	1053.70	2	per fixture	$753.67	12	1.3
LED Exit Sign	201.00	2	per fixture	$25.00	15	12.3
LED High Bay Lighting	4160.00	2	per lamp	$2,900.00	16	2.8
LED Low Bay Lighting	2669.00	2	per lamp	$2,900.00	18	1.8
Light Tube	344.30	2	per fixture	$500.00	14	0.8
High Intensity Fluorescent Fixture (replacing HID)	4160.00	2	per fixture	$1,491.00	12	4.6
42W 8 lamp Hi Bay CFL	345.00	2	xture, Replacing 400V	$496.00	12	0.8
HID Fixture Upgrade - Pulse Start Metal Halide	768.50	2	per fixture	$223.63	13	6.0
Interior Induction Lighting	4.16	2	Watt Reduced	$1.53	16	5.5
CFL Fixture	157.50	2	per fixture	$45.00	12	5.3
CFL Screw-in	84.74	2	per lamp	$1.36	2	19.7
LED Screw In Replacing Incandescent	134.80	2	$/unit	$16.45	9	9.9
LED Screw In Replacing CFL	12.00	2	Not Found	$13.41	9	0.8
CFL Reflector Flood	133.50	2	per lamp	$6.00	2	7.0
LED Downlight	141.50	2	per fixture	$12.74	15	19.6
LED Troffer	32.30	2	per lamp	$125.00	18	0.5
LED Tube Lighting	53.90	2	$/unit	$35.00	18	3.0
LED Grow Light	4.40	2	$/unit	$1.53	11	4.4
Interior Non-Highbay/Lowbay LED Fixtures	2.67	2	$/unit	$2.90	18	1.8
Exterior HID Replaced with CFL	1021.40	2	$/unit	$597.00	12	1.7
Exterior Linear Fluorescent	4319.00	2	$/unit	$2,500.00	12	1.7

Consumers Energy Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
LED Specialty replacing CFL	16.10	2	$/unit	$10.00	9	1.9
CFL Screw in Specialty	132.80	2	per lamp	$4.58	2	9.2
LED Specialty replacing incandescent	80.60	2	per lamp	$13.00	9	7.6
Illuminated Signs to LED	5.71	2	per watt reduced	$4.00	10	1.8
Lighting Controls						
Exterior Bi-level Controls	530.50	2	per fixture	$444.00	10	0.8
Garage Bi-level Controls	927.50	2	$/unit	$632.00	11	2.1
Daylight Sensor Controls	10409.10	1	10,000 SF	$4,000.00	12	3.7
Lighting Power Density- Exterior	4319.00	2	10,000 SF	$220.00	12	19.4
Lighting Power Density - Parking Garage	8760.00	2	0.000	$220.00	12	50.6
Stairwell Bi-Level Control	4809.00	2	per kW controlled	$825.00	9	6.0
Occupancy Sensor	504.40	2	per sensor	$226.47	10	0.4
Occupancy Sensor & Daylight Sensor	639.00	2	per sensor	$278.00	10	0.7
Central Lighting Control	8340.63	1	10,000 SF	$3,700.00	12	3.4
Switching Controls for Multilevel Lighting (Non-HID)	6000.00	1	10,000 SF	$4,000.00	12	2.3
Lighting Power Density - Interior	2669.00	2	per kW reduced	$220.00	15	21.3
Long Day Lighting Dairy	6.21	2	per watt reduced	$2.00	16	3.8
Space Heating						
Air Source Heat Pump - Heating	74.30	2	ton	$131.25	15	1.5
Ground Source Heat Pump - Heating	1208.70	2	ton	$3,710.00	15	0.5
Ductless (mini split) - Heating	126.10	1	ton	$952.30	15	0.3
Water Loop Heat Pump (WLHP) - Heating	28.90	2	ton	$20.09	15	4.2
VFD Pump	1732.20	1	per CHW pump hp	$212.29	10	6.9
ECM motors on furnaces	1034.00	1	per Furnace	$1,359.00	20	0.9
Other						
High Efficiency Transformer, single-phase	0.39	2	per fan	$0.46	30	2.3
NEMA Premium Transformer, single-phase	0.16	2	per kVA	$0.24	30	3.0
NEMA Premium Transformer, three-phase	0.24	2	per kVA	$0.18	30	2.0
High Efficiency Transformer, three-phase	0.44	2	$/unit	$0.44	30	4.7
Parking Garage Exhaust Fan CO Control	2413.00	2	per unit	$900.00	15	6.2
Optimized Snow and Ice Melt Controls	0.12	1	SF	$15.15	15	0.0
Engine Block Heater Timer	576.00	2	per engine block	$50.00	5	27.3
Machine Drive						
Sensors & Controls	1.00	1	$/kWh	$0.15	15	126.3
Energy Information System	1.00	1	$/kWh	$0.64	15	29.0
Electric Supply System Improvements	1.00	1	$/kWh	$0.10	15	176.8
Advanced Efficient Motors	1.00	1	$/kWh	$0.49	25	66.7
Industrial Motor Management	1.00	1	$/kWh	$0.08	5	41.0
Advanced Lubricants	1.00	1	$/kWh	$0.00	1	16303.7
Motor System Optimization (Including ASD)	1.00	1	$/kWh	$0.10	15	196.5
Pump System Efficiency Improvements	1.00	1	$/kWh	$0.08	15	221.0
Fan System Improvements	1.00	1	$/kWh	$0.25	15	73.7
Compressed Air System Management	1.00	1	$/kWh	$0.00	1	16303.7
Compressed Air - Advanced Compressor Controls	1.00	1	$/kWh	$0.00	15	176832.4
VFD for Process Fans	785.00	1	per hp	$46.00	15	7.7
VFD for Process Pumps	1082.00	1	per hp	$94.00	15	20.4
High Efficiency Pumps	201.00	1	per hp	$31.00	15	11.5
Compressed Air Audits and Leak Repair	624.00	1	per cfm	$8.00	1	12.7
Elec motors replacing pneumatic (comp air)	1426.00	1	per hp	$25.00	10	25.0
Automatic Drains, High efficiency nozzles and other (comp air)	2097.00	1	per drain	$100.00	5	15.5

Consumers Energy Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

Consumers Energy	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
Storage Tank Addition (comp air)	423.00	1	per hp	$24.00	25	41.2
High Efficiency Dryers (comp air)	48.00	1	per hp	$10.00	15	8.5
Process Cooling & Refrigeration						
Sensors & Controls	1.00	1	$/kWh	$0.15	15	126.3
Energy Information System	1.00	1	$/kWh	$0.64	15	29.0
Electric Supply System Improvements	1.00	1	$/kWh	$0.10	15	176.8
Improved Refrigeration	1.00	1	$/kWh	$0.03	15	589.4
Process Heating						
Sensors & Controls	1.00	1	$/kWh	$0.15	15	126.3
Energy Information System	1.00	1	$/kWh	$0.64	15	29.0
Electric Supply System Improvements	1.00	1	$/kWh	$0.10	15	176.8
Industrial Other						
High Efficiency Welders	761.00	1	per unit	$200.00	20	12.4
3 Phase High Eff Battery Charger	2595.00	1	per unit	$872.50	20	5.4
Barrel Insulation - Inj. Molding (plastics)	1210.00	1	per sq ft	$80.00	10	21.8
Pellet Dryer Insulation (plastics)	185.00	1	per ft	$40.00	10	9.9
Injection Molding Machine - efficient (plastics)	237.00	1	per ton capacity	$175.00	20	2.9
Fiber Laser Replacing CO2 laser (auto industry)	32562.00	1	per kw	$60,000.00	20	0.8
Agriculture						
Other Industrial -Low-Energy Livestock Waterer	1593.00	1	per waterer	$788.00	10	2.6
Other Industrial -Dairy Refrigerator Tune-Up	0.10	1	per lb of milk/day	$0.05	5	1.4
Greenhouse Environmental Controls	98.00	1	per 1000 SF	$125.00	15	1.5
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	190.00	1	er 1000 lbs of milk/da	$1,500.00	15	0.2
Variable Speed Drive withHeat Exchanger, Milk	0.58	1	er 1000 lbs of milk/da	$2.20	15	0.6
Milk Pre-Cooler Heat Exchanger	1.21	1	per lb milk/day	$0.30	15	11.8
Variable Speed Drives for Dairy Vacuum Pumps	598.00	1	per hp	$250.00	10	3.1
VFD for Process Fans - Agriculture	520.00	1	per hp	$200.00	15	20.0
VFD for Process Pumps - Agriculture	290.00	1	per hp	$200.00	15	11.1
VFD for Process Pumps - Irrigation	195.00	1	per hp	$200.00	10	5.6
Grain Storage Temperature and Moisture Management Controller	349.00	1	per hp	$233.00	15	2.8
Low Pressure Sprinkler Nozzles	5.00	1	per nozzle	$1.00	15	8.8
Fan Thermostat Controller	1586.00	1	per unit	$50.00	15	56.1

Consumers Energy Industrial Measure Database - Electric

Base Case Factor:
Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Computers and Office Equipment																				
Energy Star Compliant Single Door Refrigerator	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%
PC Network Energy Management Controls replacing no central control	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%
Energy Star UPS	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%
High Efficiency CRAC Unit	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%
Water Heating																				
Heat Pump Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Electric Tankless Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Efficient Hot Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Solar Storage Water Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
High Efficiency Electric Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
HVAC Condenser Heater Recovery Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Flow Faucet Aerator	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
Low Flow Showerhead	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hot Water (DHW) Pipe Insulation	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Tank Insulation (electric)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Drain Water Heat Recovery Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Circulator Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Cooling Condenser Heat Recovery	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Envelope																				
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cool Roofing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Duct Sealing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ventilation																				
Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Speed Drive Control, 15 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 5 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 40 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
High Speed Fans	3.3%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
High Volume Low Speed Fans	3.3%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Destratification Fan (HVLS)	3.3%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Cooling - Chillers																				
Air-Cooled Recip Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Side Economizer	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
VAV System Conversion	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Water-Cooled Centrifugal Chiller > 300 ton	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Motor Belt Replacement	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Chilled Hot Water Reset	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Water-Cooled Screw Chiller > 300 ton	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Chiller Tune Up	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%

Consumers Energy Industrial Measure Database - Electric

Base Case Factor:
Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Efficient Chilled Water Pump	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
High Efficiency Pumps	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
HVAC Controls																				
Programmable Thermostats	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS install	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS Optimization	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
HVAC Occupancy Sensors	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Zoning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Web Enabled EMS	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Cooling - Unitary and Split AC																				
AC 240K - 760 K	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Ductless (mini split) - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Ground Source Heat Pump - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Water Loop Heat Pump (WLHP) - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Air Source Heat Pump - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
DX Condenser Coil Cleaning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Room AC	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Lighting																				
Lamp & Ballast Retrofit (HPT8 Replacing T12)	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
T5 HP replacing T12	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%
Exterior HID replaced with LED	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Garage HID replacement with LED	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LED Exit Sign	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
LED High Bay Lighting	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
LED Low Bay Lighting	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Light Tube	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
High Intensity Fluorescent Fixture (replacing HID)	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
42W 8 lamp Hi Bay CFL	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
HID Fixture Upgrade - Pulse Start Metal Halide	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Interior Induction Lighting	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
CFL Fixture	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
CFL Screw-in	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
LED Screw In Replacing Incandescent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
LED Screw In Replacing CFL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CFL Reflector Flood	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
LED Downlight	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
LED Troffer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
LED Tube Lighting	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
LED Grow Light	10.0%	0.0%	0.0%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%
Interior Non-Highbay/Lowbay LED Fixtures	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Exterior HID Replaced with CFL	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Exterior Linear Fluorescent	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%

Consumers Energy Industrial Measure Database - Electric

Base Case Factor:
Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
LED Specialty replacing CFL	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
CFL Screw in Specialty	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
LED Specialty replacing incandescent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Illuminated Signs to LED	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Lighting Controls																				
Exterior Bi-level Controls	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Garage Bi-level Controls	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Daylight Sensor Controls	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%
Lighting Power Density- Exterior	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Lighting Power Density - Parking Garage	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Stairwell Bi-Level Control	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Occupancy Sensor	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%
Occupancy Sensor & Daylight Sensor	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%
Central Lighting Control	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%
Switching Controls for Multilevel Lighting (Non-HID)	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%
Lighting Power Density - Interior	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Long Day Lighting Dairy	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Space Heating																				
Air Source Heat Pump - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Ground Source Heat Pump - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Ductless (mini split) - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Loop Heat Pump (WLHP) - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
VFD Pump	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
ECM motors on furnaces	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Other																				
High Efficiency Transformer, single-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NEMA Premium Transformer, single-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NEMA Premium Transformer, three-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
High Efficiency Transformer, three-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Parking Garage Exhaust Fan CO Control	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Optimized Snow and Ice Melt Controls	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Engine Block Heater Timer	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Machine Drive																				
Sensors & Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Information System	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Advanced Efficient Motors	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Industrial Motor Management	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Advanced Lubricants	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Motor System Optimization (Including ASD)	43.0%	43.0%	46.0%	46.0%	59.8%	54.0%	26.9%	62.0%	14.8%	37.9%	41.2%	58.8%	50.8%	54.9%	55.8%	28.5%	28.5%	43.6%	54.8%	42.1%
Pump System Efficiency Improvements	23.2%	23.2%	23.0%	23.0%	0.0%	12.0%	33.1%	3.0%	59.4%	28.1%	34.0%	9.0%	8.7%	15.9%	15.5%	50.9%	50.9%	25.0%	1.0%	20.4%
Fan System Improvements	10.6%	10.6%	7.0%	7.0%	12.7%	8.0%	20.8%	7.0%	9.6%	12.0%	2.0%	5.0%	15.3%	3.0%	2.2%	1.0%	1.0%	8.0%	18.0%	14.5%
Compressed Air System Management	3.3%	3.3%	4.4%	4.4%	7.3%	2.5%	1.5%	2.2%	4.7%	9.1%	4.0%	7.8%	4.4%	7.5%	4.9%	22.7%	22.7%	5.7%	12.5%	4.9%
Compressed Air - Advanced Compressor Controls	10.9%	10.9%	14.3%	14.3%	24.0%	8.3%	4.8%	7.3%	15.3%	29.9%	13.0%	25.4%	14.3%	24.4%	15.9%	22.7%	22.7%	18.7%	12.5%	16.1%
VFD for Process Fans	8.5%	8.5%	5.6%	5.6%	10.2%	6.4%	16.6%	5.6%	7.7%	9.6%	1.6%	4.0%	12.2%	2.4%	1.8%	0.8%	0.8%	6.4%	14.4%	11.6%
VFD for Process Pumps	18.6%	18.6%	18.4%	18.4%	0.0%	9.6%	26.5%	2.4%	47.5%	22.5%	27.2%	7.2%	7.0%	12.7%	12.4%	40.7%	40.7%	20.0%	0.8%	16.3%
High Efficiency Pumps	23.2%	23.2%	23.0%	23.0%	0.0%	12.0%	33.1%	3.0%	59.4%	28.1%	34.0%	9.0%	8.7%	15.9%	15.5%	50.9%	50.9%	25.0%	1.0%	20.4%
Compressed Air Audits and Leak Repair	2.7%	2.7%	3.6%	3.6%	6.0%	2.1%	1.2%	1.8%	3.8%	7.5%	3.3%	6.4%	3.6%	6.1%	4.0%	0.0%	0.0%	4.7%	0.0%	4.0%

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Elec motors replacing pneumatic (comp air)	1.2%	1.2%	1.6%	1.6%	2.7%	0.9%	0.5%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	0.0%	0.0%	2.1%	0.0%	1.8%
Automatic Drains, High efficiency nozzles and other (comp air)	1.2%	1.2%	1.6%	1.6%	2.7%	0.9%	0.5%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	0.0%	0.0%	2.1%	0.0%	1.8%
Storage Tank Addition (comp air)	1.2%	1.2%	1.6%	1.6%	2.7%	0.9%	0.5%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	0.0%	0.0%	2.1%	0.0%	1.8%
High Efficiency Dryers (comp air)	1.2%	1.2%	1.6%	1.6%	2.7%	0.9%	0.5%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	0.0%	0.0%	2.1%	0.0%	1.8%
Process Cooling & Refrigeration																				
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Refrigeration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Heating																				
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Other																				
High Efficiency Welders	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	0.0%	0.0%	5.0%	0.0%	0.0%
3 Phase High Eff Battery Charger	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Barrel Insulation - Inj. Molding (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pellet Dryer Insulation (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Injection Molding Machine - efficient (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fiber Laser Replacing CO2 laser (auto industry)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	0.0%	5.0%	0.0%	0.0%
Agriculture																				
Other Industrial -Low-Energy Livestock Waterer	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Industrial -Dairy Refrigerator Tune-Up	33.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenhouse Environmental Controls	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	33.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drive withHeat Exchanger, Milk	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Pre-Cooler Heat Exchanger	33.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drives for Dairy Vacuum Pumps	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Fans - Agriculture	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Agriculture	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Irrigation	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grain Storage Temperature and Moisture Management Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Low Pressure Sprinkler Nozzles	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fan Thermostat Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Consumers Energy Industrial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Computers and Office Equipment																				
Energy Star Compliant Single Door Refrigerator	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
PC Network Energy Management Controls replacing no central control	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%
Energy Star UPS	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
High Efficiency CRAC Unit	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Water Heating																				
Heat Pump Water Heater	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%
Electric Tankless Water Heater	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Efficient Hot Water Pump	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%
Solar Storage Water Heating	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
High Efficiency Electric Water Heater	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
HVAC Condenser Heater Recovery Water Heating	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Low Flow Faucet Aerator	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%
Low Flow Showerhead	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Hot Water (DHW) Pipe Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Tank Insulation (electric)	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%
Drain Water Heat Recovery Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
ECM Circulator Pump	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Process Cooling Condenser Heat Recovery	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Building Envelope																				
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roofing	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Wall Insulation	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Roof Insulation	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Improved Duct Sealing	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Ventilation																				
Economizer	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Variable Speed Drive Control, 15 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 5 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 40 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
High Speed Fans	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
High Volume Low Speed Fans	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Destratification Fan (HVLS)	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Space Cooling - Chillers																				
Air-Cooled Recip Chiller	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Side Economizer	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
VAV System Conversion	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Water-Cooled Centrifugal Chiller > 300 ton	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%
Motor Belt Replacement	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Chilled Hot Water Reset	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water-Cooled Screw Chiller > 300 ton	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%

Consumers Energy Industrial Measure Database - Electric

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Chiller Tune Up	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Efficient Chilled Water Pump	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
High Efficiency Pumps	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%
HVAC Controls																				
Programmable Thermostats	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Zoning	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web Enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Retrocommissioning	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Space Cooling - Unitary and Split AC																				
AC 240K - 760 K	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Ductless (mini split) - Cooling	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
Ground Source Heat Pump - Cooling	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%
Water Loop Heat Pump (WLHP) - Cooling	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%
Air Source Heat Pump - Cooling	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
DX Condenser Coil Cleaning	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
Room AC	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%
Lighting																				
Lamp & Ballast Retrofit (HPT8 Replacing T12)	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
T5 HP replacing T12	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%
Exterior HID replaced with LED	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage HID replacement with LED	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
LED Exit Sign	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%
LED High Bay Lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
LED Low Bay Lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
Light Tube	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%
High Intensity Fluorescent Fixture (replacing HID)	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
42W 8 lamp Hi Bay CFL	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%
HID Fixture Upgrade - Pulse Start Metal Halide	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%
Interior Induction Lighting	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
CFL Fixture	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%
CFL Screw-in	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%
LED Screw In Replacing Incandescent	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%
LED Screw In Replacing CFL	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
CFL Reflector Flood	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%
LED Downlight	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%
LED Troffer	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
LED Tube Lighting	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%
LED Grow Light	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Interior Non-Highbay/Lowbay LED Fixtures	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%

Consumers Energy Industrial Measure Database - Electric

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Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Exterior HID Replaced with CFL	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%
Exterior Linear Fluorescent	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%
LED Specialty replacing CFL	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
CFL Screw in Specialty	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%
LED Specialty replacing incandescent	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%
Illuminated Signs to LED	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%
Lighting Controls																				
Exterior Bi-level Controls	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage Bi-level Controls	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%
Daylight Sensor Controls	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Lighting Power Density- Exterior	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Lighting Power Density - Parking Garage	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Stairwell Bi-Level Control	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%
Occupancy Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Occupancy Sensor & Daylight Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Central Lighting Control	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Switching Controls for Multilevel Lighting (Non-HID)	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Lighting Power Density - Interior	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Long Day Lighting Dairy	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Space Heating																				
Air Source Heat Pump - Heating	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Ground Source Heat Pump - Heating	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%
Ductless (mini split) - Heating	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
Water Loop Heat Pump (WLHP) - Heating	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
VFD Pump	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%
ECM motors on furnaces	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%
Other																				
High Efficiency Transformer, single-phase	2.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%
NEMA Premium Transformer, single-phase	2.5%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
NEMA Premium Transformer, three-phase	2.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%
High Efficiency Transformer, three-phase	2.5%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%
Parking Garage Exhaust Fan CO Control	48.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Optimized Snow and Ice Melt Controls	92.0%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%
Engine Block Heater Timer	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Machine Drive																				
Sensors & Controls	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Energy Information System	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Electric Supply System Improvements	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Advanced Efficient Motors	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Industrial Motor Management	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Advanced Lubricants	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Motor System Optimization (Including ASD)	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Pump System Efficiency Improvements	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%
Fan System Improvements	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Compressed Air System Management	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Compressed Air - Advanced Compressor Controls	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
VFD for Process Fans	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
VFD for Process Pumps	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%

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Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
High Efficiency Pumps	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Compressed Air Audits and Leak Repair	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Elec motors replacing pneumatic (comp air)	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Automatic Drains, High efficiency nozzles and other (comp air)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Storage Tank Addition (comp air)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
High Efficiency Dryers (comp air)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Process Cooling & Refrigeration																				
Sensors & Controls	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Energy Information System	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Electric Supply System Improvements	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Improved Refrigeration	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Process Heating																				
Sensors & Controls	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Energy Information System	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Electric Supply System Improvements	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Industrial Other																				
High Efficiency Welders	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
3 Phase High Eff Battery Charger	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Barrel Insulation - Inj. Molding (plastics)	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Pellet Dryer Insulation (plastics)	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Injection Molding Machine - efficient (plastics)	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
Fiber Laser Replacing CO2 laser (auto industry)	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%
Agriculture																				
Other Industrial -Low-Energy Livestock Waterer	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%
Other Industrial -Dairy Refrigerator Tune-Up	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Greenhouse Environmental Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
Variable Speed Drive withHeat Exchanger, Milk	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Milk Pre-Cooler Heat Exchanger	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Variable Speed Drives for Dairy Vacuum Pumps	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
VFD for Process Fans - Agriculture	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%
VFD for Process Pumps - Agriculture	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
VFD for Process Pumps - Irrigation	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Grain Storage Temperature and Moisture Management Controller	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%
Low Pressure Sprinkler Nozzles	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Fan Thermostat Controller	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%

Consumers Energy Industrial Measure Database - Electric

Remaining Factor:
Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure;
that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Computers and Office Equipment																				
Energy Star Compliant Single Door Refrigerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
PC Network Energy Management Controls replacing no central control	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Energy Star UPS	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
High Efficiency CRAC Unit	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
Water Heating																				
Heat Pump Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Tankless Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Hot Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Solar Storage Water Heating	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
High Efficiency Electric Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Condenser Heater Recovery Water Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Faucet Aerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Flow Showerhead	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Hot Water (DHW) Pipe Insulation	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Tank Insulation (electric)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Drain Water Heat Recovery Water Heater	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%
ECM Circulator Pump	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Process Cooling Condenser Heat Recovery	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Building Envelope																				
Integrated Building Design	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%
Energy Efficient Windows	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%	53.0%
Cool Roofing	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Ceiling Insulation	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Window Improvements	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Wall Insulation	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Roof Insulation	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%	69.0%
Improved Duct Sealing	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
Ventilation																				
Economizer	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%	97.0%
Variable Speed Drive Control, 15 HP	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Variable Speed Drive Control, 5 HP	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Variable Speed Drive Control, 40 HP	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
High Speed Fans	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Volume Low Speed Fans	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Destratification Fan (HVLS)	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Space Cooling - Chillers																				
Air-Cooled Recip Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Screw Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Side Economizer	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
VAV System Conversion	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Centrifugal Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Motor Belt Replacement	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Chilled Hot Water Reset	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Water-Cooled Screw Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chiller Tune Up	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%

Consumers Energy Industrial Measure Database - Electric

Remaining Factor:
Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure;
that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Efficient Chilled Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
High Efficiency Pumps	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
HVAC Controls																				
Programmable Thermostats	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
EMS install	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web Enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Unitary and Split AC																				
AC 240K - 760 K	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ductless (mini split) - Cooling	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Ground Source Heat Pump - Cooling	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Water Loop Heat Pump (WLHP) - Cooling	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Air Source Heat Pump - Cooling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
DX Condenser Coil Cleaning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Room AC	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Lighting																				
Lamp & Ballast Retrofit (HPT8 Replacing T12)	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%
T5 HP replacing T12	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%
Exterior HID replaced with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Exit Sign	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%	55.0%
LED High Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Low Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Light Tube	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%
High Intensity Fluorescent Fixture (replacing HID)	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
42W 8 lamp Hi Bay CFL	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
HID Fixture Upgrade - Pulse Start Metal Halide	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Interior Induction Lighting	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
CFL Fixture	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
CFL Screw-in	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Screw In Replacing Incandescent	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Screw In Replacing CFL	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%	58.0%
CFL Reflector Flood	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Downlight	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
LED Troffer	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
LED Tube Lighting	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
LED Grow Light	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Interior Non-Highbay/Lowbay LED Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID Replaced with CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior Linear Fluorescent	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%

Consumers Energy Industrial Measure Database - Electric

Remaining Factor:
Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure;
that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
LED Specialty replacing CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Specialty replacing incandescent	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Controls																				
Exterior Bi-level Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage Bi-level Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Daylight Sensor Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density- Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Stairwell Bi-Level Control	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Occupancy Sensor	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Occupancy Sensor & Daylight Sensor	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Central Lighting Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Switching Controls for Multilevel Lighting (Non-HID)	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Lighting Power Density - Interior	65.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Long Day Lighting Dairy	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Space Heating																				
Air Source Heat Pump - Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ground Source Heat Pump - Heating	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Ductless (mini split) - Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Water Loop Heat Pump (WLHP) - Heating	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
VFD Pump	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
ECM motors on furnaces	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Other																				
High Efficiency Transformer, single-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
NEMA Premium Transformer, single-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
NEMA Premium Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
High Efficiency Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Optimized Snow and Ice Melt Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Machine Drive																				
Sensors & Controls	71.0%	71.0%	72.0%	72.0%	72.0%	76.0%	64.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	77.0%	77.0%	81.0%	72.0%	72.0%
Energy Information System	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Electric Supply System Improvements	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Advanced Efficient Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Motor Management	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Advanced Lubricants	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Motor System Optimization (Including ASD)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Pump System Efficiency Improvements	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Fan System Improvements	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Compressed Air System Management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air - Advanced Compressor Controls	71.0%	71.0%	72.0%	72.0%	72.0%	76.0%	64.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	77.0%	77.0%	81.0%	72.0%	72.0%
VFD for Process Fans	71.0%	71.0%	72.0%	72.0%	72.0%	76.0%	64.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	77.0%	77.0%	81.0%	72.0%	72.0%
VFD for Process Pumps	71.0%	71.0%	72.0%	72.0%	72.0%	76.0%	64.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	77.0%	77.0%	81.0%	72.0%	72.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Audits and Leak Repair	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Industrial Measure Database - Electric

Remaining Factor:
Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure;
that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Elec motors replacing pneumatic (comp air)	71.0%	71.0%	72.0%	72.0%	72.0%	76.0%	64.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	77.0%	77.0%	81.0%	72.0%	72.0%
Automatic Drains, High efficiency nozzles and other (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Storage Tank Addition (comp air)	71.0%	71.0%	72.0%	72.0%	72.0%	76.0%	64.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	77.0%	77.0%	81.0%	72.0%	72.0%
High Efficiency Dryers (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Cooling & Refrigeration																				
Sensors & Controls	72.0%	72.0%	86.0%	86.0%	86.0%	78.0%	64.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	80.0%	80.0%	84.0%	86.0%	86.0%
Energy Information System	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Electric Supply System Improvements	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Improved Refrigeration	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Process Heating																				
Sensors & Controls	72.0%	72.0%	86.0%	86.0%	86.0%	78.0%	64.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	80.0%	80.0%	84.0%	86.0%	86.0%
Energy Information System	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Electric Supply System Improvements	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Industrial Other																				
High Efficiency Welders	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
3 Phase High Eff Battery Charger	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Barrel Insulation - Inj. Molding (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pellet Dryer Insulation (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Injection Molding Machine - efficient (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fiber Laser Replacing CO2 laser (auto industry)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%	0.0%	75.0%	0.0%	0.0%
Agriculture																				
Other Industrial -Low-Energy Livestock Waterer	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Industrial -Dairy Refrigerator Tune-Up	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenhouse Environmental Controls	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	70.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drive withHeat Exchanger, Milk	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Pre-Cooler Heat Exchanger	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drives for Dairy Vacuum Pumps	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Fans - Agriculture	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Agriculture	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Irrigation	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grain Storage Temperature and Moisture Management Controller	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Low Pressure Sprinkler Nozzles	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fan Thermostat Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Consumers Energy Industrial Measure Database - Electric

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

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Computers and Office Equipment																				
Energy Star Compliant Single Door Refrigerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
PC Network Energy Management Controls replacing no central control	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Energy Star UPS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency CRAC Unit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heating																				
Heat Pump Water Heater	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Electric Tankless Water Heater	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Efficient Hot Water Pump	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Solar Storage Water Heating	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
High Efficiency Electric Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Condenser Heater Recovery Water Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Faucet Aerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Flow Showerhead	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Hot Water (DHW) Pipe Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Tank Insulation (electric)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Drain Water Heat Recovery Water Heater	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
ECM Circulator Pump	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Process Cooling Condenser Heat Recovery	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Building Envelope																				
Integrated Building Design	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roofing	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Improved Duct Sealing	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Ventilation																				
Economizer	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Variable Speed Drive Control, 15 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Variable Speed Drive Control, 5 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Variable Speed Drive Control, 40 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
High Speed Fans	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
High Volume Low Speed Fans	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Destratification Fan (HVLS)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Space Cooling - Chillers																				
Air-Cooled Recip Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Screw Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Side Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VAV System Conversion	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Centrifugal Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Motor Belt Replacement	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Chilled Hot Water Reset	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Water-Cooled Screw Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chiller Tune Up	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Industrial Measure Database - Electric

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

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
Efficient Chilled Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Controls																				
Programmable Thermostats	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web Enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Unitary and Split AC																				
AC 240K - 760 K	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Ductless (mini split) - Cooling	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Ground Source Heat Pump - Cooling	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Loop Heat Pump (WLHP) - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Air Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
DX Condenser Coil Cleaning	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Room AC	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Lighting																				
Lamp & Ballast Retrofit (HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
T5 HP replacing T12	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replaced with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Exit Sign	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED High Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Low Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Light Tube	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Intensity Fluorescent Fixture (replacing HID)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
42W 8 lamp Hi Bay CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HID Fixture Upgrade - Pulse Start Metal Halide	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Induction Lighting	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
CFL Fixture	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
CFL Screw-in	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Screw In Replacing Incandescent	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Screw In Replacing CFL	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
CFL Reflector Flood	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
LED Downlight	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
LED Troffer	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
LED Tube Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Grow Light	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Non-Highbay/Lowbay LED Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID Replaced with CFL	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Exterior Linear Fluorescent	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%

Consumers Energy Industrial Measure Database - Electric

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

Measure Name	Food	Beverage	Textile Mills	Textile Mill Products	Apparel & Leather	Wood	Paper	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Computer & Electronics	Elec. Equip.	Trans. Equip.	Furniture	Misc.
LED Specialty replacing CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Specialty replacing incandescent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Controls																				
Exterior Bi-level Controls	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%
Garage Bi-level Controls	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Daylight Sensor Controls	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Lighting Power Density- Exterior	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Lighting Power Density - Parking Garage	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Stairwell Bi-Level Control	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Occupancy Sensor	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Occupancy Sensor & Daylight Sensor	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Central Lighting Control	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Switching Controls for Multilevel Lighting (Non-HID)	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Lighting Power Density - Interior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Long Day Lighting Dairy	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Heating																				
Air Source Heat Pump - Heating	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Ground Source Heat Pump - Heating	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ductless (mini split) - Heating	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Water Loop Heat Pump (WLHP) - Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD Pump	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ECM motors on furnaces	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Other																				
High Efficiency Transformer, single-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NEMA Premium Transformer, single-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
NEMA Premium Transformer, three-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Efficiency Transformer, three-phase	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Optimized Snow and Ice Melt Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Machine Drive																				
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Advanced Efficient Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Motor Management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Advanced Lubricants	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Motor System Optimization (Including ASD)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pump System Efficiency Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fan System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air System Management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air - Advanced Compressor Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Fans	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Audits and Leak Repair	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Consumers Energy Industrial Measure Database - Electric

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Elec motors replacing pneumatic (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Drains, High efficiency nozzles and other (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Storage Tank Addition (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Dryers (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Cooling & Refrigeration																				
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Refrigeration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Heating																				
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Other																				
High Efficiency Welders	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3 Phase High Eff Battery Charger	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Barrel Insulation - Inj. Molding (plastics)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pellet Dryer Insulation (plastics)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Injection Molding Machine - efficient (plastics)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fiber Laser Replacing CO2 laser (auto industry)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Agriculture																				
Other Industrial -Low-Energy Livestock Waterer	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Industrial -Dairy Refrigerator Tune-Up	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenhouse Environmental Controls	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drive withHeat Exchanger, Milk	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Pre-Cooler Heat Exchanger	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drives for Dairy Vacuum Pumps	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Fans - Agriculture	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Agriculture	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Irrigation	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grain Storage Temperature and Moisture Management Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Low Pressure Sprinkler Nozzles	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fan Thermostat Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Consumers Energy Industrial Measure Database - Electric

Electric Measure Sources

Source Number	Source
1	Michigan Master Database of Deemed Savings - 2013 - Non-Weather Sensitive Commercial
2	Michigan Master Database of Deemed Savings - 2013 - Weather Sensitive
3	Michigan Baseline 2011: Commercial Baseline Report
4	http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/appliance_calculator.xlsx
5	Big Ass Fan Company Calculations, http://www.todaysfacilitymanager.com/articles/the-hvac-factor-high-volume-low-speed-fans.php
6	2009 MPRP EE Potential Study - June 2009
7	Vermont TRM - Manual No. 2011-73b
8	Vermont Energy Efficiency Potential Study - January 2007
9	Natural Gas Energy Efficiency Potential in Massachusetts, Prepared for GasNetworks by GDS Associates, April 22, 2009
10	Energy Efficiency and Renewable Energy Resource Development Potential in New York State - Final Report, Volume 5 Energy Efficiency Technical Appendices, August 2003.
11	GDS Benefit Cost Model
12	Federal Energy Management Program (FEMP), Energy Cost Calculator for Electric and Gas Water Heaters
13	http://www.aceee.org/consumer/water-heating
14	GDS Associates estimate based upon review of various customer and vendor surveys, baseline studies and potential studies conducted by GDS in other states
15	GDS New Hampshire Potential Study
16	Efficiency Vermont Technical Reference User Manual (TRM) No. 2006-41
17	Efficiency Vermont Technical Reference User Manual (TRM) No. 2010-64
18	Efficiency Maine Commercial Technical Reference Manual No. 2007-01
19	Efficiency Maine Commercial Technical Reference Manual No. 2010-01
20	Refrigerant Heat Recovery System Learning Center Dining Facility, PG&E Food Services Technology Center, April 1993
21	http://apps1.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12430
22	http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13200
23	US DOE, EERE Consumer's Guide to Energy Efficiency and Renewable Energy, "Solar Swimming Pool Heaters" http://apps1.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13230
24	ES Analysis-ResDWH: ENERGY STAR® Residential Water Heaters: Final Criteria Analysis (www.energystar.gov). April 2008.
25	http://web.archive.org/web/20061006153904/http://www.energy.ca.gov/appliances/2003rulemaking/documents/case_studies/CASE_Portable_Spa.pdf
26	City of Keene NH, Cities for Climate Protection Campaign, Local Action Plan, February 19, 2004
27	EPA Energy Star Program
28	DC SEU Technical Reference Manual 2012-1.2
29	Maryland Baseline Study – Commercial and Industrial Sectors, ITRON, December 3, 2010
30	Delaware Statewide Commercial & Industrial End Use & Saturation Study - July 26, 2012
31	Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, GDS Associates, June 2004
32	Building Commissioning - A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions. Lawrence Berkeley National Laboratory. Report Prepared for: California Energy Commission Public Interest Energy Research (PIER) - July 21, 2009
33	DTE Non-Residential Potential Study - 2010. Cadmus
34	Efficiency Maine Commercial Technical Reference Manual - Version 2013.1, January 1, 2013, Efficiency Maine Trust
35	Mid-Atlantic Technical Reference Manual - Version 3.0, March, 2013, NEEP
36	MEMD Support Documentation - 2014 - Workbooks and Algorithms
37	ENERGY STAR Qualified Office Equipment Calculator
38	Energy Consumption by Commercial Office and Telecommunication Equipment, ACEEE August 18, 2002
39	epartment of Energy, Office of Industrial Technologies, United States Industrial Electric Motor Systems Market Opportunities, December
40	U.S. Department of Energy, Office of Industrial Technologies, Assessment of the Market for Compressed Air Efficiency Services, 2002.
41	Advancing Energy Efficeincy In Arkansas, ACEEE, March 2011, p. 173
42	GDS Maine Potential Study (GDS Engineering Estimates)
43	ergy Information Administration, Model Documentation Report: Industrial Demand Module of the National Energy Modeling System, Ma

Consumers Energy Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Computers & Office Equipment					
Energy Star Compliant Single Door Refrigerator	36	36	36	36	3
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	27	7	27	7	14
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	36	36	36	36	3
PC Network Energy Management Controls replacing no central control	36	36	36	36	3
Energy Star UPS	36	36	36	36	3
High Efficiency CRAC Unit	36	36	36	36	3
Ventilation					
Economizer	36	36	36	36	3
Variable Speed Drive Control, 15 HP	36	36	36	36	3
Variable Speed Drive Control, 5 HP	36	36	36	36	14
Variable Speed Drive Control, 40 HP	36	36	36	36	14
High Speed Fans	36	36	36	36	14
High Volume Low Speed Fans	36	36	36	36	3
Destratification Fan (HVLS)	36	36	36	36	14
Engineered CKV Hood	36	36	36	36	3
Building Envelope					
Integrated Building Design	14	14	14	14	14
Energy Efficient Windows	36	36	36	36	3
Cool Roofing	36	36	36	36	3
Ceiling Insulation	36	36	36	36	3
Window Improvements	36	36	36	36	3
Wall Insulation	36	36	36	36	3
Roof Insulation	36	36	36	36	3
Improved Duct Sealing	36	36	36	36	3
Water Heating					
Heat Pump Water Heater	36	36	36	36	36
Electric Tankless Water Heater	36	36	36	36	36
Efficient Hot Water Pump	36	36	36	36	36
Solar Storage Water Heating	36	36	36	36	36
High Efficiency Electric Water Heater	36	36	36	36	36
HVAC Condenser Heater Recovery Water Heating	36	36	36	36	36
Low Flow Faucet Aerator	36	36	36	36	36
Low Flow Showerhead	36	36	36	36	36
Hot Water (DHW) Pipe Insulation	36	36	36	36	36
Tank Insulation (electric)	36	36	36	36	36
Drain Water Heat Recovery Water Heater	7	7	7	7	14
ECM Circulator Pump	36	36	36	36	36
Process Cooling Condenser Heat Recovery	36	36	36	36	36
Space Cooling - Chillers					
Air-Cooled Recip Chiller	36	36	36	36	14

Consumers Energy Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Air-Cooled Screw Chiller	36	36	36	36	14
Water Side Economizer	36	36	36	36	14
VAV System Conversion	36	36	36	36	14
Water-Cooled Centrifugal Chiller > 300 ton	36	36	36	36	14
Motor Belt Replacement	36	36	36	36	14
Chilled Hot Water Reset	36	36	36	36	14
Water-Cooled Screw Chiller > 300 ton	36	36	36	36	14
Chiller Tune Up	36	36	36	36	14
Efficient Chilled Water Pump	36	36	36	36	14
High Efficiency Pumps	36	36	36	36	14
HVAC Controls					
Programmable Thermostats	2	2	2	8	3
EMS install	36	36	36	36	14
EMS Optimization	36	36	36	36	14
HVAC Occupancy Sensors	36	36	36	36	14
Zoning	2	2	2	14	3
Setback with Electric Heat	36	36	36	36	14
EMS Pump Scheduling	36	36	36	36	14
Web Enabled EMS	36	36	36	36	14
Retrocommissioning	2	2	2	14	3
Space Cooling - Unitary & Split AC					
AC 240K - 760 K	36	36	36	36	14
Ductless (mini split) - Cooling	36	36	36	36	3
Ground Source Heat Pump - Cooling	36	36	36	36	14
Water Loop Heat Pump (WLHP) - Cooling	36	36	36	36	14
Air Source Heat Pump - Cooling	36	36	36	36	14
DX Condenser Coil Cleaning	36	36	36	36	14
Room AC	36	36	36	36	14
Lighting					
Lamp & Ballast Retrofit (HPT8 Replacing T12)	36	36	36	36	3
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	36	36	36	36	3
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	36	36	36	36	3
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	36	36	36	36	3
T5 HP replacing T12	36	36	36	36	3
Exterior HID replaced with LED	36	36	36	36	3
Garage HID replacement with LED	36	36	36	36	14
LED Exit Sign	36	36	36	36	3
LED High Bay Lighting	36	36	36	36	14
LED Low Bay Lighting	36	36	36	36	14
Light Tube	36	36	36	36	3
High Intensity Fluorescent Fixture (replacing HID)	36	36	36	36	3
42W 8 lamp Hi Bay CFL	36	36	36	36	3

Consumers Energy Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
HID Fixture Upgrade - Pulse Start Metal Halide	36	36	36	36	3
Interior Induction Lighting	36	36	36	36	3
CFL Fixture	36	36	36	36	3
CFL Screw-in	36	36	36	36	3
LED Screw In Replacing Incandescent	36	36	36	36	3
LED Screw In Replacing CFL	36	36	36	36	14
CFL Reflector Flood	36	36	36	36	3
LED Downlight	36	36	36	36	3
LED Troffer	36	36	36	36	3
LED Tube Lighting	36	36	36	36	3
LED Grow Light	36	36	36	36	3
Interior Non-Highbay/Lowbay LED Fixtures	36	36	36	36	14
Exterior HID Replaced with CFL	36	36	36	36	14
Exterior Linear Fluorescent	36	36	36	36	3
LED Specialty replacing CFL	36	36	36	36	3
CFL Screw in Specialty	36	36	36	36	3
LED Specialty replacing incandescent	36	36	36	36	3
Illuminated Signs to LED	36	36	36	36	3
Lighting Controls					
Exterior Bi-level Controls	36	36	36	36	3
Garage Bi-level Controls	36	36	36	36	3
Daylight Sensor Controls	36	36	36	36	3
Lighting Power Density- Exterior	36	36	36	36	3
Lighting Power Density - Parking Garage	36	36	36	36	3
Stairwell Bi-Level Control	36	36	36	36	3
Occupancy Sensor	36	36	36	36	3
Occupancy Sensor & Daylight Sensor	36	36	36	36	3
Central Lighting Control	36	36	36	36	3
Switching Controls for Multilevel Lighting (Non-HID)	36	36	36	36	3
Lighting Power Density - Interior	36	36	36	36	3
Long Day Lighting Dairy	36	36	36	36	3
Space Heating					
Air Source Heat Pump - Heating	36	36	36	36	3
Ground Source Heat Pump - Heating	36	36	36	36	3
Ductless (mini split) - Heating	36	36	36	36	3
Water Loop Heat Pump (WLHP) - Heating	36	36	36	36	14
VFD Pump	36	36	36	36	3
ECM motors on furnaces	36	36	36	36	14
Other					
High Efficiency Transformer, single-phase	36	36	36	36	14
NEMA Premium Transformer, single-phase	36	36	36	36	3
NEMA Premium Transformer, three-phase	36	36	36	36	14
High Efficiency Transformer, three-phase	36	36	36	36	3
Parking Garage Exhaust Fan CO Control	36	36	36	36	14

Consumers Energy Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Optimized Snow and Ice Melt Controls	36	36	36	36	14
Engine Block Heater Timer	36	36	36	36	14
Machine Drive					
Sensors & Controls	41	41	41	41	43
Energy Information System	41	41	41	41	43
Electric Supply System Improvements	41	41	41	41	43
Advanced Efficient Motors	41	41	41	41	43
Industrial Motor Management	41	41	41	41	43
Advanced Lubricants	41	41	41	41	43
Motor System Optimization (Including ASD)	41	41	41	41	43
Pump System Efficiency Improvements	41	41	41	41	43
Fan System Improvements	41	41	41	41	43
Compressed Air System Management	41	41	41	41	43
Compressed Air - Advanced Compressor Controls	41	41	41	41	43
VFD for Process Fans	36	36	36	36,14	14
VFD for Process Pumps	36	36	36	36,14	14
High Efficiency Pumps	36	36	36	36,14	14
Compressed Air Audits and Leak Repair	36	36	36	36,14	14
Elec motors replacing pneumatic (comp air)	36	36	36	36,14	14
Automatic Drains, High efficiency nozzles and other (comp air)	36	36	36	36,14	14
Storage Tank Addition (comp air)	36	36	36	36,14	14
High Efficiency Dryers (comp air)	36	36	36	36,14	14
Process Cooling & Refrigeration					
Sensors & Controls	41	41	41	41	43
Energy Information System	41	41	41	41	43
Electric Supply System Improvements	41	41	41	41	43
Improved Refrigeration	41	41	41	41	43
Process Heating					
Sensors & Controls	41	41	41	41	43
Energy Information System	41	41	41	41	43
Electric Supply System Improvements	41	41	41	41	43
Industrial Other Process					
High Efficiency Welders	36	36	36	36,14	14
3 Phase High Eff Battery Charger	36	36	36	36,14	14
Barrel Insulation - Inj. Molding (plastics)	36	36	36	36,14	14
Pellet Dryer Insulation (plastics)	36	36	36	36,14	14
Injection Molding Machine - efficient (plastics)	36	36	36	36,14	14
Fiber Laser Replacing CO_2 laser (auto industry)	36	36	36	36,14	14
Agriculture					
Other Industrial -Low-Energy Livestock Waterer	36	36	36	36,14	14
Other Industrial -Dairy Refrigerator Tune-Up	36	36	36	36,14	14
Greenhouse Environmental Controls	36	36	36	36,14	14

Consumers Energy Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	36	36	36	36,14	14
Variable Speed Drive withHeat Exchanger, Milk	36	36	36	36,14	14
Milk Pre-Cooler Heat Exchanger	36	36	36	36,14	14
Variable Speed Drives for Dairy Vacuum Pumps	36	36	36	36,14	14
VFD for Process Fans - Agriculture	36	36	36	36,14	14
VFD for Process Pumps - Agriculture	36	36	36	36,14	14
VFD for Process Pumps - Irrigation	36	36	36	36,14	14
Grain Storage Temperature and Moisture Management Controller	36	36	36	36,14	14
Low Pressure Sprinkler Nozzles	36	36	36	36,14	14
Fan Thermostat Controller	36	36	36	36,14	14

DTE Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
Computers & Office Equipment						
Energy Star Compliant Single Door Refrigerator	47.80	2	Per Unit	$30.75	16	1.8
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	631.00	2	per set	$20.00	5	11.5
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	16.97	1	per unit	$40.00	5	0.2
PC Network Energy Management Controls replacing no central control	135.00	1	per PC	$17.00	4	2.3
Energy Star UPS	104.79	2	per kW	$1,303.35	10	0.1
High Efficiency CRAC Unit	162.33	1	MBH	$82.50	15	2.1
Water Heating						
Heat Pump Water Heater	184058.00	2	per heater	$10,600.00	15	20.0
Electric Tankless Water Heater	621.00	2	per heater	$466.00	20	1.7
Efficient Hot Water Pump	525.50	1	hp	$78.20	15	5.8
Pre-rinse sprayers (electric)	1396.00	1	each	$35.00	5	15.0
HVAC Condenser Heater Recovery Water Heating	3536.50	1	ton	$254.00	15	30.4
Low Flow Faucet Aerator	903.00	1	per unit	$2.50	10	275.5
Low Flow Showerhead	615.00	1	per unit	$25.00	10	18.3
Hot Water (DHW) Pipe Insulation	44.74	1	Linear Ft	$10.00	20	6.1
Tank Insulation (electric)	468.00	1	per square foot	$6.22	15	77.7
Drain Water Heat Recovery Water Heater	546.00	1	Per Unit	$631.00	25	1.2
ECM Circulator Pump	4949.40	1	per Motor	$2,266.67	15	2.4
Process Cooling Condenser Heat Recovery	5720.00	1	ton	$254.00	15	25.6
Building Envelope						
Integrated Building Design	322775.40	2	per Building	$75,580.52	30	8.3
Energy Efficient Windows	170.35	2	100SF	$272.96	25	0.9
Cool Roofing	51.25	2	1000 sq ft roof area	$332.44	20	0.1
Ceiling Insulation	65.50	1	1000 sq ft roof area	$47.16	30	2.7
Window Improvements	85.30	1	100 sq ft glazing	$286.16	15	0.4
Wall Insulation	364.80	1	1000 sq ft wall area	$4.57	30	130.5
Roof Insulation	22.10	1	1000 sq ft	$54.88	30	1.0
Improved Duct Sealing	37.60	2	ton	$107.91	18	0.6
Ventilation						
Economizer	136.60	2	ton	$122.55	13	0.8
Variable Speed Drive Control, 15 HP	19590.00	1	per Unit	$3,690.00	15	5.7
Variable Speed Drive Control, 5 HP	6530.00	1	Per Unit	$1,230.00	15	5.7
Variable Speed Drive Control, 40 HP	52240.00	1	Per Unit	$9,840.00	15	5.7
High Speed Fans	706.60	1	per fan	$675.00	7	0.8
High Volume Low Speed Fans	5859.90	1	per fan	$5,767.40	10	1.0
Destratification Fan (HVLS)	16.60	1	)00 sq ft cond floor are	$12.75	15	1.6
Space Cooling - Chillers						
Air-Cooled Recip Chiller	343.80	2	ton	$141.03	20	4.0
Air-Cooled Screw Chiller	344.80	2	ton	$143.92	20	3.9
Water Side Economizer	1047.50	2	ton	$50.00	15	18.3
VAV System Conversion	4945.40	1	)00 sq ft cond floor are	$1,395.76	20	3.7
Water-Cooled Centrifugal Chiller > 300 ton	209.70	2	ton	$27.30	20	11.7
Motor Belt Replacement	94.70	1	per HP	$21.33	14	5.0
Chilled Hot Water Reset	116.90	1	ton	$5.53	8	26.8
Water-Cooled Screw Chiller > 300 ton	207.60	2	ton	$27.15	20	12.2
Chiller Tune Up	141.70	1	ton	$5.66	5	14.5
Efficient Chilled Water Pump	772.20	1	per HP	$33.20	15	25.5

DTE Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
High Efficiency Pumps	201.40	1	per HP	$96.79	15	2.4
HVAC Controls						
Programmable Thermostats	77.00	1	)00 sq ft cond floor are	$59.00	9	0.8
EMS install	269.45	1	)00 sq ft cond floor are	$2.94	15	80.9
EMS Optimization	358.90	1	)00 sq ft cond floor are	$18.62	20	23.5
HVAC Occupancy Sensors	99.25	2	)00 sq ft cond floor are	$107.59	15	1.8
Zoning	187.35	2	)00 sq ft cond floor are	$500.00	15	0.6
Setback with Electric Heat	3451.55	2	each	$71.00	9	28.1
EMS Pump Scheduling	1524.40	2	pump Hp	$1.32	15	1298.3
Web Enabled EMS	670.75	2	)00 sq ft cond floor are	$19.10	15	23.1
Retrocommissioning	2.55	1	sq ft	$0.30	7	3.9
Space Cooling - Unitary and Split AC						
AC 240K - 760 K	51.60	2	ton	$118.39	15	1.1
Ductless (mini split) - Cooling	127.60	1	ton	$834.32	15	0.3
Ground Source Heat Pump - Cooling	2740.20	2	ton	$927.66	15	2.9
Water Loop Heat Pump (WLHP) - Cooling	7.12	2	ton	$5.02	15	3.9
Air Source Heat Pump - Cooling	75.70	2	ton	$131.25	15	1.2
DX Condenser Coil Cleaning	58.60	1	ton	$32.40	3	1.0
Room AC	158.00	2	per unit	$74.75	15	5.9
Lighting						
Lamp & Ballast Retrofit (HPT8 Replacing T12)	54.20	2	per fixture	$34.15	15	1.8
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	24.70	2	ıre, Replacing standa	$34.00	15	1.1
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	73.40	2	ıre, Replacing standar	$37.09	15	2.2
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	42.00	2	Replacing standard T	$37.09	15	1.3
T5 HP replacing T12	80.70	2	per fixture	$107.00	15	1.1
Exterior HID replaced with LED	519.47	2	per fixture	$753.67	12	0.5
Garage HID replacement with LED	1053.67	2	per fixture	$753.67	12	1.2
LED Exit Sign	201.00	2	per fixture	$25.00	15	8.3
LED High Bay Lighting	4160.00	2	kW saved	$2,900.00	16	1.8
LED Low Bay Lighting	2669.00	2	kW saved	$2,900.00	18	1.2
Light Tube	344.30	2	per fixture	$500.00	14	0.7
High Intensity Fluorescent Fixture (replacing HID)	4160.00	2	kW saved	$1,491.00	12	2.8
42W 8 lamp Hi Bay CFL	345.00	2	xture, Replacing 400V	$496.40	12	0.7
HID Fixture Upgrade - Pulse Start Metal Halide	768.50	2	per fixture	$223.63	13	3.7
Interior Induction Lighting	4.16	2	Watt Reduced	$1.53	16	3.4
CFL Fixture	157.50	2	per fixture	$45.00	12	3.4
CFL Screw-in	84.74	2	per lamp	$1.36	2	11.6
LED Screw In Replacing Incandescent	134.80	2	per lamp	$16.45	9	6.3
LED Screw In Replacing CFL	12.00	2	per lamp	$13.41	9	0.7
CFL Reflector Flood	133.50	2	per lamp	$6.00	2	4.1
LED Downlight	141.50	2	per fixture	$12.74	15	12.5
LED Troffer	32.33	2	per fixture	$125.00	18	0.4
LED Tube Lighting	53.86	2	per lamp	$35.00	18	2.0
LED Grow Light	4.38	2	per watt reduced	$1.53	11	2.7
Interior Non-Highbay/Lowbay LED Fixtures	2.67	2	per watt reduced	$2.90	18	1.2
Exterior HID Replaced with CFL	1021.43	2	per fixture	$596.67	12	1.3
Exterior Linear Fluorescent	4319.00	2	per kW reduced	$2,500.00	12	1.3
LED Specialty replacing CFL	16.13	2	per lamp	$10.17	9	1.2
CFL Screw in Specialty	132.80	2	per lamp	$4.58	2	5.4

DTE Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
LED Specialty replacing incandescent	80.55	2	per lamp	$12.79	9	4.8
Illuminated Signs to LED	5.71	2	per watt reduced	$4.00	10	1.1
Lighting Controls						
Exterior Bi-level Controls	530.53	2	per fixture	$444.33	10	0.8
Garage Bi-level Controls	927.49	2	per fixture	$632.00	11	1.4
Daylight Sensor Controls	10409.10	1	10,000 SF	$4,000.00	12	2.5
Lighting Power Density- Exterior	4319.00	2	per kW reduced	$220.00	12	14.6
Lighting Power Density - Parking Garage	8760.00	2	per kW reduced	$220.00	12	34.5
Stairwell Bi-Level Control	4809.00	2	per kW controlled	$825.00	9	4.0
Occupancy Sensor	504.43	2	per sensor	$226.47	10	1.5
Occupancy Sensor & Daylight Sensor	639.00	2	per sensor	$277.50	10	1.9
Central Lighting Control	8340.63	1	10,000 SF	$3,700.00	12	2.2
Switching Controls for Multilevel Lighting (Non-HID)	6000.00	1	10,000 SF	$4,000.00	12	1.5
Lighting Power Density - Interior	2669.00	2	per kW reduced	$220.00	15	13.7
Long Day Lighting Dairy	6.21	2	per watt controlled	$1.79	16	4.0
Space Heating						
Air Source Heat Pump - Heating	75.70	2	ton	$131.25	15	1.1
Ground Source Heat Pump - Heating	10960.80	2	ton	$3,710.66	15	2.6
Ductless (mini split) - Heating	127.60	1	ton	$834.32	15	0.3
Water Loop Heat Pump (WLHP) - Heating	28.48	2	ton	$20.09	15	1.9
VFD Pump	1708.90	1	per CHW pump hp	$212.29	10	5.4
ECM motors on furnaces	1034.00	1	per Furnace	$1,359.07	20	0.9
Other						
High Efficiency Transformer, single-phase	0.39	2	of additional efficienc	$0.46	30	1.4
NEMA Premium Transformer, single-phase	0.16	2	NEMA Premium effici	$0.24	30	1.6
NEMA Premium Transformer, three-phase	0.24	2	NEMA Premium effici	$0.18	30	1.5
High Efficiency Transformer, three-phase	0.44	2	of additional efficienc	$0.44	30	2.5
Parking Garage Exhaust Fan CO Control	2413.00	2	per HP	$900.00	15	4.7
Optimized Snow and Ice Melt Controls	0.12	1	SF	$15.15	15	0.0
Engine Block Heater Timer	576.00	2	per engine block	$50.00	5	13.1
Machine Drive						
Sensors & Controls	1.00	1	$/kWh	$0.15	15	6.5
Energy Information System	1.00	1	$/kWh	$0.64	15	1.5
Electric Supply System Improvements	1.00	1	$/kWh	$0.10	15	9.1
Advanced Efficient Motors	1.00	1	$/kWh	$0.49	25	2.7
Industrial Motor Management	1.00	1	$/kWh	$0.08	5	5.0
Advanced Lubricants	1.00	1	$/kWh	$0.00	1	8886.1
Motor System Optimization (Including ASD)	1.00	1	$/kWh	$0.10	15	9.8
Pump System Efficiency Improvements	1.00	1	$/kWh	$0.08	15	11.4
Fan System Improvements	1.00	1	$/kWh	$0.25	15	3.8
Compressed Air System Management	1.00	1	$/kWh	$0.00	1	8886.1
Compressed Air - Advanced Compressor Controls	1.00	1	$/kWh	$0.00	1	96413.7
VFD for Process Fans	707.00	1	per hp	$46.00	15	14.8
VFD for Process Pumps	1082.00	1	per hp	$94.00	15	11.1
High Efficiency Pumps	201.00	1	per hp	$31.00	15	6.3
Compressed Air Audits and Leak Repair	624.00	1	per cfm	$8.00	1	6.5
Elec motors replacing pneumatic (comp air)	1330.00	1	per hp	$25.00	10	38.2
Automatic Drains, High efficiency nozzles and other (comp air)	2097.00	1	per drain	$100.00	5	8.1
Storage Tank Addition (comp air)	423.00	1	per hp	$24.00	25	22.0
High Efficiency Dryers (comp air)	48.00	1	per hp	$10.00	15	4.6

DTE Industrial Measure Database - Electric

Measure Savings, Cost and Useful Life

DTE (Michigan)	Measure Assumption					
Measure Name	**Annual kWh Savings**	**Cost Type: 1=Full 2=Inc.**	**Cost/Unit Descriptor**	**Cost/Unit**	**Effective Measure Life**	**UCT**
Process Cooling & Refrigeration						
Sensors & Controls	1.00	1	$/kWh	$0.15	15	68.9
Energy Information System	1.00	1	$/kWh	$0.64	15	15.8
Electric Supply System Improvements	1.00	1	$/kWh	$0.10	15	96.4
Improved Refrigeration	1.00	1	$/kWh	$0.03	15	321.4
Process Heating						
Sensors & Controls	1.00	1	$/kWh	$0.15	15	68.9
Energy Information System	1.00	1	$/kWh	$0.64	15	15.8
Electric Supply System Improvements	1.00	1	$/kWh	$0.10	15	96.4
Industrial Other						
High Efficiency Welders	761.00	1	per unit	$200.00	20	10.9
3 Phase High Eff Battery Charger	2595.00	1	per unit	$872.50	20	4.5
Barrel Insulation - Inj. Molding (plastics)	1210.00	1	per sq ft	$80.00	10	18.8
Pellet Dryer Insulation (plastics)	185.00	1	per ft	$40.00	10	8.8
Injection Molding Machine - efficient (plastics)	223.00	1	per ton capacity	$125.00	20	3.4
Fiber Laser Replacing CO2 laser (auto industry)	32562.00	1	per unit	$60,000.00	20	0.9
Agriculture						
Other Industrial -Low-Energy Livestock Waterer	1593.00	1	per waterer	$788.00	10	2.6
Other Industrial -Dairy Refrigerator Tune-Up	0.10	1	per lb of milk/day	$0.05	5	0.6
Greenhouse Environmental Controls	98.00	1	per 1000 SF	$125.00	15	0.6
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	190.00	1	er 1000 lbs of milk/da	$1,500.00	15	0.1
Variable Speed Drive withHeat Exchanger, Milk	878.00	1	er 1000 lbs of milk/da	$2,725.00	15	0.3
Milk Pre-Cooler Heat Exchanger	1.00	1	per lb milk/day	$0.15	15	5.4
Variable Speed Drives for Dairy Vacuum Pumps	598.00	1	per hp	$250.00	10	1.4
VFD for Process Fans - Agriculture	520.00	1	per hp	$46.00	15	9.1
VFD for Process Pumps - Agriculture	290.00	1	per hp	$46.00	15	5.1
VFD for Process Pumps - Irrigation	195.00	1	per hp	$46.00	10	2.5
Grain Storage Temperature and Moisture Management Controller	349.00	1	per hp	$233.00	15	1.2
Low Pressure Sprinkler Nozzles	5.00	1	per nozzle	$1.00	15	4.1
Fan Thermostat Controller	1586.00	1	per fan	$50.00	15	25.7

DTE Industrial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Computers and Office Equipment													
Energy Star Compliant Single Door Refrigerator	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%
PC Network Energy Management Controls replacing no central control	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%
Energy Star UPS	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%
High Efficiency CRAC Unit	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%
Water Heating													
Heat Pump Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Electric Tankless Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Efficient Hot Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pre-rinse sprayers (electric)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
HVAC Condenser Heater Recovery Water Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Flow Faucet Aerator	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
Low Flow Showerhead	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hot Water (DHW) Pipe Insulation	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Tank Insulation (electric)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Drain Water Heat Recovery Water Heater	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
ECM Circulator Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Cooling Condenser Heat Recovery	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Building Envelope													
Integrated Building Design	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient Windows	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Cool Roofing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ceiling Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Window Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation													

DTE Industrial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Improved Duct Sealing	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ventilation													
Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Speed Drive Control, 15 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 5 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
Variable Speed Drive Control, 40 HP	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%
High Speed Fans	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
High Volume Low Speed Fans	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Destratification Fan (HVLS)	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Space Cooling - Chillers													
Air-Cooled Recip Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Side Economizer	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
VAV System Conversion	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Water-Cooled Centrifugal Chiller > 300 ton	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Motor Belt Replacement	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Chilled Hot Water Reset	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Water-Cooled Screw Chiller > 300 ton	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Chiller Tune Up	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Efficient Chilled Water Pump	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
High Efficiency Pumps	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
HVAC Controls													
Programmable Thermostats	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS install	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS Optimization	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
HVAC Occupancy Sensors	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Zoning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Web Enabled EMS	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Retrocommissioning	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Cooling - Unitary and Split AC													
AC 240K - 760 K	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Ductless (mini split) - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%

DTE Industrial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Ground Source Heat Pump - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Water Loop Heat Pump (WLHP) - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Air Source Heat Pump - Cooling	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
DX Condenser Coil Cleaning	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Room AC	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Lighting													
Lamp & Ballast Retrofit (HPT8 Replacing T12)	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%
T5 HP replacing T12	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%
Exterior HID replaced with LED	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Garage HID replacement with LED	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
LED Exit Sign	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
LED High Bay Lighting	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
LED Low Bay Lighting	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Light Tube	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%
High Intensity Fluorescent Fixture (replacing HID)	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
42W 8 lamp Hi Bay CFL	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
HID Fixture Upgrade - Pulse Start Metal Halide	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
Interior Induction Lighting	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%	11.3%
CFL Fixture	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
CFL Screw-in	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
LED Screw In Replacing Incandescent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
LED Screw In Replacing CFL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CFL Reflector Flood	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
LED Downlight	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
LED Troffer	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
LED Tube Lighting	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%	8.4%

DTE Industrial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
LED Grow Light	10.0%	0.0%	0.0%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%	16.8%
Interior Non-Highbay/Lowbay LED Fixtures	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Exterior HID Replaced with CFL	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Exterior Linear Fluorescent	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
LED Specialty replacing CFL	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
CFL Screw in Specialty	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
LED Specialty replacing incandescent	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Illuminated Signs to LED	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Lighting Controls													
Exterior Bi-level Controls	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Garage Bi-level Controls	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Daylight Sensor Controls	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%	73.7%
Lighting Power Density- Exterior	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Lighting Power Density - Parking Garage	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Stairwell Bi-Level Control	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Occupancy Sensor	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%
Occupancy Sensor & Daylight Sensor	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%
Central Lighting Control	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%	88.9%
Switching Controls for Multilevel Lighting (Non-HID)	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%
Lighting Power Density - Interior	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Long Day Lighting Dairy	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Space Heating													
Air Source Heat Pump - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Ground Source Heat Pump - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Ductless (mini split) - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Loop Heat Pump (WLHP) - Heating	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
VFD Pump	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
ECM motors on furnaces	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Other													
High Efficiency Transformer, single-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
NEMA Premium Transformer, single-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%

DTE Industrial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
NEMA Premium Transformer, three-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
High Efficiency Transformer, three-phase	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Parking Garage Exhaust Fan CO Control	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Optimized Snow and Ice Melt Controls	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Engine Block Heater Timer	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Machine Drive													
Sensors & Controls	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Energy Information System	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Advanced Efficient Motors	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Industrial Motor Management	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Advanced Lubricants	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Motor System Optimization (Including ASD)	43.0%	46.0%	54.0%	62.0%	14.8%	37.9%	41.2%	58.8%	50.8%	54.9%	55.8%	43.6%	42.1%
Pump System Efficiency Improvements	23.2%	23.0%	12.0%	3.0%	59.4%	28.1%	34.0%	9.0%	8.7%	15.9%	15.5%	25.0%	20.4%
Fan System Improvements	10.6%	7.0%	8.0%	7.0%	9.6%	12.0%	2.0%	5.0%	15.3%	3.0%	2.2%	8.0%	14.5%
Compressed Air System Management	3.3%	4.4%	2.5%	2.2%	4.7%	9.1%	4.0%	7.8%	4.4%	7.5%	4.9%	5.7%	4.9%
Compressed Air - Advanced Compressor Controls	10.9%	14.3%	8.3%	7.3%	15.3%	29.9%	13.0%	25.4%	14.3%	24.4%	15.9%	18.7%	16.1%
VFD for Process Fans	8.5%	5.6%	6.4%	5.6%	7.7%	9.6%	1.6%	4.0%	12.2%	2.4%	1.8%	6.4%	11.6%
VFD for Process Pumps	18.6%	18.4%	9.6%	2.4%	47.5%	22.5%	27.2%	7.2%	7.0%	12.7%	12.4%	20.0%	16.3%
High Efficiency Pumps	23.2%	23.0%	12.0%	3.0%	59.4%	28.1%	34.0%	9.0%	8.7%	15.9%	15.5%	25.0%	20.4%
Compressed Air Audits and Leak Repair	2.7%	3.6%	2.1%	1.8%	3.8%	7.5%	3.3%	6.4%	3.6%	6.1%	4.0%	4.7%	4.0%
Elec motors replacing pneumatic (comp air)	1.2%	1.6%	0.9%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	2.1%	1.8%
Automatic Drains, High efficiency nozzles and other (comp air)	1.2%	1.6%	0.9%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	2.1%	1.8%
Storage Tank Addition (comp air)	1.2%	1.6%	0.9%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	2.1%	1.8%
High Efficiency Dryers (comp air)	1.2%	1.6%	0.9%	0.8%	1.7%	3.3%	1.4%	2.8%	1.6%	2.7%	1.8%	2.1%	1.8%
Process Cooling & Refrigeration													
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Refrigeration	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%

DTE Industrial Measure Database - Electric

Base Case Factor:

Is the fraction of the end use energy that is applicable for the efficient technology in a given market segment. For example, for fluorescent lighting, this would be the fraction of all lighting kWh in a given market segment that is associated with fluorescent fixtures.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Process Heating													
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Other													
High Efficiency Welders	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3 Phase High Eff Battery Charger	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Barrel Insulation - Inj. Molding (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pellet Dryer Insulation (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Injection Molding Machine - efficient (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fiber Laser Replacing CO_2 laser (auto industry)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%
Agriculture													
Other Industrial -Low-Energy Livestock Waterer	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Industrial -Dairy Refrigerator Tune-Up	33.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenhouse Environmental Controls	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	33.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drive withHeat Exchanger, Milk	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Pre-Cooler Heat Exchanger	33.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drives for Dairy Vacuum Pumps	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Fans - Agriculture	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Agriculture	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Irrigation	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grain Storage Temperature and Moisture Management Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Low Pressure Sprinkler Nozzles	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fan Thermostat Controller	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

DTE Industrial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Computers and Office Equipment													
Energy Star Compliant Single Door Refrigerator	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%	24.3%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
PC Network Energy Management Controls replacing no central control	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%
Energy Star UPS	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
High Efficiency CRAC Unit	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Water Heating													
Heat Pump Water Heater	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%	30.7%
Electric Tankless Water Heater	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Efficient Hot Water Pump	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%	20.5%
Pre-rinse sprayers (electric)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
HVAC Condenser Heater Recovery Water Heating	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Low Flow Faucet Aerator	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%	65.9%
Low Flow Showerhead	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Hot Water (DHW) Pipe Insulation	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Tank Insulation (electric)	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%	91.0%
Drain Water Heat Recovery Water Heater	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
ECM Circulator Pump	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Process Cooling Condenser Heat Recovery	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Building Envelope													
Integrated Building Design	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Energy Efficient Windows	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%	13.9%
Cool Roofing	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Ceiling Insulation	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Window Improvements	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Wall Insulation	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Roof Insulation	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Improved Duct Sealing	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%

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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Ventilation													
Economizer	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Variable Speed Drive Control, 15 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 5 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Variable Speed Drive Control, 40 HP	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
High Speed Fans	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
High Volume Low Speed Fans	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Destratification Fan (HVLS)	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Space Cooling - Chillers													
Air-Cooled Recip Chiller	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%	24.6%
Air-Cooled Screw Chiller	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Side Economizer	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
VAV System Conversion	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Water-Cooled Centrifugal Chiller > 300 ton	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%	29.6%
Motor Belt Replacement	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Chilled Hot Water Reset	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water-Cooled Screw Chiller > 300 ton	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%
Chiller Tune Up	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Efficient Chilled Water Pump	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
High Efficiency Pumps	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%	9.9%
HVAC Controls													
Programmable Thermostats	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
EMS install	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Optimization	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
HVAC Occupancy Sensors	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Zoning	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Setback with Electric Heat	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EMS Pump Scheduling	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Web Enabled EMS	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Retrocommissioning	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Space Cooling - Unitary and Split AC											1		
AC 240K - 760 K	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Ductless (mini split) - Cooling	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
Ground Source Heat Pump - Cooling	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%	40.8%
Water Loop Heat Pump (WLHP) - Cooling	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%

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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Air Source Heat Pump - Cooling	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%	15.4%
DX Condenser Coil Cleaning	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%
Room AC	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%
Lighting													
Lamp & Ballast Retrofit (HPT8 Replacing T12)	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%	25.3%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%	33.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
T5 HP replacing T12	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%	32.4%
Exterior HID replaced with LED	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage HID replacement with LED	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
LED Exit Sign	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%	83.3%
LED High Bay Lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
LED Low Bay Lighting	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%	45.7%
Light Tube	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%	44.6%
High Intensity Fluorescent Fixture (replacing HID)	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%	53.8%
42W 8 lamp Hi Bay CFL	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%	18.2%
HID Fixture Upgrade - Pulse Start Metal Halide	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%	21.2%
Interior Induction Lighting	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
CFL Fixture	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%	64.5%
CFL Screw-in	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%	68.6%
LED Screw In Replacing Incandescent	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%	78.4%
LED Screw In Replacing CFL	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
CFL Reflector Flood	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%	71.4%
LED Downlight	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%	66.2%
LED Troffer	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%	22.0%
LED Tube Lighting	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%	46.1%
LED Grow Light	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Interior Non-Highbay/Lowbay LED Fixtures	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%	42.9%
Exterior HID Replaced with CFL	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%	78.8%

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Exterior Linear Fluorescent	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%	51.4%
LED Specialty replacing CFL	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%	47.3%
CFL Screw in Specialty	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%	72.5%
LED Specialty replacing incandescent	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%	86.2%
Illuminated Signs to LED	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%
Lighting Controls													
Exterior Bi-level Controls	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Garage Bi-level Controls	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%	28.5%
Daylight Sensor Controls	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Lighting Power Density- Exterior	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Lighting Power Density - Parking Garage	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Stairwell Bi-Level Control	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%
Occupancy Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Occupancy Sensor & Daylight Sensor	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Central Lighting Control	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Switching Controls for Multilevel Lighting (Non-HID)	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Lighting Power Density - Interior	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Long Day Lighting Dairy	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Space Heating													
Air Source Heat Pump - Heating	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Ground Source Heat Pump - Heating	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%	40.9%
Ductless (mini split) - Heating	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%	61.5%
Water Loop Heat Pump (WLHP) - Heating	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
VFD Pump	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%	38.4%
ECM motors on furnaces	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%	26.1%
Other													
High Efficiency Transformer, single-phase	2.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%	33.5%
NEMA Premium Transformer, single-phase	2.5%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
NEMA Premium Transformer, three-phase	2.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%	36.5%
High Efficiency Transformer, three-phase	2.5%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%	31.4%
Parking Garage Exhaust Fan CO Control	48.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Optimized Snow and Ice Melt Controls	92.0%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%	91.8%

DTE Industrial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Engine Block Heater Timer	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%	64.0%
Machine Drive													
Sensors & Controls	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Energy Information System	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Electric Supply System Improvements	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Advanced Efficient Motors	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%
Industrial Motor Management	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Advanced Lubricants	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
Motor System Optimization (Including ASD)	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%	19.0%
Pump System Efficiency Improvements	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%	16.4%
Fan System Improvements	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Compressed Air System Management	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Compressed Air - Advanced Compressor Controls	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
VFD for Process Fans	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
VFD for Process Pumps	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%
High Efficiency Pumps	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%	7.4%
Compressed Air Audits and Leak Repair	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Elec motors replacing pneumatic (comp air)	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Automatic Drains, High efficiency nozzles and other (comp air)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Storage Tank Addition (comp air)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
High Efficiency Dryers (comp air)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Process Cooling & Refrigeration													
Sensors & Controls	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Energy Information System	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Electric Supply System Improvements	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Improved Refrigeration	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Process Heating													
Sensors & Controls	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Energy Information System	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Electric Supply System Improvements	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Industrial Other													
High Efficiency Welders	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%

DTE Industrial Measure Database - Electric

Savings Factor:
Is the percentage reduction in electricity or gas consumption resulting from application of the efficient technology.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
3 Phase High Eff Battery Charger	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Barrel Insulation - Inj. Molding (plastics)	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%	18.0%
Pellet Dryer Insulation (plastics)	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%	17.0%
Injection Molding Machine - efficient (plastics)	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
Fiber Laser Replacing CO2 laser (auto industry)	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%	78.0%
Agriculture													
Other Industrial -Low-Energy Livestock Waterer	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%	47.7%
Other Industrial -Dairy Refrigerator Tune-Up	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Greenhouse Environmental Controls	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%	10.5%
Variable Speed Drive withHeat Exchanger, Milk	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Milk Pre-Cooler Heat Exchanger	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Variable Speed Drives for Dairy Vacuum Pumps	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%	34.8%
VFD for Process Fans - Agriculture	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%
VFD for Process Pumps - Agriculture	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
VFD for Process Pumps - Irrigation	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Grain Storage Temperature and Moisture Management Controller	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%
Low Pressure Sprinkler Nozzles	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Fan Thermostat Controller	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%	53.4%

DTE Industrial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Computers and Office Equipment													
Energy Star Compliant Single Door Refrigerator	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
PC Network Energy Management Controls replacing no central control	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Energy Star UPS	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
High Efficiency CRAC Unit	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%	61.0%
Water Heating													
Heat Pump Water Heater	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%
Electric Tankless Water Heater	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%
Efficient Hot Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Pre-rinse sprayers (electric)	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%	84.0%
HVAC Condenser Heater Recovery Water Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Faucet Aerator	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%	41.1%
Low Flow Showerhead	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Hot Water (DHW) Pipe Insulation	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Tank Insulation (electric)	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Drain Water Heat Recovery Water Heater	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%	94.1%
ECM Circulator Pump	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Process Cooling Condenser Heat Recovery	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Building Envelope													
Integrated Building Design	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%
Energy Efficient Windows	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%	29.0%
Cool Roofing	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Ceiling Insulation	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Window Improvements	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%	54.0%
Wall Insulation	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Roof Insulation	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Improved Duct Sealing	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%	51.0%
Ventilation													
Economizer	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Variable Speed Drive Control, 15 HP	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Variable Speed Drive Control, 5 HP	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%

DTE Industrial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Variable Speed Drive Control, 40 HP	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
High Speed Fans	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
High Volume Low Speed Fans	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Destratification Fan (HVLS)	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
Space Cooling - Chillers													
Air-Cooled Recip Chiller	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Air-Cooled Screw Chiller	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water Side Economizer	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
VAV System Conversion	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Centrifugal Chiller > 300 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Motor Belt Replacement	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Chilled Hot Water Reset	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Water-Cooled Screw Chiller > 300 ton	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Chiller Tune Up	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Efficient Chilled Water Pump	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
High Efficiency Pumps	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
HVAC Controls													
Programmable Thermostats	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
EMS install	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS Optimization	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
HVAC Occupancy Sensors	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Zoning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Setback with Electric Heat	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
EMS Pump Scheduling	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Web Enabled EMS	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Retrocommissioning	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%	82.0%
Space Cooling - Unitary and Split AC												1	
AC 240K - 760 K	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Ductless (mini split) - Cooling	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%	54.9%
Ground Source Heat Pump - Cooling	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Water Loop Heat Pump (WLHP) - Cooling	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%	70.0%
Air Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
DX Condenser Coil Cleaning	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Room AC	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Lighting													
Lamp & Ballast Retrofit (HPT8 Replacing T12)	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%

DTE Industrial Measure Database - Electric

Remaining Factor:

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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%
T5 HP replacing T12	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%
Exterior HID replaced with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Exit Sign	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
LED High Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Low Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Light Tube	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%	98.7%
High Intensity Fluorescent Fixture (replacing HID)	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
42W 8 lamp Hi Bay CFL	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
HID Fixture Upgrade - Pulse Start Metal Halide	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Interior Induction Lighting	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
CFL Fixture	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
CFL Screw-in	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Screw In Replacing Incandescent	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Screw In Replacing CFL	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CFL Reflector Flood	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Downlight	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Troffer	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Tube Lighting	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%	82.8%
LED Grow Light	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Interior Non-Highbay/Lowbay LED Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID Replaced with CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior Linear Fluorescent	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Specialty replacing CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
LED Specialty replacing incandescent	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%	86.5%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Controls													
Exterior Bi-level Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage Bi-level Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Daylight Sensor Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density- Exterior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Power Density - Parking Garage	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%

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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Stairwell Bi-Level Control	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%	89.0%
Occupancy Sensor	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Occupancy Sensor & Daylight Sensor	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Central Lighting Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Switching Controls for Multilevel Lighting (Non-HID)	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Lighting Power Density - Interior	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%	65.8%
Long Day Lighting Dairy	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Space Heating													
Air Source Heat Pump - Heating	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Ground Source Heat Pump - Heating	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%
Ductless (mini split) - Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Water Loop Heat Pump (WLHP) - Heating	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
VFD Pump	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
ECM motors on furnaces	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%	47.0%
Other													
High Efficiency Transformer, single-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NEMA Premium Transformer, single-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
NEMA Premium Transformer, three-phase	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%	98.0%
High Efficiency Transformer, three-phase	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Optimized Snow and Ice Melt Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Machine Drive													
Sensors & Controls	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Energy Information System	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Electric Supply System Improvements	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Advanced Efficient Motors	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Industrial Motor Management	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Advanced Lubricants	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Motor System Optimization (Including ASD)	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Pump System Efficiency Improvements	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Fan System Improvements	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Compressed Air System Management	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Compressed Air - Advanced Compressor Controls	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%

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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
VFD for Process Fans	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
VFD for Process Pumps	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
High Efficiency Pumps	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Compressed Air Audits and Leak Repair	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Elec motors replacing pneumatic (comp air)	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Automatic Drains, High efficiency nozzles and other (comp air)	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Storage Tank Addition (comp air)	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
High Efficiency Dryers (comp air)	71.0%	72.0%	76.0%	64.0%	72.0%	72.0%	80.0%	83.0%	74.0%	74.0%	76.0%	81.0%	72.0%
Process Cooling & Refrigeration													
Sensors & Controls	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Energy Information System	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Electric Supply System Improvements	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Improved Refrigeration	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Process Heating													
Sensors & Controls	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Energy Information System	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Electric Supply System Improvements	72.0%	86.0%	78.0%	64.0%	86.0%	86.0%	82.0%	83.0%	76.0%	76.0%	78.0%	84.0%	86.0%
Industrial Other													
High Efficiency Welders	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
3 Phase High Eff Battery Charger	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Barrel Insulation - Inj. Molding (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pellet Dryer Insulation (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Injection Molding Machine - efficient (plastics)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fiber Laser Replacing CO2 laser (auto industry)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%
Agriculture													
Other Industrial -Low-Energy Livestock Waterer	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Industrial -Dairy Refrigerator Tune-Up	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Greenhouse Environmental Controls	50.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	70.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Variable Speed Drive withHeat Exchanger, Milk	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Milk Pre-Cooler Heat Exchanger	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

DTE Industrial Measure Database - Electric

Remaining Factor:

Is the fraction of applicable kWh or therm sales that are associated with equipment that has not yet been converted to the energy efficiency measure; that is, one minus the fraction of the market segment that already have the energy-efficiency measure installed.

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Variable Speed Drives for Dairy Vacuum Pumps	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Fans - Agriculture	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Agriculture	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
VFD for Process Pumps - Irrigation	71.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grain Storage Temperature and Moisture Management Controller	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Low Pressure Sprinkler Nozzles	80.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fan Thermostat Controller	70.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

DTE Industrial Measure Database - Electric

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

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Computers and Office Equipment													
Energy Star Compliant Single Door Refrigerator	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
PC Network Energy Management Controls replacing no central control	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Energy Star UPS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency CRAC Unit	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Heating													
Heat Pump Water Heater	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
Electric Tankless Water Heater	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Efficient Hot Water Pump	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Pre-rinse sprayers (electric)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
HVAC Condenser Heater Recovery Water Heating	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Faucet Aerator	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Low Flow Showerhead	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Hot Water (DHW) Pipe Insulation	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Tank Insulation (electric)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Drain Water Heat Recovery Water Heater	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%	39.0%
ECM Circulator Pump	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Process Cooling Condenser Heat Recovery	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Building Envelope													
Integrated Building Design	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Energy Efficient Windows	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Cool Roofing	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ceiling Insulation	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%	57.0%
Window Improvements	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%	14.0%
Wall Insulation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Roof Insulation	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Improved Duct Sealing	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%	43.0%
Ventilation													
Economizer	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%	86.0%
Variable Speed Drive Control, 15 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
Variable Speed Drive Control, 5 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%

DTE Industrial Measure Database - Electric

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

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Variable Speed Drive Control, 40 HP	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%	92.0%
High Speed Fans	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
High Volume Low Speed Fans	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Destratification Fan (HVLS)	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%
Space Cooling - Chillers													
Air-Cooled Recip Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Air-Cooled Screw Chiller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water Side Economizer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VAV System Conversion	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Water-Cooled Centrifugal Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Motor Belt Replacement	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
Chilled Hot Water Reset	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Water-Cooled Screw Chiller > 300 ton	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chiller Tune Up	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Efficient Chilled Water Pump	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Controls													
Programmable Thermostats	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS install	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Optimization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HVAC Occupancy Sensors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Zoning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Setback with Electric Heat	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
EMS Pump Scheduling	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Web Enabled EMS	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Retrocommissioning	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Space Cooling - Unitary and Split AC													
AC 240K - 760 K	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Ductless (mini split) - Cooling	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Ground Source Heat Pump - Cooling	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Water Loop Heat Pump (WLHP) - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Air Source Heat Pump - Cooling	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
DX Condenser Coil Cleaning	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Room AC	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Lighting													
Lamp & Ballast Retrofit (HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Industrial Measure Database - Electric

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

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
T5 HP replacing T12	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID replaced with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Garage HID replacement with LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Exit Sign	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED High Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Low Bay Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Light Tube	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Intensity Fluorescent Fixture (replacing HID)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
42W 8 lamp Hi Bay CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
HID Fixture Upgrade - Pulse Start Metal Halide	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Induction Lighting	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
CFL Fixture	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
CFL Screw-in	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Screw In Replacing Incandescent	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Screw In Replacing CFL	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
CFL Reflector Flood	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
LED Downlight	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
LED Troffer	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
LED Tube Lighting	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
LED Grow Light	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Interior Non-Highbay/Lowbay LED Fixtures	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Exterior HID Replaced with CFL	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Exterior Linear Fluorescent	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Specialty replacing CFL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
CFL Screw in Specialty	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%
LED Specialty replacing incandescent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Illuminated Signs to LED	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Lighting Controls													
Exterior Bi-level Controls	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%	73.0%
Garage Bi-level Controls	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Daylight Sensor Controls	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Lighting Power Density- Exterior	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Lighting Power Density - Parking Garage	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%

DTE Industrial Measure Database - Electric

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

Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
Stairwell Bi-Level Control	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Occupancy Sensor	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Occupancy Sensor & Daylight Sensor	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Central Lighting Control	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Switching Controls for Multilevel Lighting (Non-HID)	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
Lighting Power Density - Interior	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Long Day Lighting Dairy	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Space Heating													
Air Source Heat Pump - Heating	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%	67.0%
Ground Source Heat Pump - Heating	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%
Ductless (mini split) - Heating	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%
Water Loop Heat Pump (WLHP) - Heating	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD Pump	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
ECM motors on furnaces	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Other													
High Efficiency Transformer, single-phase	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NEMA Premium Transformer, single-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
NEMA Premium Transformer, three-phase	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%
High Efficiency Transformer, three-phase	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%	99.0%
Parking Garage Exhaust Fan CO Control	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Optimized Snow and Ice Melt Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Engine Block Heater Timer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Machine Drive													
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Advanced Efficient Motors	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Motor Management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Advanced Lubricants	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Motor System Optimization (Including ASD)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pump System Efficiency Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fan System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air System Management	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air - Advanced Compressor Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Industrial Measure Database - Electric

Convertible Factor:
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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
VFD for Process Fans	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compressed Air Audits and Leak Repair	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Elec motors replacing pneumatic (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Automatic Drains, High efficiency nozzles and other (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Storage Tank Addition (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
High Efficiency Dryers (comp air)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Cooling & Refrigeration													
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Improved Refrigeration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Process Heating													
Sensors & Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Energy Information System	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Electric Supply System Improvements	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Industrial Other													
High Efficiency Welders	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
3 Phase High Eff Battery Charger	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Barrel Insulation - Inj. Molding (plastics)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pellet Dryer Insulation (plastics)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Injection Molding Machine - efficient (plastics)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fiber Laser Replacing CO_2 laser (auto industry)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Agriculture													
Other Industrial -Low-Energy Livestock Waterer	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Other Industrial -Dairy Refrigerator Tune-Up	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Greenhouse Environmental Controls	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Speed Drive withHeat Exchanger, Milk	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Milk Pre-Cooler Heat Exchanger	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Variable Speed Drives for Dairy Vacuum Pumps	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

DTE Industrial Measure Database - Electric

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Measure Name	Food	Textile Mill Products	Wood	Printing	Petroleum	Chemicals	Plastics & Rubber	Nonmetallic Mineral	Primary Metals	Fabricated Metals	Machinery	Auto. Mfg.	Misc.
VFD for Process Fans - Agriculture	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Pumps - Agriculture	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
VFD for Process Pumps - Irrigation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Grain Storage Temperature and Moisture Management Controller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Low Pressure Sprinkler Nozzles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Fan Thermostat Controller	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Michigan Industrial Measure Database - Electric

Electric Measure Sources

Source Number	Source
1	Michigan Master Database of Deemed Savings - 2013 - Non-Weather Sensitive Commercial
2	Michigan Master Database of Deemed Savings - 2013 - Weather Sensitive
3	Michigan Baseline 2011: Commercial Baseline Report
4	http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/appliance_calculator.xlsx
5	Big Ass Fan Company Calculations, http://www.todaysfacilitymanager.com/articles/the-hvac-factor-high-volume-low-speed-fans.php
6	2009 MPRP EE Potential Study - June 2009
7	Vermont TRM - Manual No. 2011-73b
8	Vermont Energy Efficiency Potential Study - January 2007
9	Natural Gas Energy Efficiency Potential in Massachusetts, Prepared for GasNetworks by GDS Associates, April 22, 2009
10	Energy Efficiency and Renewable Energy Resource Development Potential in New York State - Final Report, Volume 5 Energy Efficiency Technical Appendices, August 2003.
11	GDS Benefit Cost Model
12	Federal Energy Management Program (FEMP), Energy Cost Calculator for Electric and Gas Water Heaters
13	http://www.aceee.org/consumer/water-heating
14	GDS Associates estimate based upon review of various customer and vendor surveys, baseline studies and potential studies conducted by GDS in other states
15	GDS New Hampshire Potential Study
16	Efficiency Vermont Technical Reference User Manual (TRM) No. 2006-41
17	Efficiency Vermont Technical Reference User Manual (TRM) No. 2010-64
18	Efficiency Maine Commercial Technical Reference Manual No. 2007-01
19	Efficiency Maine Commercial Technical Reference Manual No. 2010-01
20	Refrigerant Heat Recovery System Learning Center Dining Facility, PG&E Food Services Technology Center, April 1993
21	http://apps1.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12430
22	http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13200
23	US DOE, EERE Consumer's Guide to Energy Efficiency and Renewable Energy, "Solar Swimming Pool Heaters" http://apps1.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13230
24	ES Analysis-ResDWH: ENERGY STAR® Residential Water Heaters: Final Criteria Analysis (www.energystar.gov). April 2008.
25	http://web.archive.org/web/20061006153904/http://www.energy.ca.gov/appliances/2003rulemaking/documents/case_studies/CASE_Portable_Spa.pdf
26	City of Keene NH, Cities for Climate Protection Campaign, Local Action Plan, February 19, 2004
27	EPA Energy Star Program
28	DC SEU Technical Reference Manual 2012-1.2
29	Maryland Baseline Study – Commercial and Industrial Sectors, ITRON, December 3, 2010
30	Delaware Statewide Commercial & Industrial End Use & Saturation Study - July 26, 2012
31	Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, GDS Associates, June 2004
32	Building Commissioning - A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions. Lawrence Berkeley National Laboratory. Report Prepared for: California Energy Commission Public Interest Energy Research (PIER) - July 21, 2009
33	DTE Non-Residential Potential Study - 2010. Cadmus
34	Efficiency Maine Commercial Technical Reference Manual - Version 2013.1, January 1, 2013, Efficiency Maine Trust
35	Mid-Atlantic Technical Reference Manual - Version 3.0, March, 2013, NEEP
36	MEMD Support Documentation - 2014 - Workbooks and Algorithms
37	ENERGY STAR Qualified Office Equipment Calculator
38	Energy Consumption by Commercial Office and Telecommunication Equipment, ACEEE August 18, 2002
39	epartment of Energy, Office of Industrial Technologies, United States Industrial Electric Motor Systems Market Opportunities, December
40	U.S. Department of Energy, Office of Industrial Technologies, Assessment of the Market for Compressed Air Efficiency Services, 2002.
41	Advancing Energy Efficeincy In Arkansas, ACEEE, March 2011, p. 173
42	GDS Maine Potential Study (GDS Engineering Estimates)
43	ergy Information Administration, Model Documentation Report: Industrial Demand Module of the National Energy Modeling System, Ma

DTE Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Computers & Office Equipment					
Energy Star Compliant Single Door Refrigerator	36	36	36	36	3
Energy Star office equipment including computers, monitors, copiers, multi-function machines.	27	7	27	7	14
Energy Efficient "Smart" Power Strip for PC/Monitor/Printer	36	36	36	36	3
PC Network Energy Management Controls replacing no central control	36	36	36	36	3
Energy Star UPS	36	36	36	36	3
High Efficiency CRAC Unit	36	36	36	36	3
Ventilation					
Economizer	36	36	36	36	3
Variable Speed Drive Control, 15 HP	36	36	36	36	3
Variable Speed Drive Control, 5 HP	36	36	36	36	14
Variable Speed Drive Control, 40 HP	36	36	36	36	14
High Speed Fans	36	36	36	36	14
High Volume Low Speed Fans	36	36	36	36	3
Destratification Fan (HVLS)	36	36	36	36	14
Building Envelope					
Integrated Building Design	14	14	14	14	14
Energy Efficient Windows	36	36	36	36	3
Cool Roofing	36	36	36	36	3
Ceiling Insulation	36	36	36	36	3
Window Improvements	36	36	36	36	3
Wall Insulation	36	36	36	36	3
Roof Insulation	36	36	36	36	3
Improved Duct Sealing	36	36	36	36	3
Water Heating					
Heat Pump Water Heater	36	36	36	36	36
Electric Tankless Water Heater	36	36	36	36	36
Efficient Hot Water Pump	36	36	36	36	36
Pre-rinse sprayers (electric)	36	36	36	36	36
HVAC Condenser Heater Recovery Water Heating	36	36	36	36	36
Low Flow Faucet Aerator	36	36	36	36	36
Low Flow Showerhead	36	36	36	36	36
Hot Water (DHW) Pipe Insulation	36	36	36	36	36
Tank Insulation (electric)	36	36	36	36	36
Drain Water Heat Recovery Water Heater	7	7	7	7	14
ECM Circulator Pump	36	36	36	36	36
Process Cooling Condenser Heat Recovery	36	36	36	36	36
Space Cooling - Chillers					
Air-Cooled Recip Chiller	36	36	36	36	14
Air-Cooled Screw Chiller	36	36	36	36	14
Water Side Economizer	36	36	36	36	14
VAV System Conversion	36	36	36	36	14

DTE Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Water-Cooled Centrifugal Chiller > 300 ton	36	36	36	36	14
Motor Belt Replacement	36	36	36	36	14
Chilled Hot Water Reset	36	36	36	36	14
Water-Cooled Screw Chiller > 300 ton	36	36	36	36	14
Chiller Tune Up	36	36	36	36	14
Efficient Chilled Water Pump	36	36	36	36	14
High Efficiency Pumps	36	36	36	36	14
HVAC Controls					
Programmable Thermostats	2	2	2	8	3
EMS install	36	36	36	36	14
EMS Optimization	36	36	36	36	14
HVAC Occupancy Sensors	36	36	36	36	14
Zoning	2	2	2	14	3
Setback with Electric Heat	36	36	36	36	14
EMS Pump Scheduling	36	36	36	36	14
Web Enabled EMS	36	36	36	36	14
Retrocommissioning	2	2	2	14	3
Space Cooling - Unitary & Split AC					
AC 240K - 760 K	36	36	36	36	14
Ductless (mini split) - Cooling	36	36	36	36	3
Ground Source Heat Pump - Cooling	36	36	36	36	14
Water Loop Heat Pump (WLHP) - Cooling	36	36	36	36	14
Air Source Heat Pump - Cooling	36	36	36	36	14
DX Condenser Coil Cleaning	36	36	36	36	14
Room AC	36	36	36	36	14
Lighting					
Lamp & Ballast Retrofit (HPT8 Replacing T12)	36	36	36	36	3
Lamp & Ballast Retrofit (HPT8 Replacing Standard T8)	36	36	36	36	3
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing T12)	36	36	36	36	3
Lamp & Ballast Retrofit (Low Wattage HPT8 Replacing Standard T8)	36	36	36	36	3
T5 HP replacing T12	36	36	36	36	3
Exterior HID replaced with LED	36	36	36	36	3
Garage HID replacement with LED	36	36	36	36	14
LED Exit Sign	36	36	36	36	3
LED High Bay Lighting	36	36	36	36	14
LED Low Bay Lighting	36	36	36	36	14
Light Tube	36	36	36	36	3
High Intensity Fluorescent Fixture (replacing HID)	36	36	36	36	3
42W 8 lamp Hi Bay CFL	36	36	36	36	3
HID Fixture Upgrade - Pulse Start Metal Halide	36	36	36	36	3
Interior Induction Lighting	36	36	36	36	3
CFL Fixture	36	36	36	36	3
CFL Screw-in	36	36	36	36	3

DTE Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
LED Screw In Replacing Incandescent	36	36	36	36	3
LED Screw In Replacing CFL	36	36	36	36	14
CFL Reflector Flood	36	36	36	36	3
LED Downlight	36	36	36	36	3
LED Troffer	36	36	36	36	3
LED Tube Lighting	36	36	36	36	3
LED Grow Light	36	36	36	36	3
Interior Non-Highbay/Lowbay LED Fixtures	36	36	36	36	14
Exterior HID Replaced with CFL	36	36	36	36	14
Exterior Linear Fluorescent	36	36	36	36	3
LED Specialty replacing CFL	36	36	36	36	3
CFL Screw in Specialty	36	36	36	36	3
LED Specialty replacing incandescent	36	36	36	36	3
Illuminated Signs to LED	36	36	36	36	3
Lighting Controls					
Exterior Bi-level Controls	36	36	36	36	3
Garage Bi-level Controls	36	36	36	36	3
Daylight Sensor Controls	36	36	36	36	3
Lighting Power Density- Exterior	36	36	36	36	3
Lighting Power Density - Parking Garage	36	36	36	36	3
Stairwell Bi-Level Control	36	36	36	36	3
Occupancy Sensor	36	36	36	36	3
Occupancy Sensor & Daylight Sensor	36	36	36	36	3
Central Lighting Control	36	36	36	36	3
Switching Controls for Multilevel Lighting (Non-HID)	36	36	36	36	3
Lighting Power Density - Interior	36	36	36	36	3
Long Day Lighting Dairy	36	36	36	36	3
Space Heating					
Air Source Heat Pump - Heating	36	36	36	36	3
Ground Source Heat Pump - Heating	36	36	36	36	3
Ductless (mini split) - Heating	36	36	36	36	3
Water Loop Heat Pump (WLHP) - Heating	36	36	36	36	14
VFD Pump	36	36	36	36	3
ECM motors on furnaces	36	36	36	36	14
Other					
High Efficiency Transformer, single-phase	36	36	36	36	14
NEMA Premium Transformer, single-phase	36	36	36	36	3
NEMA Premium Transformer, three-phase	36	36	36	36	14
High Efficiency Transformer, three-phase	36	36	36	36	3
Parking Garage Exhaust Fan CO Control	36	36	36	36	14
Optimized Snow and Ice Melt Controls	36	36	36	36	14
Engine Block Heater Timer	36	36	36	36	14
Machine Drive					
Sensors & Controls	41	41	41	41	43
Energy Information System	41	41	41	41	43

DTE Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
Electric Supply System Improvements	41	41	41	41	43
Advanced Efficient Motors	41	41	41	41	43
Industrial Motor Management	41	41	41	41	43
Advanced Lubricants	41	41	41	41	43
Motor System Optimization (Including ASD)	41	41	41	41	43
Pump System Efficiency Improvements	41	41	41	41	43
Fan System Improvements	41	41	41	41	43
Compressed Air System Management	41	41	41	41	43
Compressed Air - Advanced Compressor Controls	41	41	41	41	43
VFD for Process Fans	36	36	36	36,14	14
VFD for Process Pumps	36	36	36	36,14	14
High Efficiency Pumps	36	36	36	36,14	14
Compressed Air Audits and Leak Repair	36	36	36	36,14	14
Elec motors replacing pneumatic (comp air)	36	36	36	36,14	14
Automatic Drains, High efficiency nozzles and other (comp air)	36	36	36	36,14	14
Storage Tank Addition (comp air)	36	36	36	36,14	14
High Efficiency Dryers (comp air)	36	36	36	36,14	14
Process Cooling & Refrigeration					
Sensors & Controls	41	41	41	41	43
Energy Information System	41	41	41	41	43
Electric Supply System Improvements	41	41	41	41	43
Improved Refrigeration	41	41	41	41	43
Process Heating					
Sensors & Controls	41	41	41	41	43
Energy Information System	41	41	41	41	43
Electric Supply System Improvements	41	41	41	41	43
Industrial Other Process					
High Efficiency Welders	36	36	36	36,14	14
3 Phase High Eff Battery Charger	36	36	36	36,14	14
Barrel Insulation - Inj. Molding (plastics)	36	36	36	36,14	14
Pellet Dryer Insulation (plastics)	36	36	36	36,14	14
Injection Molding Machine - efficient (plastics)	36	36	36	36,14	14
Fiber Laser Replacing CO_2 laser (auto industry)	36	36	36	36,14	14
Agriculture					
Other Industrial -Low-Energy Livestock Waterer	36	36	36	36,14	14
Other Industrial -Dairy Refrigerator Tune-Up	36	36	36	36,14	14
Greenhouse Environmental Controls	36	36	36	36,14	14
Scroll Compressor with Heat Exchanger for Dairy Refrigeration	36	36	36	36,14	14
Variable Speed Drive withHeat Exchanger, Milk	36	36	36	36,14	14
Milk Pre-Cooler Heat Exchanger	36	36	36	36,14	14
Variable Speed Drives for Dairy Vacuum Pumps	36	36	36	36,14	14
VFD for Process Fans - Agriculture	36	36	36	36,14	14
VFD for Process Pumps - Agriculture	36	36	36	36,14	14

DTE Industrial Measure Database - Electric
Measure Savings, Cost and Useful Life, Savings Factor, Remaining Factor Sources
Reference numbers designate source for information from Electric Measure Source List

Measure Name	Annual kWh Savings	Cost/Unit	Effective Measure Life	Savings Factor	Remaining Factor
VFD for Process Pumps - Irrigation	36	36	36	36,14	14
Grain Storage Temperature and Moisture Management Controller	36	36	36	36,14	14
Low Pressure Sprinkler Nozzles	36	36	36	36,14	14
Fan Thermostat Controller	36	36	36	36,14	14

APPENDIX D ● Global Assumptions

Consumers Energy | **UCT GLOBAL ASSUMPTIONS**

Analysis Start Year	2017
Length of Analysis (Years)	20

Nominal Discount Rate	7.650%
Inflation Rate	2.50%
Reserve Margin Multiplier	7.24%
Carbon Tax Adder ($/kWh)	$0.00
Carbon Tax Adder ($/MMBtu)	$0.00

Avoided Costs (Nominal Dollars)

Data Year	Natural Gas Wholesale Forecast $/MMBTU
2016	2.34
2017	3.06
2018	3.03
2019	3.05
2020	3.14
2021	3.30
2022	3.49
2023	3.60
2024	3.72
2025	3.83
2026	3.96
2027	4.08
2028	4.21
2029	4.35
2030	4.49
2031	4.63
2032	4.78
2033	4.93
2034	5.09
2035	5.25
2036	5.41
2037	5.59
2038	5.77
2039	5.95
2040	6.14
2041	6.33
2042	6.54
2043	6.74
2044	6.96

Data Year	Winter Peak Energy $/kWh	Winter Off-Peak Energy $/kWh	Summer Peak Energy $/kWh	Summer Off-Peak Energy $/kWh	Summer Capacity $/kW-yr	Winter Capacity $/kW-yr	Avoided T&D $/kW-yr
2016	0.029	0.025	0.034	0.025	22.25	0.000	2.405
2017	0.036	0.029	0.040	0.028	74.38	0.000	2.465
2018	0.036	0.029	0.040	0.029	86.59	0.000	2.527
2019	0.037	0.030	0.041	0.030	89.70	0.000	2.590
2020	0.036	0.031	0.043	0.031	92.92	0.000	2.655
2021	0.039	0.032	0.045	0.032	96.27	0.000	2.721
2022	0.040	0.033	0.046	0.033	99.75	0.000	2.789
2023	0.043	0.035	0.049	0.035	103.35	0.000	2.859
2024	0.044	0.037	0.052	0.037	107.09	0.000	2.930
2025	0.046	0.038	0.053	0.038	110.96	0.000	3.004
2026	0.047	0.039	0.055	0.039	114.98	0.000	3.079
2027	0.049	0.040	0.056	0.040	119.14	0.000	3.156
2028	0.050	0.041	0.057	0.041	123.45	0.000	3.234
2029	0.051	0.042	0.058	0.042	127.92	0.000	3.315
2030	0.051	0.043	0.060	0.043	132.56	0.000	3.398
2031	0.051	0.044	0.059	0.044	137.37	0.000	3.483
2032	0.053	0.045	0.061	0.045	142.36	0.000	3.570
2033	0.056	0.047	0.064	0.047	147.52	0.000	3.660
2034	0.058	0.048	0.066	0.048	152.88	0.000	3.751
2035	0.060	0.050	0.068	0.050	158.44	0.000	3.845
2036	0.062	0.052	0.071	0.052	164.19	0.000	3.941
2037	0.065	0.053	0.073	0.053	170.16	0.000	4.039
2038	0.070	0.056	0.077	0.056	176.35	0.000	4.140
2039	0.075	0.058	0.080	0.059	182.77	0.000	4.244
2040	0.077	0.060	0.084	0.062	189.42	0.000	4.350
2041	0.081	0.062	0.088	0.064	196.28	0.000	4.459
2042	0.085	0.065	0.091	0.067	203.39	0.000	4.570
2043	0.088	0.067	0.095	0.069	210.75	0.000	4.684
2044	0.093	0.069	0.099	0.072	218.39	0.000	4.802

Electric Line Losses

	Winter On Peak	Winter Off Peak	Summer On Peak	Summer Off Peak
Residential	1.094	1.090	1.096	1.091
C&I	1.094	1.090	1.096	1.091

Demand Line Losses

Winter Gen.	Summer Gen.	T&D Capacity
1.107	1.121	1.121
1.107	1.121	1.121

General Modeling Assumptions Avoided Costs

DTE Energy — **UCT GLOBAL ASSUMPTIONS**

Analysis Start Year	2016
Length of Analysis (Years)	10

Nominal Discount Rate	9.310%
Inflation Rate	2.00%
Reserve Margin Multiplier	14.80%
Carbon Tax Adder ($/kWh)	$0.00
Carbon Tax Adder ($/MMBtu)	$0.00

Avoided Costs (Nominal Dollars)

Data Year	Natural Gas Wholesale Forecast $/MMBTU
2015	
2016	3.83
2017	3.48
2018	3.30
2019	3.55
2020	3.77
2021	3.89
2022	4.01
2023	4.14
2024	4.27
2025	4.41
2026	4.55
2027	4.69
2028	4.84
2029	5.00
2030	5.16
2031	5.32
2032	5.49
2033	5.67
2034	5.85
2035	6.03
2036	6.23
2037	6.42
2038	6.63
2039	6.84
2040	7.06
2041	7.28
2042	7.52
2043	7.75

Data Year	Winter Peak Energy $/kWh	Winter Off-Peak Energy $/kWh	Summer Peak Energy $/kWh	Summer Off-Peak Energy $/kWh	Summer Capacity $/kW-yr	Winter Capacity $/kW-yr	Avoided T&D $/kW-yr
2015	0.034	0.026	0.034	0.026	3.288	0.000	0.000
2016	0.039	0.029	0.039	0.029	32.273	0.000	0.000
2017	0.039	0.028	0.039	0.028	61.519	0.000	0.000
2018	0.040	0.029	0.040	0.029	67.761	0.000	0.000
2019	0.039	0.028	0.039	0.028	63.444	0.000	0.000
2020	0.040	0.028	0.040	0.028	75.921	0.000	0.000
2021	0.054	0.044	0.054	0.044	77.402	0.000	0.000
2022	0.055	0.045	0.055	0.045	77.825	0.000	0.000
2023	0.057	0.047	0.057	0.047	73.439	0.000	0.000
2024	0.061	0.048	0.061	0.048	62.410	0.000	0.000
2025	0.064	0.050	0.064	0.050	66.084	0.000	0.000
2026	0.066	0.051	0.066	0.051	67.996	0.000	0.000
2027	0.066	0.051	0.066	0.051	76.567	0.000	0.000
2028	0.067	0.052	0.067	0.052	82.391	0.000	0.000
2029	0.068	0.054	0.068	0.054	79.780	0.000	0.000
2030	0.070	0.054	0.070	0.054	85.036	0.000	0.000
2031	0.071	0.056	0.071	0.056	90.786	0.000	0.000
2032	0.072	0.057	0.072	0.057	95.647	0.000	0.000
2033	0.073	0.058	0.073	0.058	98.844	0.000	0.000
2034	0.075	0.059	0.075	0.059	104.188	0.000	0.000
2035	0.076	0.060	0.076	0.060	103.676	0.000	0.000
2036	0.078	0.061	0.078	0.061	105.750	0.000	0.000
2037	0.079	0.063	0.079	0.063	107.865	0.000	0.000
2038	0.081	0.064	0.081	0.064	110.022	0.000	0.000
2039	0.083	0.065	0.083	0.065	112.222	0.000	0.000
2040	0.084	0.066	0.084	0.066	114.467	0.000	0.000
2041	0.086	0.068	0.086	0.068	116.756	0.000	0.000
2042	0.088	0.069	0.088	0.069	119.091	0.000	0.000
2043	0.089	0.070	0.089	0.070	121.473	0.000	0.000

Electric Line Losses

	Winter On Peak	Winter Off Peak	Summer On Peak	Summer Off Peak
Residential	1.068	1.068	1.068	1.068
C&I	1.068	1.068	1.068	1.068

Demand Line Losses

Winter Gen.	Summer Gen.	T&D Capacity
1.068	1.068	1.068
1.068	1.068	1.068

APPENDIX E ● Energy Efficiency Potential Study Catalog

Energy Efficiency Potential Studies Catalog of the U.S. Department of Energy

The U.S. Department of Energy maintains an "Energy Efficiency Potential Studies Catalog". This report appendix provides a summary of the energy efficiency potential studies compiled by the US DOE. More information can be located on the US DOE web site for this catalog at http://energy.gov/eere/slsc/energy-efficiency-potential-studies-catalog#catalog. This U.S. DOE web site reports that "States, utilities, and non-governmental organizations across the country have commissioned analyses over the years to identify potential energy savings (typically for electricity) available within their jurisdictions. These studies can be used to fulfill a variety of needs, including energy efficiency program planning, state goal setting, utility resource planning, and other priorities.

Below is a compilation of state and local energy efficiency potential studies published since 2007, to serve as a resource for energy planners and as a baseline for future analyses. Although these studies have been completed by a variety of authors to meet numerous purposes and have important differences among them, the majority (60%) show an average annual energy efficiency potential savings rate[1] in the range of 1 to 2.5% per year (Figure 1). This convergence across such a wide range of studies suggests a high level of energy efficiency potential available throughout the U.S." GDS finds that the achievable electric energy efficiency potential for the Lower Peninsula service area determined in this study are comparable to the majority of studies included in DOE's Catalog of studies.

Catalog Summary

The table below is re-produced from the U.S. DOE web site referenced above and "provides a summary of energy efficiency potential studies conducted by state, local, and non-governmental organizations (unaffiliated with DOE) between 2007 and 2015."

State	Author/Sponsor, Year	Type [48]	Study Time Range	Cumulative Energy Savings (GWh)[49]	Avg. Annual Potential Savings Rate[50]	Sectors Included [51]
AZ	SWEEP, 20B Bonanza 2012	Achievable Potential	2010-2010	16,713	2.1%	R,C,I
AR	ACEEE 2011	Achievable Potential	2009-2025	12,077	1.3%	R, C, I
AR	AR IOUs/Navigant 2015	Economic Potential	2016-2025	4,317	1.6%	R, C, I
CA	PUC/Navigant 2013	Economic Potential	2014-2024	51,000		R, C, I
CA	PUC/Navigant 2015	Economic Potential	2015-2024	30,374	1.6%	R, C, I
CA	PacificCorp Pacific Power/Cadmus 2013	Achievable Potential	2013-2032	123	0.7%	R, C, I
CO	SWEEP, 20B Bonanza 2012	Achievable Potential	2010-2020	11,495	1.1%	R, C, I
CO	Xcel/KEMA 2013	Economic Potential	2013-2020	6,470	2.9%	R, C, I
CO	CO Springs Utility/Summit Blue 2009	Achievable Potential	2009-2028	497	0.5%	R, C, I
CT	CT CES 2013	Economic Potential	2009-2018	9,748	3.3%	R, C, I
DE	Optimal Energy 2014	Economic Potential	2014-2025	4,360	2.5%	R, C, I
DC	DC 2013	Economic Potential	2013-2022	5,538	4.3%	R, C, I

[48] Economic and achievable potential are defined relative to the theoretical maximum, known as the technical potential. Technical energy efficiency potential is the total energy that could be saved by any efficiency measures, without consideration of cost or willingness of users to adopt the measures. Economic potential is the subset of technical potential that is considered cost-effective compared to a supply-side energy resource alternative (i.e., energy generation). Achievable potential is the energy savings that could be realistically achieved given real-world constraints, including market and programmatic barriers.
[49] GWh – Gigawatt-hours. Where savings were not reported directly, savings were calculated either using applicable reported percentages.
[50] Average annual savings rate was calculated by dividing the total cumulative savings percentage over the period of study by the number of years in the study; the initial year of study was assumed to be the baseline.
[51] Sectors include: residential (R), commercial (C), industrial (I) as indicated.

State	Author/Sponsor, Year	Type [48]	Study Time Range	Cumulative Energy Savings (GWh)[49]	Avg. Annual Potential Savings Rate[50]	Sectors Included [51]
FL	ACEEE 2007	Economic Potential	2013-2023	84,472	2.0%	R, C, I
GA	Georgia Power/Nexant, Cadmus 2015	Economic Potential	2015-2026	Redacted	1.7%	R, C, I
ID	PacificCorp Rocky Mountain Power/Cadmus 2013	Achievable Potential	2013-2032	298	0.6%	R, C, I
ID	Avista ID/ EnerNOC 2013	Economic Potential	2014-2033	860		R, C, I
ID	Idaho Power/ EnerNOC 2013	Economic Potential	2012-2032	3,839	1.1%	R, C, I
IL	ComEd / ICF 2013	Economic Potential	2013-2018	30,009	5.3%	R, C, I
IN	IPL/AEG 2014	Economic Potential	2015-2034	3,911	1.2%	R, C, I
IN	Duke 2013	Achievable Potential	2013-2032	4,557		R, C, I
IA	Iowa Utility Association/Nexant 2008	Economic Potential	2008-2018	6,777	1.7%	R, C, I
IA	Iowa IOUs/Cadmus 2012	Economic Potential	2014-2023	6,865	1.9%	R, C, I
KS	Kansas Energy Council/Summit Blue 2008	Economic Potential	2008-2028	16,787	1.7%	R, C, I
KY	ACEEE 2012	Economic Potential	2013-2030	21,098	1.1%	R, C, I
KY	LG&E, KU / Cadmus 2013	Economic Potential	2013-2033	2,527	0.5%	R, C
KY	Duke/Forefront Economics, Gil Peach 2009	Economic Potential	2009-2013		0.7%	R, C, I

State	Author/Sponsor, Year	Type [48]	Study Time Range	Cumulative Energy Savings (GWh)[49]	Avg. Annual Potential Savings Rate[50]	Sectors Included [51]
LA	ACEEE 2013	Economic Potential	2011-2030	24,507	1.4%	R, C, I
LA	ICF 2014	Achievable Potential	2014-2034	5,923	0.5%	R, C, I
ME	Efficiency Maine Trust/Cadmus 2012	Economic Potential	2012-2021	3,408	2.6%	R, C, I
MD	ACEEE 2008	Economic Potential	2008-2025	22,164	1.7%	R, C, I
MA	MA Energy Efficiency Advisory Council 2015	Achievable Potential	2016-2018	4,259	3.0%	R, C, I
MI	Michigan Public Service Commission/GDS 2013	Economic Potential	2013-2023	32,556	3.0%	R, C, I
MN	XCEL/KEMA 2012	Economic Potential	2011-2020	7,339	2.0%	R, C, I
MS	ACEEE 2013	Achievable Potential	2014-2025	6,815	1.3%	R, C, I
MO	ACEEE 2011	Achievable Potential	2012-2020	9,164	1.0%	R, C, I
MO	KEMA 2010	Economic Potential	2011-2030	23,359	1.3%	R, C, I
MO	Ameren / EnerNOC 2013	Economic Potential	2016-2030	7,718	1.5%	R, C, I
MO	Kansas City Power and Light 2013	Achievable Potential	2013-2032		1.5%	R, C, I
MT	Power of Efficiency 2009	Achievable Potential	2009-2020	2,190		R, C, I
NV	SWEEP, 20B Bonanza 2012	Achievable Potential	2010-2020	7,040	1.1%	R, C, I
NV	NPC/SPCC/PA Consulting 2009	Economic Potential	2009-2028		0.8%	R, C, I

State	Author/Sponsor, Year	Type [48]	Study Time Range	Cumulative Energy Savings (GWh)[49]	Avg. Annual Potential Savings Rate[50]	Sectors Included [51]
NH	NHPUC / GDS 2009	Achievable Potential	2009-2018	2,958	2.3%	R, C, I
NJ	NJ BPU/EnerNOC 2012	Economic Potential	2013-2016	9,369	3.2%	R, C, I
NM	SWEEP, 20B Bonanza 2012	Achievable Potential	2010-2020	5,110	2.4%	R, C, I
NM	GEP 2011	Economic Potential	2012-2025	3,510	1.1%	R, C, I
NY	NYSERDA/Optimal Energy 2014	Economic Potential	2014-2030	91,856	3.0%	R, C, I
NY	ConEd/GEP 2010	Economic Potential	2010-2018	11,094	2.0%	R, C, I
NC	ACEEE 2010	Achievable Potential	2015-2025	51,843	3.2%	R, C, I
NC	Dominion NC/VA / DNV-GL 2015	Economic Potential	2014-2023	16,599	2.2%	R, C, I
NC	Dominion NC / DNV-GL 2015	Economic Potential	2014-2023	640	2.2%	R, C, I
OH	ACEEE 2009	Economic Potential	2015-2025	64,000	3.3%	R, C, I
OH	AEP / Navigant 2014	Economic Potential	2015-2034	22,283	2.6%	R, C, I
OH	Duke/Forefront Economics, Gil Peach 2013	Economic Potential	2013-2032		0.7%	R, C, I
OH	FirstEnergy 2012	Economic Potential	2012-2026	14,154	1.8%	R, C, I
OH	DP&L 2013	Economic Potential	2013-2022	1,518	1.2%	R, C, I
OK	Cadmus (Sum of OG&E and PSO) 2015	Economic Potential	2015-2024	5,130	1.4%	R, C, I

State	Author/Sponsor, Year	Type [48]	Study Time Range	Cumulative Energy Savings (GWh)[49]	Avg. Annual Potential Savings Rate[50]	Sectors Included [51]
OK	OG&E / Cadmus 2015	Economic Potential	2015-2024	3,168	1.3%	R, C, I
OK	PSO / Cadmus 2015	Economic Potential	2015-2024	1,962	1.5%	R, C, I
OR	Energy Trust Oregon / Navigant 2014	Achievable potential	2014-2033	6,795	0.8%	R, C, I
PA	ACEEE 2009	Economic Potential	2008-2025	61,000	2.1%	R, C, I
PA	PA PUC 2015	Economic Potential	2016-2025	26,945	1.8%	R, C, I
RI	KEMA 2008	Economic Potential	2009-2018	2,050	2.4%	R, C, I
SC	ACEEE 2009	Achievable Potential	2015-2025	23,119	2.4%	R, C, I
SD	Synapse 2009	Achievable Potential	2010-2020	9,604		R, C
TN	TVA / EnerNOC 2012	Economic Potential	2012-2030	40,365	1.2%	R, C, I
TX	Itron 2008	Economic Potential	2009-2018	56,913	1.8%	R, C, I
TX	Austin Energy 2012	Economic Potential	2011-2020	2,784	2.6%	R, C, I
UT	SWEEP, 20B Bonanza 2012	Achievable Potential	2010-2020	6,234	2.0%	R, C, I
UT	PacificCorp Rocky Mountain Power / Cadmus 2013	Achievable Potential	2013-2032	3,408	1.3%	R, C, I
VT	VEIC 2011	Achievable Potential	2011-2031	2,317	0.9%	R, C, I
VT	VDPS / GDS, Cadmus 2011	Economic Potential	2012-2031	1,652	1.5%	R, C, I

State	Author/Sponsor, Year	Type [48]	Study Time Range	Cumulative Energy Savings (GWh)[49]	Avg. Annual Potential Savings Rate[50]	Sectors Included [51]
VA	ACEEE 2008	Economic Potential	2008-2025	44,371	1.7%	R, C, I
VA	Dominion VA / DNV-GL 2015	Economic Potential	2014-2023	13,736	1.1%	R, C, I
WA	PSE WA/ Cadmus 2013	Achievable Potential	2014-2033	4,564	0.8%	R, C, I
WA	Avista WA/ EnerNOC 2013	Economic Potential	2014-2033	1,808		R, C, I
WA	PacificCorp Pacific Power / Cadmus 2013	Achievable Potential	2013-2032	657	1.5%	R, C, I
WI	Energy Center Wisconsin 2009	Economic Potential	2012-2018	15,231	1.8%	R, C, I
WY	SWEEP, 20B Bonanza 2012	Achievable Potential	2010-2020	3,238	1.6%	R, C, I
WY	PacificCorp Rocky Mountain Power / Cadmus 2013	Achievable Potential	2013-2032	1,191	0.5%	R, C, I

APPENDIX F ● Annual Savings, Budgets, & Cost of Conserved Energy

This Appendix provides the projected levelized cost of conserved energy for the Lower Peninsula. Additionally, this chart contains the first-year and lifetime MWh saved for the two periods. This levelized cost per first-year kWh saved can be used to provide program planners and decision-makers with the expected cost to utilities to acquire the electric savings for the achievable potential scenario examined in this report. It is important for program planners and other decision-makers to have a good understanding of the cost to utilities to acquire these levels of energy efficiency savings.

An Energy Efficiency Potential Study recently completed for Ameren Illinois provides a good explanation of the methods that can be used to express energy efficiency savings in the DSM industry.[52] A summary of the methods is included below.

> Incremental Annual Savings represents the annualized, first-year savings that come only from measures installed in the given year. This is a perspective that is commonly associated with program implementation, as it focuses on resource acquisition targets in the present. This is also the perspective that is focused on primarily for a short-term implementation cycle.
>
> Cumulative Annual Savings describes the amount of savings that are active across a portfolio which have been installed up to that point in time and which have not yet burned out or expired. This is a snapshot perspective that is commonly associated with long-term resource planning and load forecasting, as it focuses on resource and system needs at specific times over long periods. This is also the perspective that we focus on primarily for Achievable Potential.

Additionally, this Appendix contains cumulative and incremental annual savings for MWh and MW, savings as a percent of sales and annual budgets for the Lower Peninsula, DTE and Consumers.

[52] http://c.ymcdn.com/sites/www.aesp.org/resource/resmgr/RFPs/ACI/RFP_AIC_Potential_DRAFT_Rprt.pdf

ACHIEVABLE UCT - COST OF CONSERVED ENERGY

LP Achievable UCT - Cost of Conserved Energy

Year	Annual Energy (MWh)	Incremental Annual EE Savings (MWh)	Cumulative Annual EE Savings (MWh)	Annual EE Expenses	Average Measure Life	Cost of Conserved Energy ($/kWh)
2017	84,276,493	1,391,028	1,391,028	$306,786,943	11.0	$0.0201
2018	85,040,428	1,442,003	2,682,902	$313,993,810	11.0	$0.0199
2019	85,408,256	1,498,618	4,003,165	$318,905,123	10.9	$0.0196
2020	85,755,265	1,550,944	5,351,144	$322,050,668	10.8	$0.0192
2021	86,083,197	1,601,821	6,215,155	$333,561,920	10.2	$0.0203
2022	86,775,822	1,688,113	7,504,319	$345,750,089	10.1	$0.0202
2023	86,922,273	1,752,518	8,811,273	$357,219,818	10.0	$0.0203
2024	87,215,421	1,823,146	10,140,200	$370,629,670	9.9	$0.0205
2025	87,516,018	2,006,556	11,462,574	$397,122,010	9.6	$0.0205
2026	87,962,615	2,032,797	12,709,772	$406,490,550	9.5	$0.0212
2027	88,077,441	1,735,149	13,535,931	$325,099,893	8.8	$0.0214
2028	88,261,599	1,650,698	14,250,320	$310,208,910	8.7	$0.0216
2029	88,468,149	1,883,388	14,914,909	$366,680,366	8.8	$0.0221
2030	88,798,421	1,888,442	15,528,081	$368,711,034	8.8	$0.0222
2031	88,938,836	1,836,783	16,114,423	$364,776,777	8.8	$0.0225
2032	89,213,806	2,256,963	16,619,226	$447,049,311	9.6	$0.0206
2033	89,508,152	2,404,281	17,091,592	$470,078,349	9.4	$0.0207
2034	89,980,458	2,402,891	17,538,467	$470,788,595	9.4	$0.0208
2035	90,202,115	2,483,362	18,007,229	$502,618,025	9.6	$0.0211
2036	90,504,726	2,408,079	18,462,268	$489,251,470	9.6	$0.0211

Levelized Cost of Energy (2017-2026)	$0.0201
Levelized Cost of Energy (2017-2036)	$0.0205

APPENDIX G ● Supply Curves

A key element in the development of Potential Studies is the use of energy-efficiency supply curves. Supply curves are a common tool in economics. In the 1970s, conservation supply curves were developed by energy analysts as a means of ranking energy conservation investments alongside investments in energy supply in order to assess the least cost approach to meeting energy service needs. The advantage of using an energy-efficiency supply curve is that it provides a clear, easy-to-understand framework for summarizing a variety of complex information about energy efficiency technologies, their costs, and the potential for energy savings. Properly constructed, an energy-efficiency supply curve avoids the double counting of energy savings across measures by accounting for interactions between measures, is independent of prices, and also provides a simplified framework to compare the costs of efficiency with the costs of energy supply technologies.

Following are Energy Efficiency Supply Curves for the Residential, Commercial and Industrial sectors reviewed in this study. These Supply Curves assume the following:

1. Levelized Cost is based upon Utility Cost, i.e. – Rebates + Administrative Expense
2. Rebates are 50% of incremental cost
3. Potential is based upon Maximum Achieve Cost Effective (MACE) potential
4. Percentage of Sales is based upon 2036 Forecast

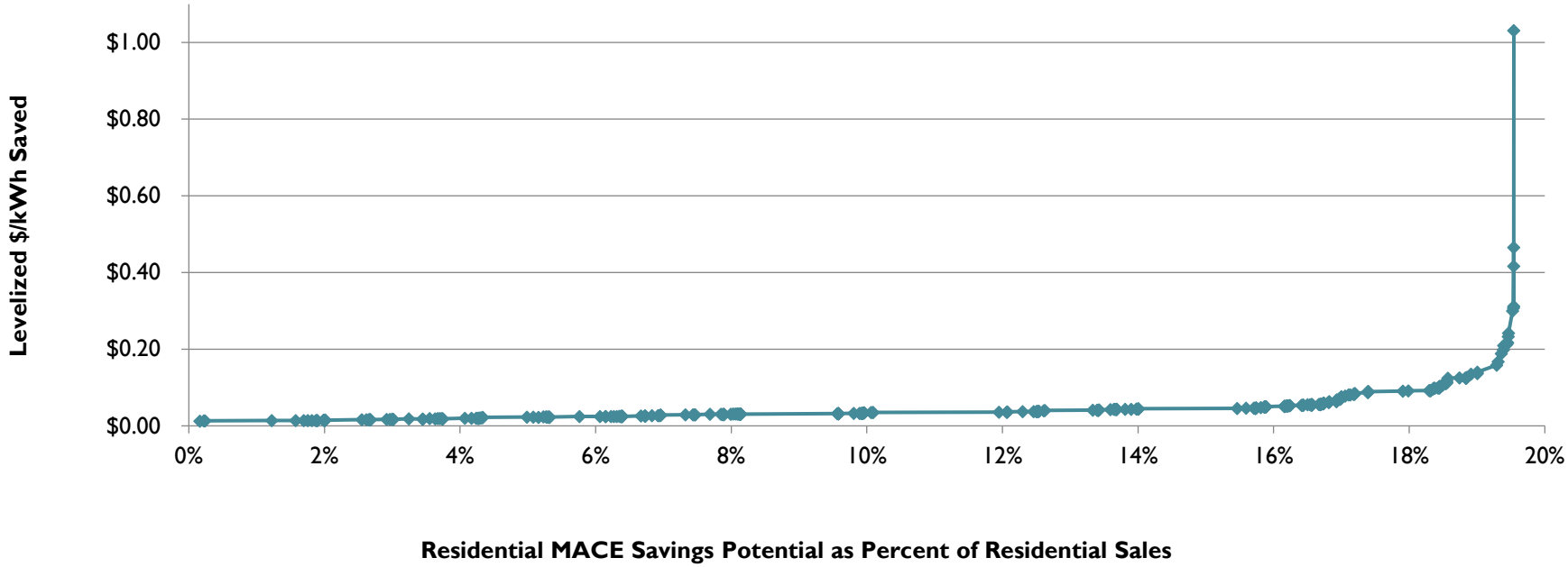
Supply curves are also included for the three sensitivity analyses that were examined for the study:

- 100% Incremental Cost Incentive Scenario
- High Assumptions Scenario
- Carbon Price Scenario

Detailed assumptions for these scenarios are explained are in Chapter 9 of the report. Below is a summary of the main assumptions:

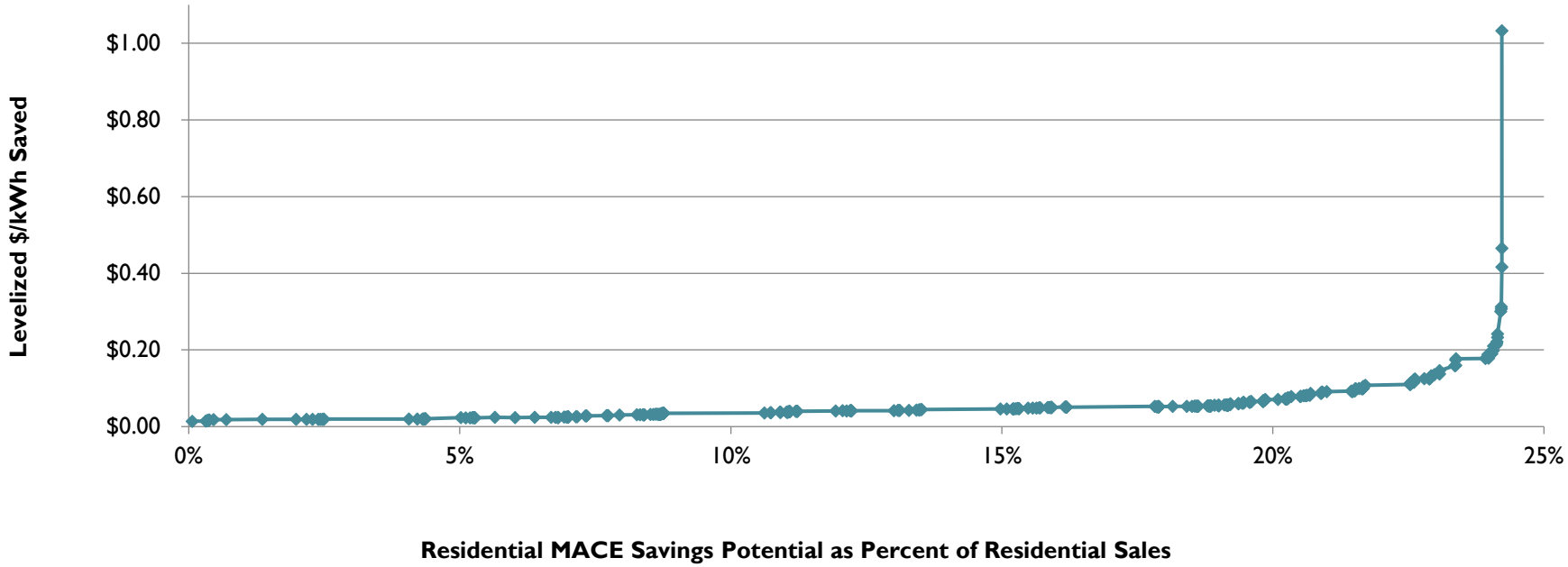
1. Levelized Cost is based upon Utility Cost, i.e. – Rebates + Administrative Expense
2. Rebates are 100% of incremental cost for measuring passing the UCT for Scenario #1 and #2
3. Rebates for Scenario #3 are 50% of incremental cost
4. Potential is based upon Maximum Achieve Cost Effective (MACE) potential
5. Percentage of Sales is based upon 2036 Forecast

Base Case
Residential Supply Curve



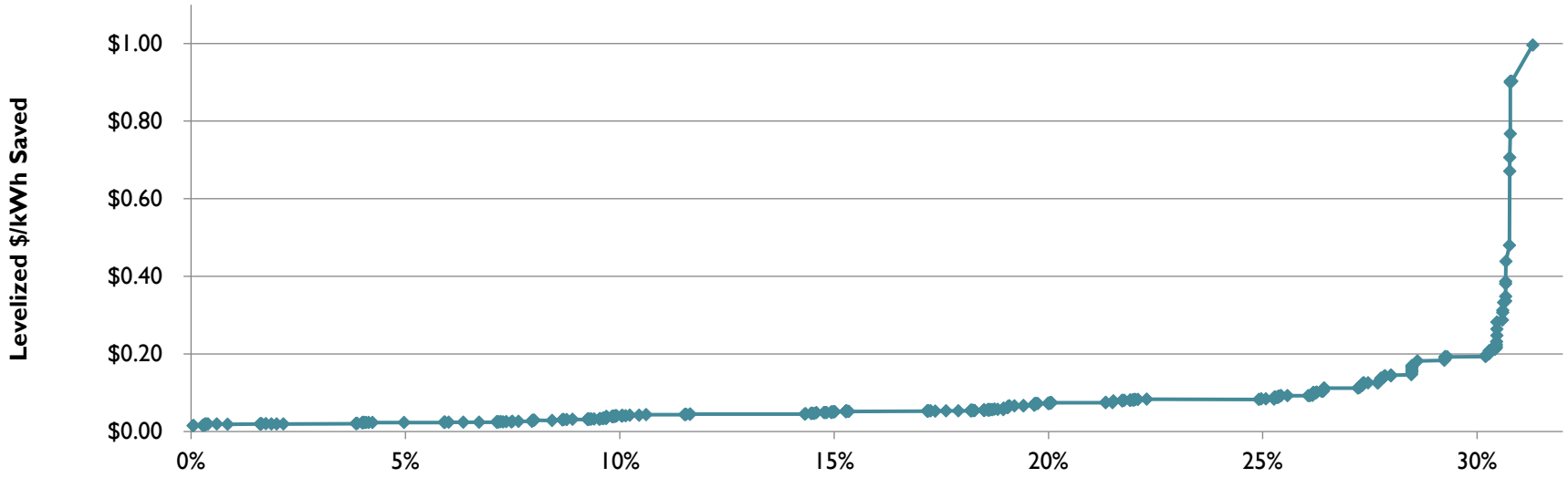
100% Incremental Cost Incentive Scenario
Residential Supply Curve

Electric Residential - Cost Effective Supply Curve



High Assumptions Scenario
Residential Supply Curve

Electric Residential - Cost Effective Supply Curve



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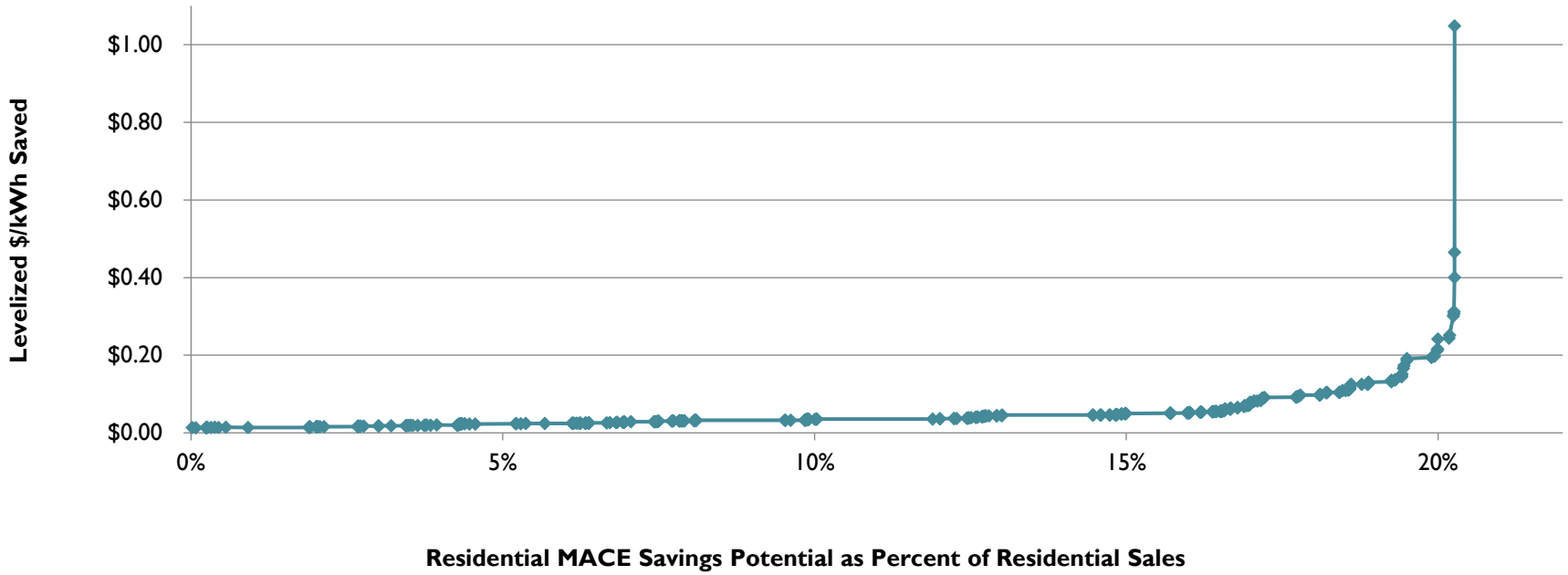
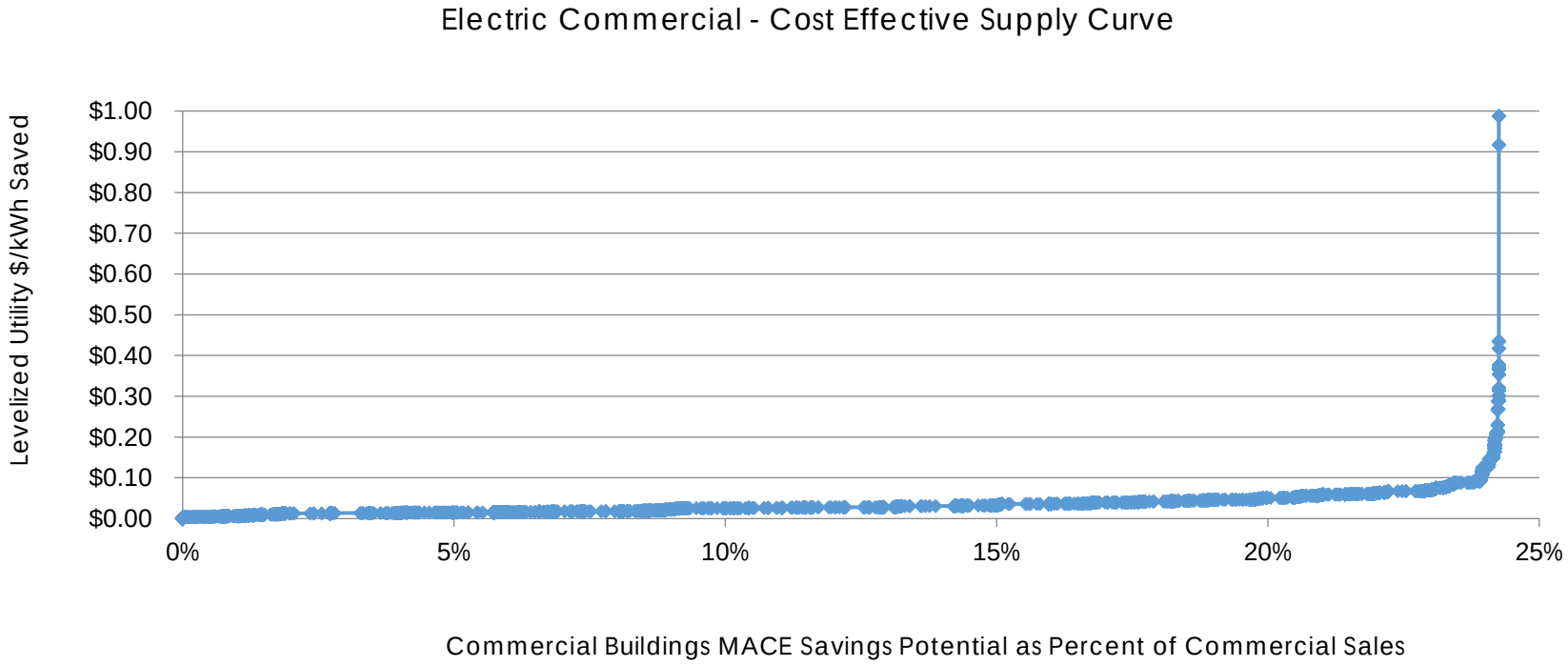
Carbon Price Scenario
Residential Supply Curve



Base Case
Commercial Supply Curve



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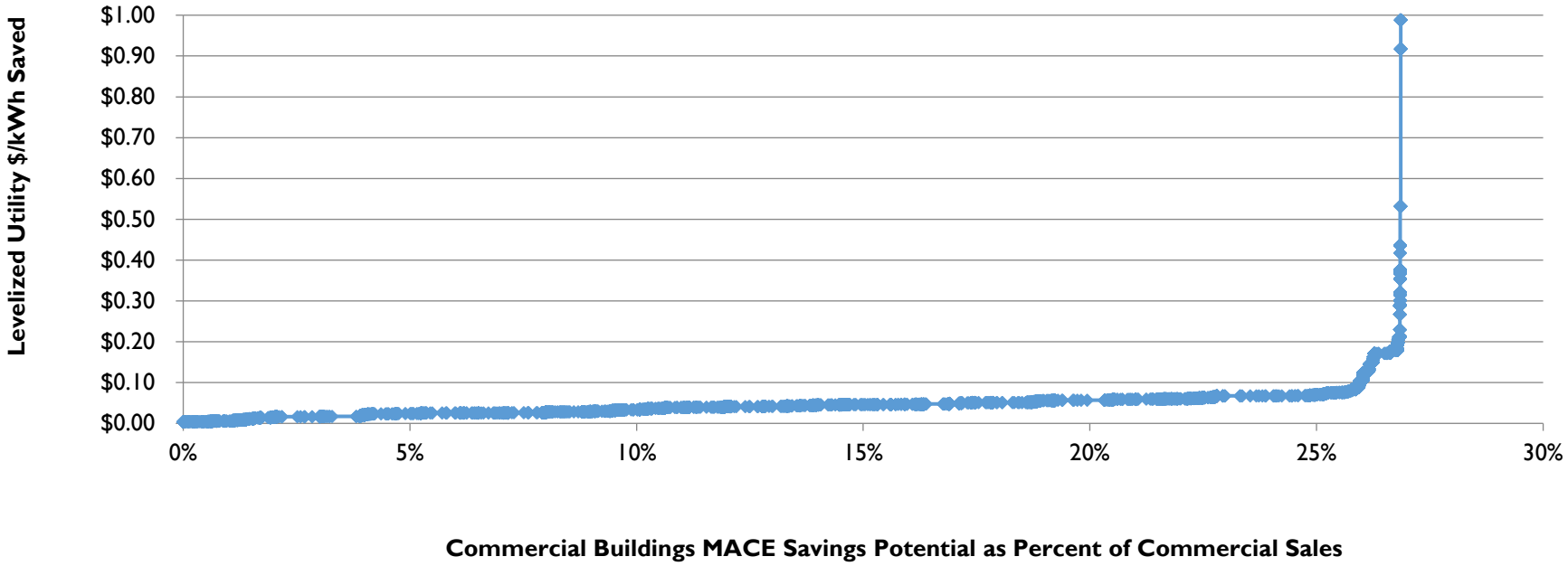
100% Incremental Cost Incentive Scenario
Commercial Supply Curve

Electric Commercial - Cost Effective Supply Curve



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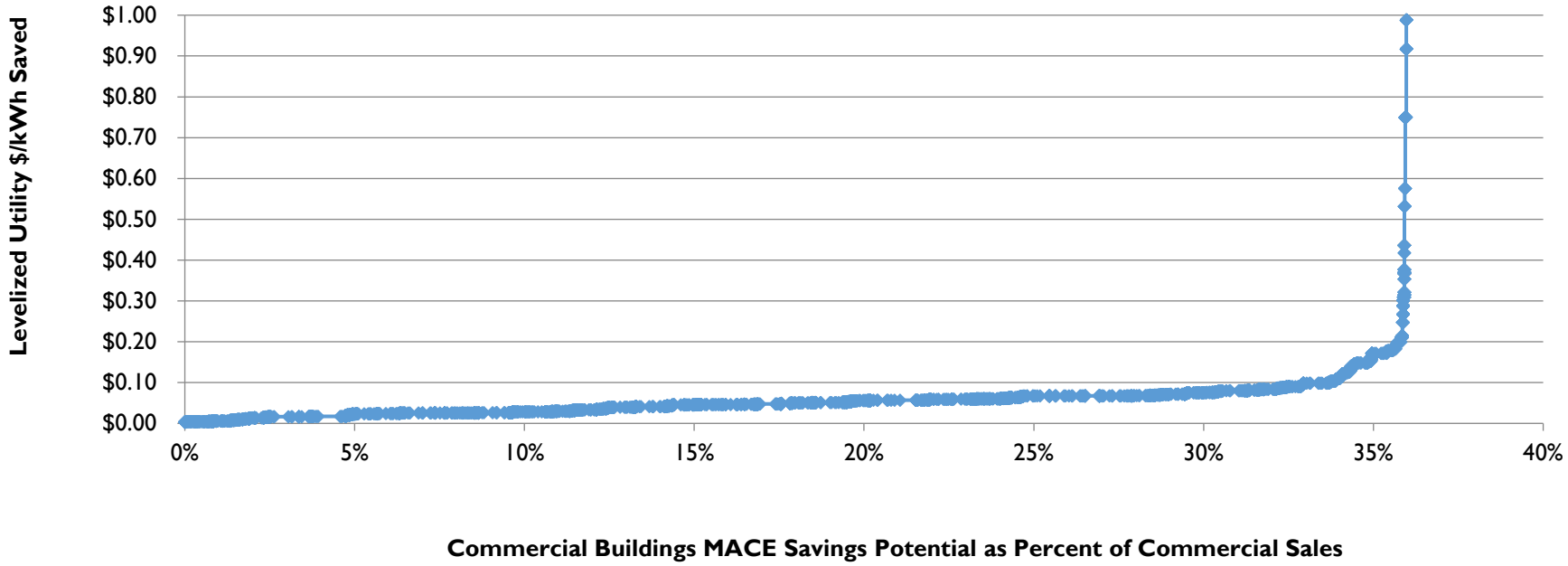
High Assumptions Scenario
Commercial Supply Curve

Electric Commercial - Cost Effective Supply Curve



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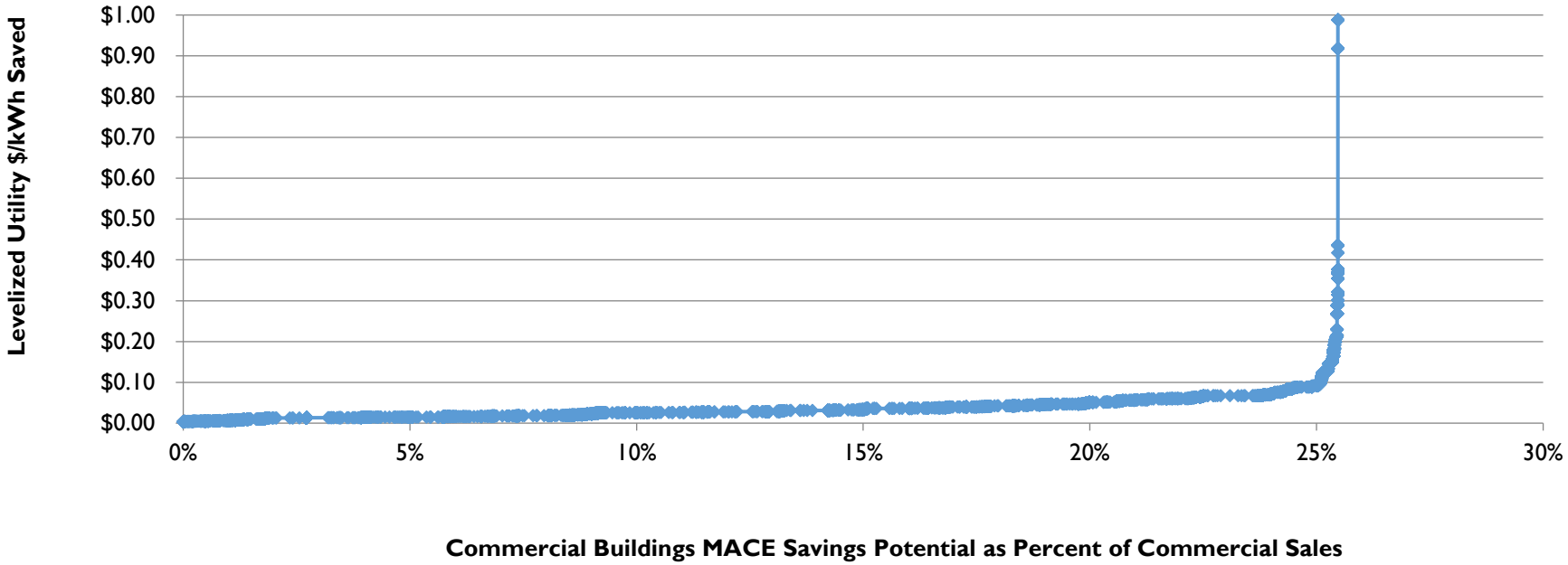
Carbon Price Scenario
Commercial Supply Curve

Electric Commercial - Cost Effective Supply Curve



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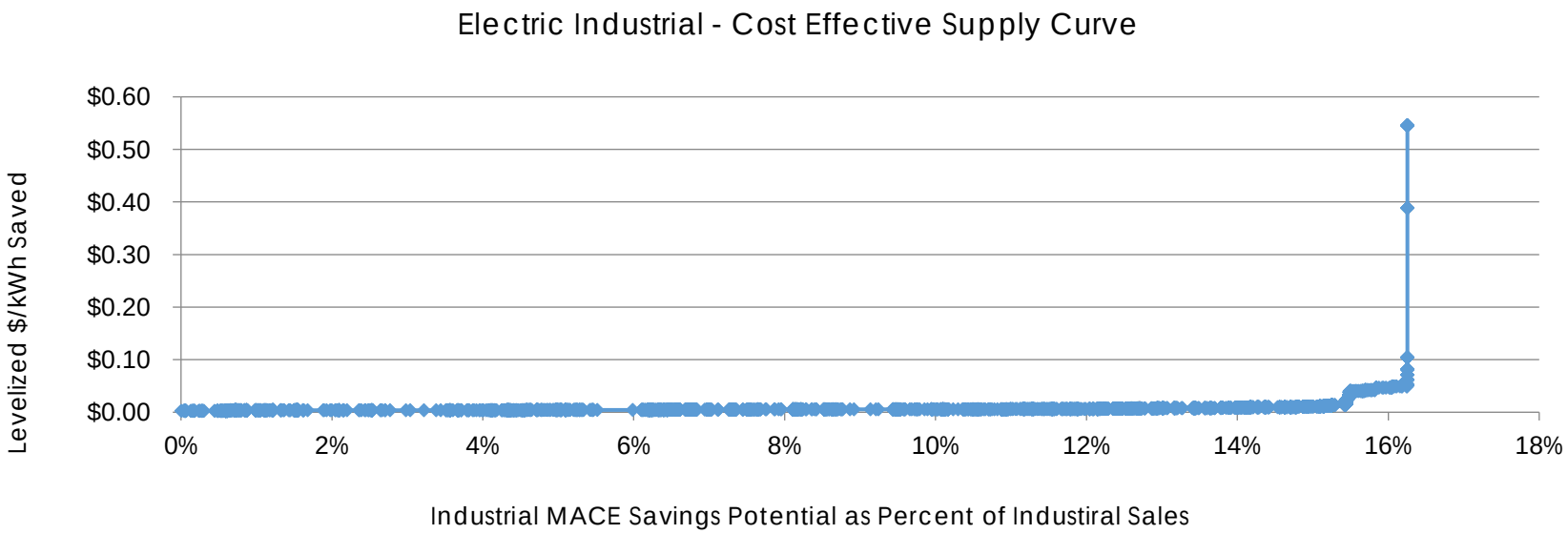
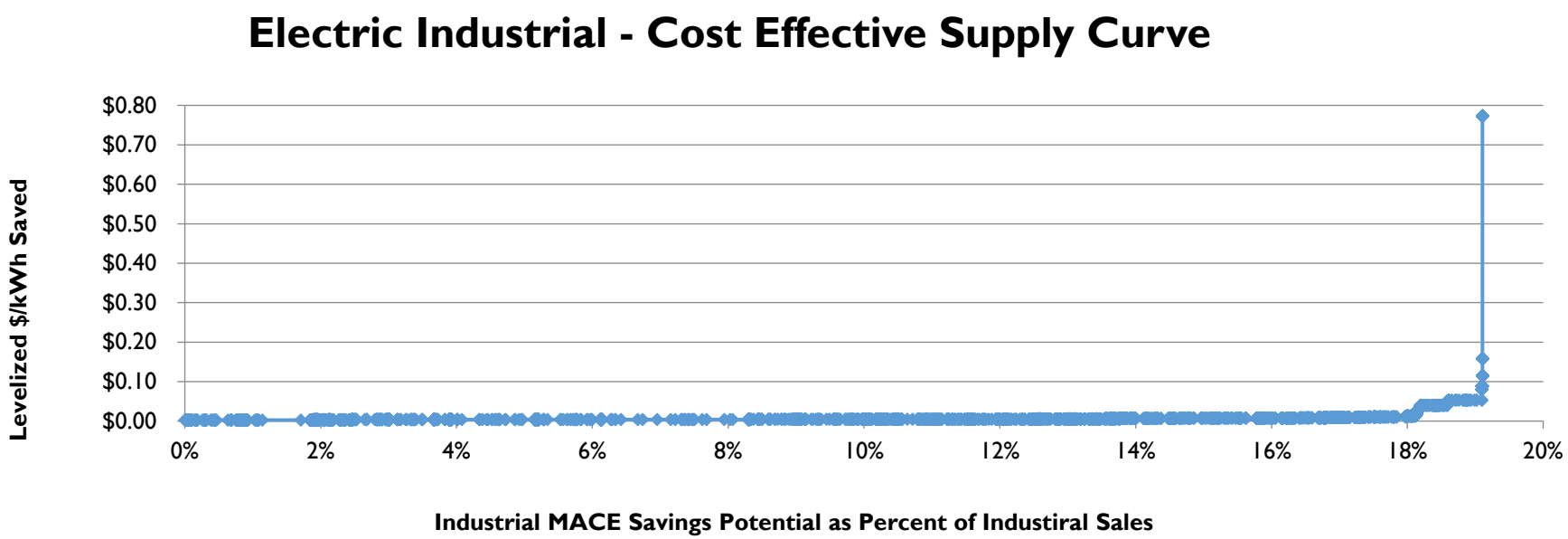
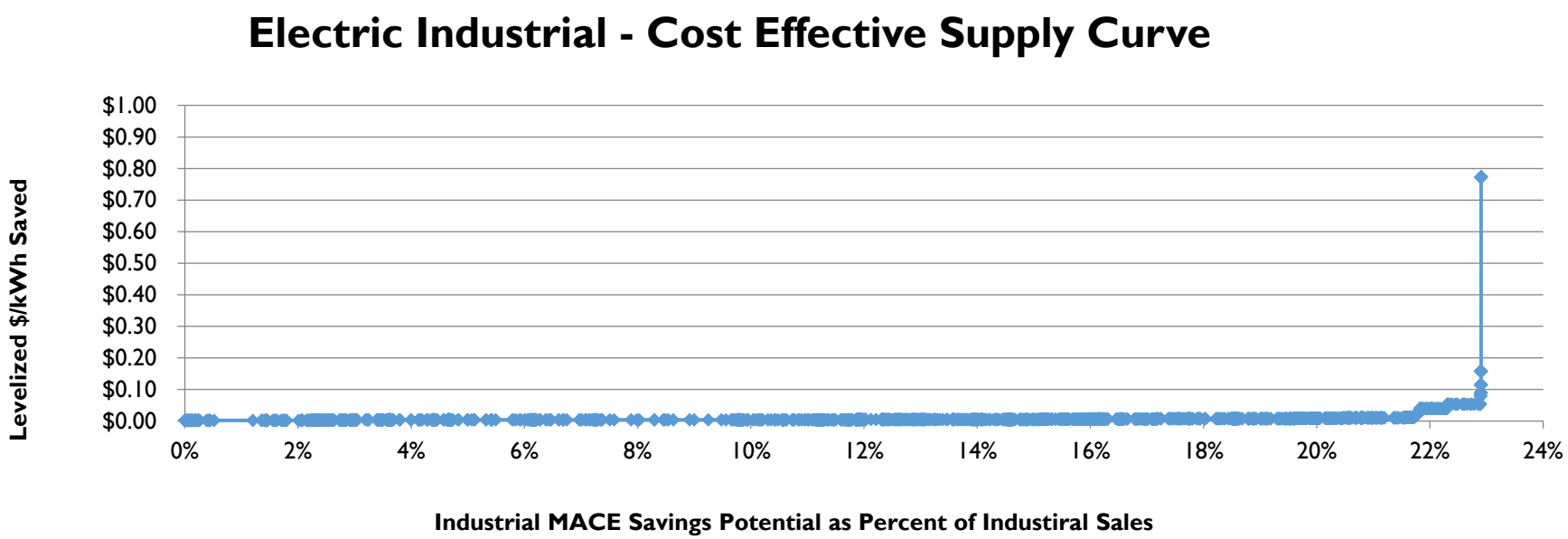
Base Case
Industrial Supply Curve



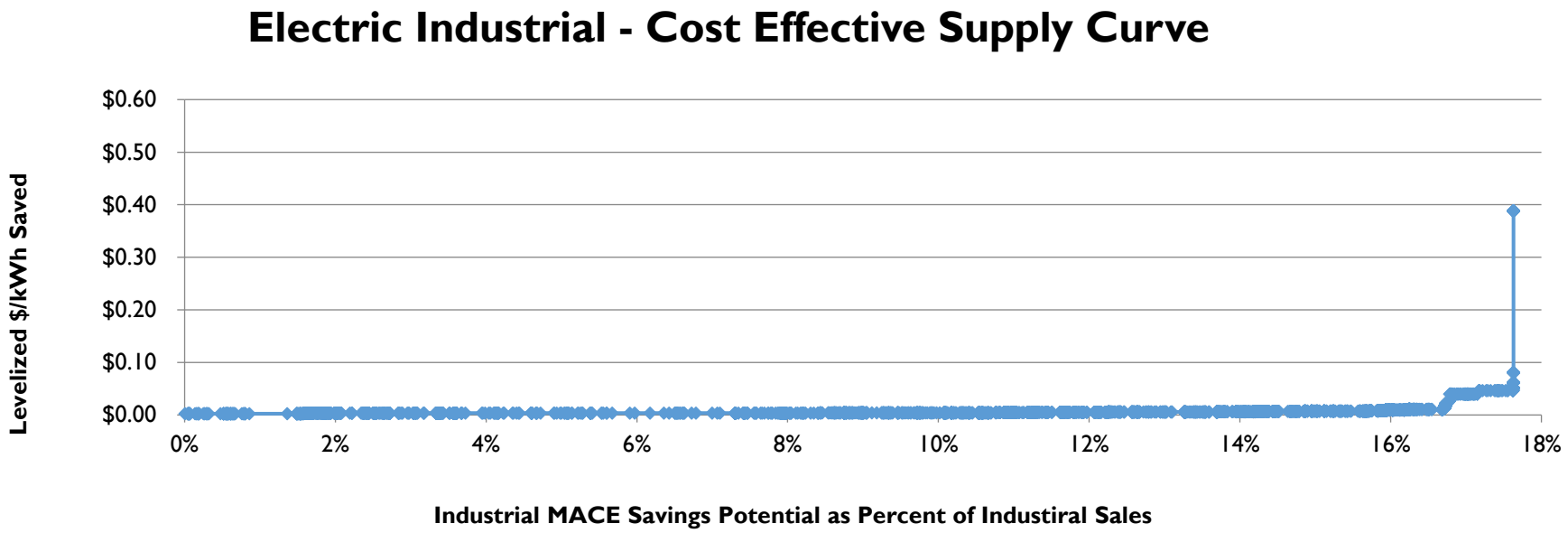
100% Incremental Cost Incentive Scenario
Industrial Supply Curve



High Assumption
Industrial Supply Curve



Carbon Price Scenario
Industrial Supply Curve



APPENDIX H ● Scenario Analysis Summary and Assumptions

This appendix contains detailed tables of the scenario results of energy and summer peak demand savings relative to the base case. Tables are presented for both Cumulative and Incremental Annual Savings. An Energy Efficiency Potential Study recently completed for Ameren Illinois provides a good explanation of the methods that can be used to express energy efficiency savings in the DSM industry.[53] A summary of the methods is included below.

Incremental Annual Savings represents the annualized, first-year savings that come only from measures installed in the given year. This is a perspective that is commonly associated with program implementation, as it focuses on resource acquisition targets in the present. This is also the perspective that is focused on primarily for a short-term implementation cycle.

Cumulative Annual Savings describes the savings that are active across a portfolio which have been installed up to that point in time and which have not yet burned out or expired. This is a snapshot perspective that is commonly associated with long-term resource planning and load forecasting, as it focuses on resource and system needs at specific times over long periods. This is also the perspective that we focus on primarily for Achievable Potential.

[53] http://c.ymcdn.com/sites/www.aesp.org/resource/resmgr/RFPs/ACI/RFP_AIC_Potential_DRAFT_Rprt.pdf

Incremental Annual Energy Savings by Scenario (Lower Peninsula-ALL SECTORS)

	Base Case		100% Incentives Scenario		High Assumptions Scenario		Carbon Price Scenario	
	Incremental Annual MWh Savings	% of Forecast Sales	Incremental Annual MWh Savings	% of Forecast Sales	Incremental Annual MWh Savings	% of Forecast Sales	Incremental Annual MWh Savings	% of Forecast Sales
2017	1,391,028	1.7%	1,532,109	1.8%	1,932,599	2.3%	1,444,575	1.7%
2018	1,442,003	1.7%	1,621,323	1.9%	2,025,146	2.4%	1,496,821	1.8%
2019	1,498,618	1.8%	1,715,280	2.0%	2,143,055	2.5%	1,554,616	1.8%
2020	1,550,944	1.8%	1,803,316	2.1%	2,242,465	2.6%	1,608,150	1.9%
2021	1,601,821	1.9%	1,878,597	2.2%	2,335,274	2.7%	1,660,210	1.9%
2022	1,688,113	1.9%	1,999,826	2.3%	2,476,833	2.9%	1,748,166	2.0%
2023	1,752,518	2.0%	2,095,230	2.4%	2,586,054	3.0%	1,813,837	2.1%
2024	1,823,146	2.1%	2,195,791	2.5%	2,703,613	3.1%	1,886,470	2.2%
2025	2,006,556	2.3%	2,421,864	2.8%	2,971,012	3.4%	2,070,916	2.4%
2026	2,032,797	2.3%	2,464,959	2.8%	3,015,630	3.4%	2,098,262	2.4%
2027	1,735,149	2.0%	2,158,221	2.5%	2,638,820	3.0%	1,799,092	2.0%
2028	1,650,698	1.9%	2,020,236	2.3%	2,444,192	2.8%	1,718,370	1.9%
2029	1,883,388	2.1%	2,273,998	2.6%	2,778,637	3.1%	1,964,415	2.2%
2030	1,888,442	2.1%	2,275,715	2.6%	2,796,856	3.1%	1,982,482	2.2%
2031	1,836,783	2.1%	2,212,895	2.5%	2,721,330	3.1%	1,933,576	2.2%
2032	2,256,963	2.5%	2,681,726	3.0%	3,286,780	3.7%	2,362,319	2.6%
2033	2,404,281	2.7%	2,844,789	3.2%	3,481,139	3.9%	2,511,833	2.8%
2034	2,402,891	2.7%	2,842,074	3.2%	3,477,901	3.9%	2,510,410	2.8%
2035	2,483,362	2.8%	2,956,762	3.3%	3,621,941	4.0%	2,592,513	2.9%
2036	2,408,079	2.7%	2,836,487	3.1%	3,452,829	3.8%	2,518,904	2.8%

Cumulative Annual Energy Savings by Scenario (Lower Peninsula-ALL SECTORS)

	Base Case		100% Incentives Scenario		High Assumptions Scenario		Carbon Price Scenario	
	Cumulative Annual MWh Savings	% of Forecast Sales	Cumulative Annual MWh Savings	% of Forecast Sales	Cumulative Annual MWh Savings	% of Forecast Sales	Cumulative Annual MWh Savings	% of Forecast Sales
2017	1,391,028	1.7%	1,532,109	1.8%	1,932,599	2.3%	1,444,575	1.7%
2018	2,682,902	3.2%	2,986,467	3.5%	3,768,876	4.4%	2,790,123	3.3%
2019	4,003,165	4.7%	4,490,301	5.3%	5,674,931	6.6%	4,164,224	4.9%
2020	5,351,144	6.2%	6,042,348	7.0%	7,637,831	8.9%	5,566,202	6.5%
2021	6,215,155	7.2%	7,054,179	8.2%	8,971,964	10.4%	6,483,908	7.5%
2022	7,504,319	8.6%	8,557,403	9.9%	10,884,551	12.5%	7,826,871	9.0%
2023	8,811,273	10.1%	10,092,954	11.6%	12,835,900	14.8%	9,187,576	10.6%
2024	10,140,200	11.6%	11,664,380	13.4%	14,830,174	17.0%	10,570,518	12.1%
2025	11,462,574	13.1%	13,240,114	15.1%	16,829,445	19.2%	11,946,767	13.7%
2026	12,709,772	14.4%	14,736,486	16.8%	18,730,855	21.3%	13,248,145	15.1%
2027	13,535,931	15.4%	15,774,761	17.9%	20,078,758	22.8%	14,122,332	16.0%
2028	14,250,320	16.1%	16,640,348	18.9%	21,194,836	24.0%	14,885,623	16.9%
2029	14,914,909	16.9%	17,440,578	19.7%	22,246,052	25.1%	15,599,590	17.6%
2030	15,528,081	17.5%	18,177,175	20.5%	23,229,014	26.2%	16,262,276	18.3%
2031	16,114,423	18.1%	18,873,893	21.2%	24,165,146	27.2%	16,898,407	19.0%
2032	16,619,226	18.6%	19,470,370	21.8%	24,967,839	28.0%	17,445,374	19.6%
2033	17,091,592	19.1%	20,019,945	22.4%	25,712,342	28.7%	17,959,505	20.1%
2034	17,538,467	19.5%	20,529,747	22.8%	26,407,338	29.3%	18,447,789	20.5%
2035	18,007,229	20.0%	21,059,207	23.3%	27,116,971	30.1%	18,957,935	21.0%
2036	18,462,268	20.4%	21,568,920	23.8%	27,799,901	30.7%	19,453,914	21.5%

Incremental Annual Summer Peak Demand Savings by Scenario (Lower Peninsula-ALL SECTORS)

	Base Case		100% Incentives Scenario		High Assumptions Scenario		Carbon Price Scenario	
	Incremental Annual MW Savings	% of Forecast Peak	Incremental Annual MW Savings	% of Forecast Peak	Incremental Annual MW Savings	% of Forecast Peak	Incremental Annual MW Savings	% of Forecast Peak
2017	223	1.1%	247	1.2%	320	1.6%	235	1.2%
2018	230	1.1%	261	1.3%	335	1.7%	242	1.2%
2019	239	1.2%	275	1.4%	354	1.8%	252	1.3%
2020	247	1.2%	289	1.4%	370	1.8%	260	1.3%
2021	254	1.3%	300	1.5%	383	1.9%	267	1.3%
2022	266	1.3%	318	1.6%	405	2.0%	281	1.4%
2023	277	1.4%	334	1.7%	424	2.1%	293	1.5%
2024	286	1.4%	348	1.7%	440	2.2%	302	1.5%
2025	305	1.5%	373	1.9%	470	2.3%	322	1.6%
2026	311	1.6%	383	1.9%	480	2.4%	329	1.6%
2027	268	1.3%	338	1.7%	425	2.1%	285	1.4%
2028	263	1.3%	327	1.6%	408	2.0%	280	1.4%
2029	300	1.5%	367	1.8%	459	2.3%	318	1.6%
2030	303	1.5%	370	1.8%	463	2.3%	322	1.6%
2031	300	1.5%	366	1.8%	459	2.3%	320	1.6%
2032	379	1.9%	455	2.3%	568	2.8%	400	2.0%
2033	395	2.0%	472	2.4%	587	2.9%	416	2.1%
2034	396	2.0%	473	2.4%	587	2.9%	418	2.1%
2035	414	2.1%	496	2.5%	615	3.1%	436	2.2%
2036	407	2.0%	485	2.4%	600	3.0%	429	2.1%

Cumulative Annual Summer Peak Demand Savings by Scenario (Lower Peninsula-ALL SECTORS)

	Base Case		100% Incentives Scenario		High Assumptions Scenario		Carbon Price Scenario	
	Cumulative Annual MW Savings	% of Forecast Peak	Cumulative Annual MW Savings	% of Forecast Peak	Cumulative Annual MW Savings	% of Forecast Peak	Cumulative Annual MW Savings	% of Forecast Peak
2017	223	1.1%	247	1.2%	320	1.6%	235	1.2%
2018	435	2.2%	487	2.4%	633	3.2%	460	2.3%
2019	651	3.2%	735	3.7%	957	4.8%	689	3.4%
2020	872	4.3%	991	4.9%	1,291	6.4%	923	4.6%
2021	1,043	5.2%	1,194	6.0%	1,563	7.8%	1,109	5.5%
2022	1,260	6.3%	1,450	7.2%	1,899	9.5%	1,340	6.7%
2023	1,478	7.4%	1,711	8.5%	2,241	11.2%	1,573	7.8%
2024	1,700	8.5%	1,979	9.9%	2,591	12.9%	1,810	9.0%
2025	1,921	9.6%	2,248	11.2%	2,943	14.7%	2,047	10.2%
2026	2,135	10.6%	2,512	12.5%	3,287	16.4%	2,278	11.4%
2027	2,285	11.4%	2,704	13.5%	3,544	17.7%	2,442	12.2%
2028	2,422	12.1%	2,877	14.3%	3,775	18.8%	2,595	12.9%
2029	2,553	12.7%	3,042	15.2%	3,998	19.9%	2,741	13.7%
2030	2,677	13.4%	3,197	15.9%	4,210	21.0%	2,880	14.4%
2031	2,798	14.0%	3,346	16.7%	4,416	22.0%	3,016	15.0%
2032	2,908	14.5%	3,480	17.4%	4,593	22.9%	3,135	15.6%
2033	3,014	15.0%	3,608	18.0%	4,760	23.7%	3,249	16.2%
2034	3,116	15.5%	3,729	18.6%	4,921	24.5%	3,359	16.8%
2035	3,220	16.1%	3,852	19.2%	5,081	25.3%	3,471	17.3%
2036	3,322	16.6%	3,971	19.8%	5,236	26.1%	3,580	17.9%

MICHIGAN
LOWER PENINSULA
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