Study of Potential for Energy Savings in Delaware

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Prepared for

by

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with

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APPENDIX I: MEASURE CHARACTERIZATIONS, UPDATED FROM PHASE 1

Notes on Measure Characterizations:

1. The Data Source numbers refer to the indexed citations provided in Appendix J, Bibliography

2. Primary Fuel Abbreviations:
E = Electric
G = Natural Gas
P = Petroleum Fuels

3. Market Abbreviations:
NC = New Construction
Reno = Renovation
Repl = Natural Replacement
Ret = Retrofit

4. All costs are presented in 2013$

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Data Sources: Measure Life Source	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Indoor Lighting	Ret	HPT8 lamp/ballast (T12 baseline)	Install High Performance T8 lamps and low-ballast factor electronic ballast in existing fixtures, replacing T12 lighting	EE T12 with EEMAG ballast	15	32.4%	$ 0.67		1	168, 168	1
Indoor Lighting	Ret	HPT8 lamp/ballast (T8 baseline)	Install High Performance T8 lamps and low-ballast factor electronic ballast in existing fixtures, replacing standard T8 lighting	Standard T8s	15	16.4%	$ 1.67		1	168, 168	1
Indoor Lighting	Repl	Reduce W T8 lamp/ballast (for HPT8)	When replacing a High Performance T8 and ballast, replace with a 25 or 28 Watt lamp and high performance ballast as opposed to a HP 32 watt lamp.	32 Watt High Performance T8s	15	13.3%	$ -		1	168, 87	68
Indoor Lighting	Ret	Reduce W T8 lamp/ballast (for HPT8)	When replacing a High Performance T8 and ballast, replace with a 25 or 28 Watt lamp and high performance ballast as opposed to a HP 32 watt lamp.	32 Watt High Performance T8s	15	13.3%	$ 2.71		1	168, 87	68
Indoor Lighting	Repl	Reduce W T8 lamp/ballast (for stnd T8)	When replacing a Standard T8, replace with a 25 or 28 watt T8 and CEE certified ballast as opposed to a standard lamp and ballast	32 Watt Standard T8 lamp and ballast	15	16.4%	$ 0.71		1	168, 168	68
Indoor Lighting	Ret	Reduce W T8 lamp/ballast (for stnd T8)	When replacing a Standard T8, replace with a 25 or 28 watt T8 and CEE certified ballast as opposed to a standard lamp and ballast	32 Watt Standard T8 lamp and ballast	15	16.4%	$ 1.62		1	168, 168	68
Indoor Lighting	Repl	Reduce W T8 relamp (for HPT8)	When replacing a High Performance T8, replace with a 25 or 28 Watt lamp as opposed to a HP 32 watt lamp.	32 Watt High Performance T8 lamp and ballast	5	10.6%	$ -		1	168, 87	68
Indoor Lighting	Ret	Reduce W T8 relamp (for HPT8)	When replacing a High Performance T8, replace with a 25 or 28 Watt lamp as opposed to a HP 32 watt lamp.	32 Watt High Performance T8 lamp and ballast	5	10.6%	$ 2.42		1	168, 87	68
Indoor Lighting	Repl	Reduce W T8 relamp (for stnd T8)	When replacing a Standard T8, replace with a 25 or 28 Watt lamp as opposed to a HP 32 watt lamp.	32 Watt High Performance T8 lamp	5	21.9%	$ 0.14		1	168, 168	68
Indoor Lighting	Ret	Reduce W T8 relamp (for stnd T8)	When replacing a Standard T8, replace with a 25 or 28 Watt lamp as opposed to a HP 32 watt lamp.	32 Watt Standard T8	5	21.9%	$ 0.43		1	168, 168	68
Indoor Lighting	Ret	HPT8 fixture (T12 baseline)	High Performance T8 fixture w/ Electronic Ballast and tandem wiring where appropriate, replacing T12	EE T12 with EE Mag ballast	15	32.4%	$ 1.07		1	168, 168	68
Indoor Lighting	NC, Reno, Repl	HPT8 fixture (T8 baseline)	High Performance T8 fixture w/ Electronic Ballast and tandem wiring where appropriate, replacing standard T8	Standard T8s	15	16.4%	$ 0.76		1	168, 168	1
Indoor Lighting	Ret	HPT8 fixture (T8 baseline)	High Performance T8 fixture w/ Electronic Ballast and tandem wiring where appropriate, replacing standard T8	Standard T8s	15	16.4%	$ 2.67		1	168, 168	68
Indoor Lighting	NC, Reno, Repl	HE fixtures/design Tier I (2009 baseline)	High efficiency fixtures and design to reduce lighting power density. Generally reflects mid-level efficiency, typically including high efficiency fixtures and improved fixture layout, including use of indirect lighting. Does not include controls, which are covered elsewhere. Baseline of IECC 2009.	IECC 2009	15	21.4%	$ 0.37		168	168, 50	69
Indoor Lighting	NC, Reno, Repl	HE fixtures/design Tier II	High efficiency fixtures and design to reduce lighting power density. Generally reflects state-of-the-art systems to achieve maximum reductions. This can include numerous things, potentially including direct/indirect, auto dimming, low glare, T5s, specular reflectors, task lighting, distribution technologies (eg, light pipes, fiber optics), etc. Does not include controls, which are covered elsewhere.	HE fixtures/design Tier I	15	33.1%	$ 0.75		168	168, 52	69
Indoor Lighting	Ret	HE fixtures/design Tier II	High efficiency fixtures and design to reduce lighting power density. Generally reflects state-of-the-art systems to achieve maximum reductions. This can include numerous things, potentially including direct/indirect, auto dimming, low glare, T5s, specular reflectors, task lighting, distribution technologies (eg, light pipes, fiber optics), etc. Does not include controls, which are covered elsewhere.	HE fixtures/design Tier I	15	45.0%	$ 1.59		168	0	69
Indoor Lighting	NC, Reno, Repl	HE fixtures/design Tier III	Emerging technologies (e.g., LEDs, Organic LEDs, daylighting) combined with emphasis on increased overall system efficiency.	HE fixtures/design Tier II	15	40.7%	$ 0.75		168	168, 39	69

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Indoor Lighting	Ret	HE fixtures/design Tier III	Emerging technologies (e.g., LEDs, Organic LEDs, daylighting) combined with emphasis on increased overall system efficiency.	HE fixtures/design Tier II	15	53.1%	$ 1.59		168	0	69
Indoor Lighting	NC, Reno, Repl	CFL fixture - interior 2012-14	Permanently installed Compact Fluorescent Lamp fixture	Incandescent fixture meeting EISA 2007 lighting performance standards (e.g., efficient halogen lamp)	12	59.0%	$ 0.42		168	168, 1	168
Indoor Lighting	Ret	CFL fixture - interior 2012-14	Permanently installed Compact Fluorescent Lamp fixture	Incandescent fixture meeting EISA 2007 lighting performance standards (e.g., efficient halogen lamp)	12	59.0%	$ 1.34		168	168, 1	70
Indoor Lighting	NC, Reno, Repl	CFL spiral 2012-14	Compact Fluorescent Lamp spiral, for interior	High-efficiency halogen lamp	5	62.2%	$ 0.03		168	168, 53	71, 168
Indoor Lighting	Ret	CFL spiral 2012-14	Compact Fluorescent Lamp spiral, for interior	High-efficiency halogen lamp	5	62.2%	$ 0.04		168	168, 53	71, 168
Indoor Lighting	NC, Reno, Repl	LED track lighting	LED replacements for track lighting	Halogen Par 38	15	79.8%	$ 0.73		1, 157, 162	1, 156	1, 157
Indoor Lighting	Ret	LED track lighting	LED replacements for track lighting	Halogen Par 38	15	79.8%	$ 1.04		1, 157, 162	1, 156	1, 157
Indoor Lighting	NC, Reno, Repl	LED downlighting	LED replacements for recessed downlights. Recessed lights are used to concentrate light in a downward direction.	Weighted average of 65W BR30 & 50W PAR30 downlight lamps	15	67.6%	$ 0.48		1, 157, 162	1, 157	46, 157
Indoor Lighting	Ret	LED downlighting	LED replacements for recessed downlights. Recessed lights are used to concentrate light in a downward direction.	Weighted average of 65W BR30 & 50W PAR30 downlight lamps	15	67.6%	$ 0.98		1, 157, 162	1, 157	46, 157
Indoor Lighting	NC, Reno, Repl	LED Lamp, directional	LED screw and pin-based lamps that replace PAR bulbs in non-dedicated fixtures. These are common in retail and museum applications where directional highlighting is common	weighted average of CFL and Halogen PAR bulb	14	78.6%	$ 0.31		1, 62	1, 156	1, 157
Indoor Lighting	Ret	LED Lamp, directional	LED screw and pin-based lamps that replace PAR bulbs in non-dedicated fixtures. These are common in retail and museum applications where directional highlighting is common	weighted average of CFL and Halogen PAR bulb	14	78.6%	$ 0.47		1, 62	1, 156	1, 157
Indoor Lighting	NC, Reno, Repl	LED Lamp, standard and decorative	LED screw and pin-based lamps that fit into traditional incandescent and CFL sockets. Varieties include PAR, MR, decorative candelabra, and standard A-style lamps.	Weighted average of EC Halogens, and incandescents	9	66.7%	$ 0.48		1, 62	1, 157	46, 168
Indoor Lighting	Ret	LED Lamp, standard and decorative	LED screw and pin-based lamps that fit into traditional incandescent and CFL sockets. Varieties include PAR, MR, decorative candelabra, and standard A-style lamps.	Weighted average of EC Halogens, and incandescents	9	66.7%	$ 0.65		1, 62	1, 157	46, 1, 168
Indoor Lighting	NC, Reno, Repl	LED refrig case light fixtures	LED refrigerated case light fixtures are installed in walk-in refrigerated coolers and freezers where they excel due to the cold temperature. They replace linear fluorescent fixtures that perform poorly in cold temperatures.	T8 linear fluorescent	8	55.3%	$ 0.46		168	168	168
Indoor Lighting	Ret	LED refrig case light fixtures	LED refrigerated case light fixtures are installed in walk-in refrigerated coolers and freezers where they excel due to the cold temperature. They replace linear fluorescent fixtures that perform poorly in cold temperatures.	T8 linear fluorescent	8	55.3%	$ 0.90		168	168	168
Indoor Lighting	NC, Reno, Repl	LED Recessed Fixture	LED Recessed Fixtures replace linear fluorescent fixtures	average of T8 and HPT8 4' fixtures	19	37.2%	$ 1.70		1, 62, 158	1, 158	46, 1, 168
Indoor Lighting	Ret	LED Recessed Fixture	LED Recessed Fixtures replace linear fluorescent fixtures	average of T8 and HPT8 4' fixtures	19	37.2%	$ 3.03		1, 62, 158	1, 158	46, 1, 168
Indoor Lighting	NC, Reno, Repl	LED task lighting	LED task lighting is used to increase light levels in work spaces above ambient levels. Replaces Halogen and Fluorescent technology	Average of 50W Hal, 13W CFL and Linear T5	19	80.4%	$ 0.40		126, 162	124, 155	1, 124, 155
Indoor Lighting	Ret	LED task lighting	LED task lighting is used to increase light levels in work spaces above ambient levels. Replaces Halogen and Fluorescent technology	Average of 50W Hal, 13W CFL and Linear T5	19	80.4%	$ 0.61		126, 162	124, 155	1, 124, 155

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Indoor Lighting	NC, Reno, Repl	Fluor high-low bay fixture - interior	Fluorescent fixture for high and low bay applications (assumes 4-lamp fixture). Generally for industrial warehouse and similar applications. Low bay is 10-15 ft.	average of 200W and 320W PSMH	15	47.2%	$ 0.15		168	1, 168	1, 60
Indoor Lighting	Ret	Fluor high-low bay fixture - interior	Fluorescent fixture for high and low bay applications (assumes 4-lamp fixture). Generally for industrial warehouse and similar applications. Low bay is 10-15 ft.	average of 200W and 320W PSMH	15	47.2%	$ 0.49		168	1, 168	1, 60, 68
Indoor Lighting	NC, Reno, Repl	LED High-Low Bay	LED fixture for high and low bay applications. Generally for industrial warehouse applications. Low bay is 10-15 ft.	MH 250 W CWA Pulse Start	15	54.9%	$ 0.58		1, 158, 168	1, 158, 168	1
Indoor Lighting	Ret	LED High-Low Bay	LED fixture for high and low bay applications. Generally for industrial warehouse applications. Low bay is 10-15 ft.	MH 250 W CWA Pulse Start	15	54.9%	$ 1.20		1, 158, 168	1, 158, 168	1
Indoor Lighting	NC, Reno, Repl	Occupancy on/off lighting control	On/off lighting control based on space occupancy	Manual control	10	30.0%	$ 0.21		168	168	48, 60, 168
Indoor Lighting	Ret	Occupancy on/off lighting control	On/off lighting control based on space occupancy	Manual control	10	30.0%	$ 0.43		168	168	48, 60, 168
Indoor Lighting	NC, Reno, Repl	Occupancy hi/low lighting control	Multilevel lighting control based on space occupancy. For example, to reduce lighting in the aisles of a warehouse.	Manual control	10	30.0%	$ 0.59		168	168, 1	72
Indoor Lighting	Ret	Occupancy hi/low lighting control	Multilevel lighting control based on space occupancy. For example, to reduce lighting in the aisles of a warehouse.	Manual control	10	30.0%	$ 1.00		168	168, 1	72
Indoor Lighting	NC, Reno, Repl	Daylight dimming	Automatic dimming in response to daylight, lumen depreciation and task needs to maintain light levels. For NC, optimization of natural light through shell measures is included under integrated building design.	Manual control	8	30.0%	$ 0.27		168	168	1, 168
Indoor Lighting	Ret	Daylight dimming	Automatic dimming in response to daylight, lumen depreciation and task needs to maintain light levels. For NC, optimization of natural light through shell measures is included under integrated building design.	Manual control	8	30.0%	$ 0.38		168	168	1, 168
Indoor Lighting	Ret	Wireless on-off lighting controls	On/off lighting controls attached to occupancy sensors. Eliminates the need for expensive cabling attached to each controlled light.	Manual control	10	30.0%	$ 0.47		39	39	183
Indoor Lighting	Ret	LED exit sign	Light emitting diode exit sign	Fluorescent exit sign	7	94.3%	$ 0.26		1, 20	168	168
Outdoor Lighting	NC, Reno, Repl	LED minor exterior area lighting	LED general area lighting on the outside of commercial buildings. This includes walkway, security, signage, and façade lighting	175W MH	14	72.1%	$ 0.71		162	127	127
Outdoor Lighting	Ret	LED minor exterior area lighting	LED general area lighting on the outside of commercial buildings. This includes walkway, security, signage, and façade lighting	CFLs, Halogen, and linear t5	14	72.1%	$ 1.03		162	127	127
Outdoor Lighting	NC, Reno, Repl	CFL - exterior 2012-2014	Spiral CFL for exterior applications to replace incandescent, 2012-14	Halogen PAR38 spot lamp	4	62.1%	$ 0.04		1	1, 59	59
Outdoor Lighting	Ret	CFL - exterior 2012-2014	Spiral CFL for exterior applications to replace incandescent, 2012-14	Halogen PAR38 spot lamp	4	62.1%	$ 0.08		1	1, 59	59
Outdoor Lighting	NC, Reno	LED Parking/Roadway Fixtures	LED outdoor lighting for parking areas and general area lighting (not utility-owned). This includes cobra heads, other more decorative street lights and canopy lighting.	Weighted average of 400W MH, 250W MH and 250W HPS, lamps and housing/fixtures	11	71.9%	$ 0.49		162	46, 162	1
Outdoor Lighting	Ret	LED Parking/Roadway Fixtures	LED outdoor lighting for parking areas and general area lighting (not utility-owned). This includes cobra heads, other more decorative street lights and canopy lighting.	Weighted average of 400W MH, 250W MH and 250W HPS lamps	11	71.9%	$ 0.60		162	46, 162	1
Outdoor Lighting	NC, Reno, Repl	Exterior Occupancy Sensors	Occupancy sensors controlling outdoor lighting	no occ sensor	10	41.0%	$ 0.74		1	1	1
Outdoor Lighting	Ret	Exterior Occupancy Sensors	Occupancy sensors controlling outdoor lighting	no occ sensor	10	41.0%	$ 1.22		1	1	1
Outdoor Lighting	NC, Reno, Repl	LED Municipal Streetlighting	LED street lighting owned by utilities	Combination of 250W MH and 250W HPS cobra heads	11	41.1%	$ 0.76		19	169	169
Outdoor Lighting	Ret	LED Municipal Streetlighting	LED street lighting owned by utilities	Combination of 250W MH and 250W HPS cobra heads	11	41.1%	$ 1.15		19	169	169

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Outdoor Lighting	NC, Reno	Improved ext lighting design	Reduced light levels and better outdoor lighting design. Includes reduced wattage lamps, better spacing, and use of cut-offs and reflectors to better control light and minimize glare	Standard exterior lighting practice	15	42.0%	$ 0.37		1	1, 30	30
Outdoor Lighting	NC, Reno, Repl	Outdoor Lighting Timeclocks	Time controls save energy by reducing lighting time of use through preprogrammed scheduling. Generally they dim the fixture during periods of low activity, such as 12am-5am. Time controls are applicable to utility owned street lights as well as non-utility owned outdoor light fixtures such as those in parking garages and security lighting	Standard efficiency exterior area lighting using metal halide and high-pressure sodium technologies	15	50.0%	$ 0.36		1	39	154
Outdoor Lighting	Ret	Outdoor Lighting Timeclocks	Time controls save energy by reducing lighting time of use through preprogrammed scheduling. Generally they dim the fixture during periods of low activity, such as 12am-5am. Time controls are applicable to utility owned street lights as well as non-utility owned outdoor light fixtures such as those in parking garages and security lighting	Standard efficiency exterior area lighting using metal halide and high-pressure sodium technologies	15	50.0%	$ 0.72		1	39	154
Cooling	NC, Reno, Repl	High-eff AC CEE Tier I	Packaged or split system unitary air conditioner meeting CEE Tier I efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	New unitary air conditioner meeting relevant energy codes or federal standards. Baseline efficiency reflects weighted average by size and type.	15	6.5%	$ 1.09		90	134,102,93, 168	135
Cooling	Ret	High-eff AC CEE Tier I	Packaged or split system unitary air conditioner meeting CEE Tier I efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	Existing stock efficiency unitary air conditioner. Existing stock efficiency reflects weighted average by size and type.	15	19.3%	$ 2.91		90	134,92,93,1 02,168	3, 135
Cooling	NC, Reno, Repl	High-eff AC CEE Tier II	Packaged or split system unitary air conditioner meeting CEE Tier II efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	New unitary air conditioner meeting relevant energy codes or federal standards. Baseline efficiency reflects weighted average by size and type.	15	10.3%	$ 1.09		90	134,102,93, 168	135
Cooling	Ret	High-eff AC CEE Tier II	Packaged or split system unitary air conditioner meeting CEE Tier II efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	Existing stock efficiency unitary air conditioner. Existing stock efficiency reflects weighted average by size and type.	15	22.6%	$ 2.55		90	134,92,93,1 68	3135
Cooling	NC, Reno, Repl	High-eff HP CEE Tier I - Cool	Single or polyphase packaged or split system unitary heat pump meeting CEE Tier I efficiency criteria. High efficiency level will reflect weighted average by size and type of units.	New unitary heat pump meeting relevant energy codes or federal standards. Baseline efficiency reflects weighted average by size and type.	15	3.8%	$ 3.00		90	134,102,93, 168	136, 135
Cooling	Ret	High-eff HP CEE Tier I - Cool	Single or polyphase packaged or split system unitary heat pump meeting CEE Tier I efficiency criteria. High efficiency level will reflect weighted average by size and type of units.	Existing stock efficiency unitary heat pump. Existing stock efficiency will reflect weighted average by size and type.	15	14.3%	$ 5.35		90	134,92,93,1 68	136, 135
Space Heating	NC, Reno, Repl	High-eff HP CEE Tier I - Heat	See corresponding "Cool" measure.	New unitary heat pump meeting relevant energy codes or federal standards. Baseline efficiency reflects weighted average by size and type.	15	2.0%	$ 3.00		90	134,102,93, 168	136, 135
Space Heating	Ret	High-eff HP CEE Tier I - Heat	See corresponding "Cool" measure.	Existing stock efficiency unitary heat pump. Existing stock efficiency will reflect weighted average by size and type.	15	6.7%	$ 5.35		90	134,92,93,1 68	136, 135
Cooling	NC, Reno, Repl	High-eff HP CEE Tier II - Cool	Single or polyphase packaged or split system unitary heat pump meeting an efficiency criteria substantially above CEE Tier II. High efficiency level will reflect the maximum level available from multiple major manufacturers, weighted by size and type of units.	Standard efficiency new unitary heat pump. Baseline efficiency will reflect weighted average by size and type.	15	11.3%	$ 0.79		90	134,102,93, 168	136
Cooling	Ret	High-eff HP CEE Tier II - Cool	Single or polyphase packaged or split system unitary heat pump meeting an efficiency criteria substantially above CEE Tier II. High efficiency level will reflect the maximum level available from multiple major manufacturers, weighted by size and type of units.	Existing stock efficiency unitary heat pump. Existing stock efficiency will reflect weighted average by size and type.	15	22.1%	$ 3.37		90	134,92,93,1 68	136

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Space Heating	NC, Reno, Repl	High-eff HP CEE Tier II - Heat	See corresponding "Cool" measure.	Standard efficiency new unitary heat pump. Baseline efficiency will reflect weighted average by size and type.	15	10.6%	$ 0.79		90	134,102,93, 168	136
Space Heating	Ret	High-eff HP CEE Tier II - Heat	See corresponding "Cool" measure.	Existing stock efficiency unitary heat pump. Existing stock efficiency will reflect weighted average by size and type.	15	14.3%	$ 3.37		90	134,92,93,1 68	136
Cooling	NC, Reno, Repl	Water src HP v. air src - Cool	Water cooled heat pump using a water loop as a heat sink.	Standard efficiency unitary heat pump.	15	29.0%	$ 0.49		1, 18, 22	93, 102, 103, 168	1, 170
Space Heating	NC, Reno, Repl	Water src HP v. air src - Heat	Water cooled heat pump using a water loop as a heat sink.	Standard efficiency unitary heat pump.	15	39.9%	$ 0.49		1, 18, 22	93, 102, 103, 168	104
Cooling	NC, Reno, Repl	Ground source HP - Cool	Heat pump using ground as a heat sink. Either trench or well type.	Standard efficiency unitary heat pump.	20	49.1%	$ 1.71		1, 18, 22	93, 102, 103, 168	104
Space Heating	NC, Reno, Repl	Ground source HP - Heat	Heat pump using ground as a heat sink. Either trench or well type.	Standard efficiency unitary heat pump.	20	33.2%	$ 1.71		1, 18, 22	93, 102, 103, 168	104
Cooling	Reno, Repl	HE Room AC	A 'room air conditioner' is defined as a consumer product, other than a 'packaged terminal air conditioner,' which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. It includes a prime source of refrigeration and may include a means for ventilating and heating. Upgrade to EER 10.8 (consistent with ENERGY STAR criteria for typical unit as of 5/27/09)	Standard efficiency Room AC unit meeting federal manufacturing standards.	9	9.3%	$ 0.39		90	15, 16, 93	17
Cooling	Ret	HE Room AC	A 'room air conditioner' is defined as a consumer product, other than a 'packaged terminal air conditioner,' which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. It includes a prime source of refrigeration and may include a means for ventilating and heating. Upgrade to EER 10.8 (consistent with ENERGY STAR criteria for typical unit as of 5/27/09)	Old window AC unit (7.5+ years old)	9	9.3%	$ 1.70		90	15, 16, 93	17
Cooling	NC, Reno, Repl	High-efficiency chillers Tier I	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier I	Standard efficiency water cooled chiller	25	19.9%	$ 1.54		1	102, 105, 93, 168	3, 39
Cooling	Ret	High-efficiency chillers Tier I	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier I	Standard efficiency water cooled chiller	25	28.7%	$ 2.62		1	92, 93, 105, 168	3, 39
Cooling	NC, Reno, Repl	High-efficiency chillers Tier II	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier II	Standard efficiency water cooled chiller	25	30.8%	$ 1.22		1	102, 105, 93, 168	3
Cooling	Ret	High-efficiency chillers Tier II	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier II	Standard efficiency water cooled chiller	25	38.4%	$ 2.15		1	92, 93, 105, 168	3
Cooling	NC, Reno	Opt unitary hvac dist/ctrl sys	High efficiency distribution system for unitary systems, based on mix of measures to optimize the total system efficiency. Potentially including controls, economizers, VFDs, VAV, better design, etc. This is mainly a design measure, applicable to NC and large renovation.	New construction standard efficiency unitary HVAC distribution system	15	30.0%	$ 0.53	0.004	40	51,93	3, 74, 39
Cooling	NC, Reno	Opt chiller dist/ctrl sys	High efficiency distribution system for chiller systems, based on mix of measures to optimize the total system efficiency. Potentially including controls, economizers, VFDs, better design, etc.	New construction standard efficiency unitary HVAC distribution system	10	20.0%	$ 0.53		22	64, 39	3, 74, 39
Cooling	NC, Reno	EMS/Controls -Cool	Energy management system and/or other controls to optimize control of HVAC system. Could include scheduling, optimal start-stop, chiller reset control, dual enthalpy economizers, CO2 sensors, etc.	No building automation	15	17.5%	$ 0.70	0.003	22	41, 42,114, 150	48, 75, 114

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Cooling	Ret	EMS/Controls -Cool	Energy management system and/or other controls to optimize control of HVAC system. Could include scheduling, optimal start-stop, chiller reset control, dual enthalpy economizers, CO2 sensors, etc.	No building automation	15	17.5%	$ 1.05	0.003	22	41, 42, 114, 150	48, 75, 114
Ventilation	NC, Reno	EMS/Controls -Vent	See corresponding "Cool" measure.	No building automation	15	17.5%	$ 0.70	0.003	22	41, 42, 114, 150	48, 75, 114
Ventilation	Ret	EMS/Controls -Vent	See corresponding "Cool" measure.	No building automation	15	17.5%	$ 1.05	0.003	22	41, 42, 114, 150	48, 75, 114
Cooling	NC, Reno, Repl	Dual enthalpy economizer	Dual enthalpy economizers with electronic controls to optimize use of outside air to reduce cooling loads.	Standard efficiency economizers, represents a mix of dry-bulb and single enthalpy.	10	7.1%	$ 1.37		1	168, 1	3
Cooling	Ret	Dual enthalpy economizer	Dual enthalpy economizers with electronic controls to optimize use of outside air to reduce cooling loads.	Existing stock, represents a mix of dry-bulb and fixed dampers.	10	9.6%	$ 1.01		1	168, 1	3
Cooling	NC, Reno, Repl	Demand controlled ventilation -Cool	Adjust ventilation rates based on indoor-air quality (typically by monitoring CO2 levels with sensors)	Ventilation system in which the outside air ventilation rate is fixed when the building is occupied	10	19.4%	$ 0.26	0.021	1	41, 25, 76, 150, 168	109
Cooling	Ret	Demand controlled ventilation -Cool	Adjust ventilation rates based on indoor-air quality (typically by monitoring CO2 levels with sensors)	Ventilation system in which the outside air ventilation rate is fixed when the building is occupied	10	19.4%	$ 0.32	0.021	1	41, 25, 76, 150, 168	109
Ventilation	NC, Reno, Repl	Demand controlled ventilation -Vent	See corresponding "Cool" measure.	Ventilation system in which the outside air ventilation rate is fixed when the building is occupied	10	10.0%	$ 0.26	0.021	1	25, 150	76
Ventilation	Ret	Demand controlled ventilation -Vent	See corresponding "Cool" measure.	Ventilation system in which the outside air ventilation rate is fixed when the building is occupied	10	10.0%	$ 0.32	0.021	1	25, 150	77
Cooling	Ret	HVAC tune-up -Cool	Optimize an existing HVAC system by adjusting refrigerant charge, air flow, and control set-points for maximum efficiency.	HVAC system with non-optimized airflow and refrigerant charge	6	7.5%	$ 0.13	0.007	39	61, 150	78, 79
Cooling	NC, Reno	Duct sealing -Cool	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	25	11.5%	$ 0.16		25	93, 150	80, 119
Cooling	Ret	Duct sealing -Cool	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	25	11.5%	$ 0.16		25	93, 150	80, 119
Ventilation	NC, Reno	Duct sealing -Vent	See corresponding "Cool" measure.	Leaky and unsealed ducts	25	9.0%	$ 0.16		25	93, 80, 150	80, 119
Ventilation	Ret	Duct sealing -Vent	See corresponding "Cool" measure.	Leaky and unsealed ducts	25	9.0%	$ 0.16		25	93, 80, 150	80, 119
Ventilation	NC, Reno, Repl	Variable Frequency Drive (VFD)	Variable frequency drive on applicable fans and pumps	No control or manual control with Inlet/outlet dampers or throttle valves	15	39.7%	$ 0.14		1, 18	1, 65	1, 48, 82
Ventilation	Ret	Variable Frequency Drive (VFD)	Variable frequency drive on applicable fans and pumps	No control or manual control with Inlet/outlet dampers or throttle valves	15	39.7%	$ 0.13		1, 18	65, 93	1, 48, 82
Cooling	NC, Reno, Repl	Low Flow Fume Hood	High efficiency low-flow fume hoods, typically used in laboratories, operate on the principle of an air supply with low turbulence intensity in the face of the hood. This alternative design results in significantly reduced volumes of exhaust air, which means less energy needed to move that air, while still providing sufficient air flow to dilute contaminants in the hood.	Constant volume (CV) and variable air volume (VAV) fume hoods with an average face velocity of >= 90 ft/min	25	44.4%	$ 0.38	0.007	88	88, 89	88, 89
Cooling	NC, Reno, Repl	HE stove hood -Cool	Optimized stove hoods to minimize conditioned make-up air requirements.	Standard stove hoods	20	10.5%	$ 0.51		27	62, 63, 81	63, 81
Cooling	Ret	HE stove hood -Cool	Optimized stove hoods to minimize conditioned make-up air requirements.	Standard stove hoods	20	10.5%	$ 0.51		27	62, 63, 81	63, 81
Ventilation	NC, Reno, Repl	HE stove hood -Vent	See corresponding "Cool" measure.	Standard stove hoods	20	68.0%	$ 0.51		27	62, 63, 81	63, 81
Ventilation	Ret	HE stove hood -Vent	See corresponding "Cool" measure.	Standard stove hoods	20	68.0%	$ 0.51		27	62, 63, 81	63, 81

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Water Heating	Ret	Electric DHW pipe insulation	Electric Domestic Hot Water pipe insulation	Uninsulated hot water pipe	15	0.4%	$ 0.01		31, 32	93	127
Water Heating	Ret	Electric water heater tank insulation	Electric water heater tank wrap insulation	Hot water tank without a tank wrap	10	0.6%	$ 0.09		91	93	127
Water Heating	NC, Reno, Ret	Elec instant water heat vs. elec DHW	Electric point-of-use water heating with no storage capacity, as compared to electric DHW storage.	Standard centrally located electric storage water heater	10	33.8%	$ 0.01		30	45, 62	172
Water Heating	Ret	Elec instant water heat vs. elec DHW	Electric point-of-use water heating with no storage capacity, as compared to electric DHW storage.	Standard centrally located electric storage water heater	10	33.8%	$ 0.13		30	45	172
Water Heating	Ret	Low-flow pre-rinse spray valve, elec DHW	Low-flow pre-rinse spray valve for food service applications	Pre-rinse spray valve greater than 1.6gpm	5	46.7%	$ 0.03		168	168	39
Cooling	NC, Reno, Repl	HP window glazing Tier I -Cool	Currently available high efficiency glazing	The baseline condition is assumed to be single pane clear glass with a solar heat gain coefficient of 0.87	20	6.1%	$ 0.08		91	93	39
Space Heating	NC, Reno, Repl	HP window glazing Tier I -Elec Heat	Currently available high efficiency glazing	The baseline condition is assumed to be single pane clear glass with a solar heat gain coefficient of 0.87	20	23.6%	$ 0.08		91	93	39
Elec Total	Reno	Deep Energy Retrofit - Electric	Deep energy retrofit going after deep savings in every building systems, mostly for the renovation market	Energy use of the existing building, before the deep energy retrofit occurs. Assumes energy use of typical existing building.	20	43.0%	$ 0.37		143	137	137
Cooling	Ret	Window Film	Window films reduce solar heat gain in the summer by blocking infrared radiation passing through windows. This reduces the cooling load in the summer	single pane clear glass in commercial buildings with a solar heat gain coefficient of 0.87	10	4.7%	$ 0.68	(0.023)	39	93	91
Office Equipment	MD	HE plug loads	Plug Load equipment, including computers, display, copier, fax, printer, power supply, TVs, and set top boxes	Standard Office equipment	4	65.8%	$ 0.07		168	131	131133
Office Equipment	Ret	Office equipment control	Low cost measures that can be done as a retrofit to an office building. Includes Power Management, advanced plug strips/timers, monitor brightness settings, and occupant behavior.	Standard Office equipment control and standard power strips	3	29.0%	$ 0.11		131, 132	131	131
Indoor Lighting	NC, Reno, Repl, Ret	Hospitality control - lighting	System controlling HVAC and lighting for hotels/motels	Typical hotel room with no key card control or occupancy sensor	15	33.0%	$ 0.17		25	25	25
Cooling	NC, Reno, Repl, Ret	Hospitality control - cooling	System controlling HVAC and lighting for hotels/motels	Typical hotel room with no key card control or occupancy sensor	15	20.0%	$ 0.17		25	25	25
Heating	NC, Reno, Repl, Ret	Hospitality control - heating	System controlling HVAC and lighting for hotels/motels	Typical hotel room with no key card control or occupancy sensor	15	20.0%	$ 0.17		25	25	25
Office Equipment	Ret	Hotel guestroom plug load reduction	efficient TVs and refrigerators in hotel guest rooms	Standard efficiency TVs and refrigerators	12	11.8%	$ 0.53		146	147	147
Office Equipment	Ret, Repl	Smart strip plug outlets	A multi-plug power strip with the ability to automatically disconnect specific loads that are plugged into it depending on the power draw of a control load, also plugged into the strip.	Conventional power strip with no mechanism for disconnecting loads	8	2.9%	$ 0.66		39	118	118
Water Heating	NC, Reno, Repl	HE clothes washer, elec DHW	High-efficiency commercial coin-op washers	Standard efficiency washer, elec DHW, electric dryer	11	28.4%	$ 0.47		33	168, 33, 62, 94	168, 33
Water Heating	Ret	HE clothes washer, elec DHW	High-efficiency commercial coin-op washers	Standard efficiency washer, elec DHW, electric dryer	11	19.9%	$ 3.18		33	168, 33, 62, 94	33
Refrigeration	NC, Reno, Repl	Energy Star vending machine	High-efficiency refrigerated vending machines. Includes better lighting, controls and refrigeration.	Standard efficiency new vending machine purchases.	14	42.1%	$ -		34, 35, 26, 94	94	47
Refrigeration	Ret	Vending miser	Vending miser or equivalent control to reduce lighting and refrigeration energy during low use periods	No control	10	37.5%	$ 0.28		1	93	85
Refrigeration	NC, Reno, Repl	High-eff built-up refrigeration	High-efficiency built-up refrigeration systems for grocery and refrigerated warehouses. This potentially includes HE compressors, better design and controls, HE motors and VFDs.	Standard efficiency built-up refrigeration systems	10	25.3%	$ 0.48	0.004	18, 34	34, 62	34

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Refrigeration	Ret	High-eff built-up refrigeration	High-efficiency built-up refrigeration systems for grocery and refrigerated warehouses. This potentially includes HE compressors, better design and controls, HE motors and VFDs.	Existing stock efficiency built-up refrigeration systems	10	31.4%	$ 2.59	0.004	18, 34	34, 62	34
Refrigeration	NC, Reno, Repl	High-eff reach-in refrig, freezers	High-efficiency stand-alone reach-in refrigeration & freezer units for grocery, convenience stores, restaurants and cafeterias. Efficiency improvements include better door heater control, better lighting, HE compressors, greater insulation.	Standard efficiency new reach-in refrigeration units.	9	26.0%	$ 0.39		20, 34, 35	93	97
Refrigeration	NC, Reno, Repl	HE Ice Makers	High efficiency new ice machines	Standard efficiency new ice machines	8	9.0%	$ 0.09		98, 97	97	97
Refrigeration	NC, Reno, Repl	High-efficiency small walk-in	High-efficiency small walk-in cooler with self-contained refrigeration system	Standard efficiency walk-in refrigeration system	13	54.0%	$ 0.10		1	34, 62	34
Refrigeration	Ret	Walk-in refrig retrofit package	High efficiency walk-in refrigeration system retrofit improvements (includes economizer, humidistat, evaporator fan control, etc.)	Standard efficiency existing stock walk-in refrigeration systems	16	16.8%	$ 0.23		34, 38	49	49
Refrigeration	NC, Reno, Repl	High-efficiency display coolers	High-efficiency refrigerated display coolers	Standard efficiency one door beverage merchandiser	9	35.1%	$ 0.26		34	62	34
Refrigeration	Ret	High-efficiency display coolers	High-efficiency refrigerated display coolers	Standard efficiency existing stock display cooler	9	35.1%	$ 4.01		34	62	34
Water Heating	NC, Reno, Repl	Heat pump H2O heat from refrig -WH	Heat pump water heating using waste heat recovery from refrigeration systems (water heating component)	Air cooled refrigeration, traditional gas or electric water heating (note some electric water heating savings result as well)	14	43.0%	$ 0.35		20	64, 20	20
Water Heating	Ret	Heat pump H2O heat from refrig -WH	Heat pump water heating using waste heat recovery from refrigeration systems (water heating component)	Air cooled refrigeration, traditional gas or electric water heating (note some electric water heating savings result as well)	14	50.0%	$ 0.38		20	64, 20	20
Refrigeration	NC, Reno, Repl	Heat pump H2O heat from refrig -Refrig	Heat pump water heating using waste heat recovery from refrigeration systems (refrigeration component)	Air cooled refrigeration, traditional gas or electric water heating (note some electric water heating savings result as well)	14	5.0%	$ -		20	62	20
Refrigeration	Ret	Heat pump H2O heat from refrig -Refrig	Heat pump water heating using waste heat recovery from refrigeration systems (refrigeration component)	Air cooled refrigeration, traditional gas or electric water heating (note some electric water heating savings result as well)	14	5.0%	$ -		20	62	20
Elec Total	Ret	Retrocommissioning - Elec	Optimizing energy usage of existing buildings and systems using O&M, control calibration, etc.	A typical existing building that hasn't been commissioned	7	9.0%	$ 0.09		25, 54, 55, 56	115, 25	115
Elec Total	NC, Reno	Commissioning -Elec	Whole building commissioning of new buildings to ensure optimized design, installation and operation of systems.	New Construction building with no commissioning performed	7	7.3%	$ 0.55		25, 54, 55, 56	115	115
Elec Total	NC	Integrated bldg design Tier I -Elec	Reflects comprehensive, optimized design of new buildings addressing all end-uses and interactions between them on a systems basis. Measures include, but are not limited to, improved air barrier performance, minimum IAQ performance, lighting controls, improved lighting power density, improved mechanical equipment efficiency, and demand controlled ventilation.	New building conforming to ASHARE 90.1-2007	15	36.4%	$ 0.61		58	184	184
Cooling	Ret	Cool roof	White roofing material or coating, to reflect the sun and reduce air-conditioning loads	Typical black roof	20	32.2%	$ 5.13	(0.000)	90	141	142
Cooling	NC, Reno, Repl	Cool roof	White roofing material or coating, to reflect the sun and reduce air-conditioning loads	Typical black roof with typical reflectance and absorption	20	32.2%	$ 0.46	(0.000)	90	141	142
Elec Total	NC	Building operational efficiency (behavioral)	Reflects an amalgamation of both post-consumption (indirect) and real-time (direct) energy usage feedback to building managers and occupants via monthly mailing, on-site displays, etc., as could be supported by Advanced Metering Infrastructure (AMI) - an emerging technology.	New building without planned direct / indirect feedback on electric usage	5	3.0%	$ 0.52		39	39	25, 39

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Elec Total	Ret	Building operational efficiency (behavioral)	Reflects an amalgamation of both post-consumption (indirect) and real-time (direct) energy usage feedback to building managers and occupants via monthly mailing, on-site displays, etc., as could be supported by Advanced Metering Infrastructure (AMI) - an emerging technology.	Building without direct / indirect feedback on electric usage	5	3.0%	$ 0.52		39	39	25, 39
Data Center	NC, Reno, Repl	Data centers virtualization -IT	Data Center energy savings for information technology (computer loads) at facilities or rooms used to house computer servers and data systems through the use of server virtualization.	Typical data center without server virtualization	5	47.9%	$ 0.17		57	57, 62	86, 39
Data Center	Ret	Data centers virtualization -IT	Data Center energy savings for information technology (computer loads) at facilities or rooms used to house computer servers and data systems through the use of server virtualization.	Typical data center without server virtualization	5	47.9%	$ 0.17		57	57, 62	86, 39
Cooling	NC, Reno, Repl	Data centers virtualization -Cool	Data Center reduced cooling loads associated with electric savings for computer loads.	Typical data center without server virtualization	5	47.9%	$ 0.17		57	57, 62	86, 39
Cooling	Ret	Data centers virtualization -Cool	Data Center reduced cooling loads associated with electric savings for computer loads.	Typical data center without server virtualization	5	47.9%	$ 0.17		57	57, 62	86, 39
Miscellaneous	NC, Reno, Repl	Water & sewer process	Municipal water and wastewater treatment system optimization, including replacing coarse-bubble aeration with fine-pore aeration, right-sizing pump, impeller trimming, addition of pony pump for smaller loads or VFD, leak reduction, better O&M practices.	Existing practices including coarse-bubble aeration, oversized pumps with no VFD.	10	31.7%	$ 0.38		39	200	200
Miscellaneous	Ret	Water & sewer process	Municipal water and wastewater treatment system optimization, including replacing coarse-bubble aeration with fine-pore aeration, right-sizing pump, impeller trimming, addition of pony pump for smaller loads or VFD, leak reduction, better O&M practices.	Existing practices including coarse-bubble aeration, oversized pumps with no VFD.	10	31.7%	$ 0.38		39	200	200
Miscellaneous	Ret	ECM Circulator Pump	Install a variable speed circulation pump instead of a constant speed pump	Circulator pump using a low efficiency shaded pole motor installed on the primary loop of a multiloop	20	64.7%	$ 0.65		1	1	1
Water Heating	Ret	Low-flow showerhead, elec DHW	0	0	10	0.1%	$ 0.01		91	91, 1, 116	91, 116
Food Preparation	Ret	HE kitchen equipment - elec, 2 meal	High-efficiency commercial electric kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep	Standard Food Preparation Equipment	12	27.1%	$ 1.35		91, 97	97	97
Food Preparation	NC, Reno, Repl	HE kitchen equipment - elec, 2 meal	High-efficiency commercial electric kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep	Standard Food Preparation Equipment	12	27.1%	$ 0.12		91, 97	97	97
Food Preparation	Ret	HE kitchen equipment - elec, 3 meal	High-efficiency commercial electric kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep	Standard Food Preparation Equipment	12	25.9%	$ 1.41		91, 97	97	97
Food Preparation	NC, Reno, Repl	HE kitchen equipment - elec, 3 meal	High-efficiency commercial electric kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep	Standard Food Preparation Equipment	12	25.9%	$ 0.11		91, 97	97	97
Elec Total	Ret	Behavioral Measures - Elec	Includes occupant training, interactive meters w/ real-time pricing capability.	No Behavioral Modification Program	1	2.0%	$ 0.09		185	185	39
Water Heating	Ret	Switch elec DHW to gas	40-gal electric DHW tank to 40-gal gas condensing gas water heater (standalone)	40-gallon electric DHW tank	13	100.0%	$ 0.22	(0.003)	29	191, 168	29
Water Heating	Repl	Switch elec DHW to gas	40-gal electric DHW tank to 40-gal gas condensing gas water heater (standalone)	40-gallon electric DHW tank	13	100.0%	$ 0.14	(0.003)	29	191, 168	29
Space Heating	Ret	Fuel switch elec unit heater to gas	Fuel switch elec unit heater to gas	Electric unit heater	20	100.0%	$ 0.19	(0.004)	138	39	198
Space Heating	Repl	Fuel switch elec unit heater to gas	Fuel switch elec unit heater to gas	Electric unit heater	20	100.0%	$ 0.01	(0.004)	138	39	197198
Space Heating	Ret	Fuel switch elec unit heater to infrared gas	Fuel switch elec unit heater to infrared gas	Electric unit heater	20	100.0%	$ 0.05	(0.003)	138	39	199

Commercial Fossil Fuel Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (kWh per MMBtu saved)	Data Sources: Measure Life Source	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Space Heating	NC, Reno, Repl	HP window glazing Tier I -FF Heat	Currently available high efficiency glazing	The baseline condition is assumed to be single pane clear glass with a solar heat gain coefficient of 0.87	20	3.2%	$ 0.08		91	93	39
Space Heating	Reno	Deep Energy Retrofit - Fossil Fuel	Deep energy retrofit going after deep savings in every building systems, mostly for the renovation market	Energy use of the existing building, before the deep energy retrofit occurs. Assumes energy use of typical existing building.	20	43.0%	$ 107.99		143	137	137
Space Heating	Ret	Envelope Upgrade	Add attic insulation,wall insulation, and air sealing to small commercial building envelopes	Typical envelope insulation levels and tightness for existing northeastern small commercial buildings	15	14.8%	$ 85.95	$107.29	144	149, 152	149
Fuel Total	Ret	Retrocommissioning - Fossil Fuel	Optimizing energy usage of existing buildings and systems using O&M, control calibration, etc.	A typical existing building that hasn't been commissioned	7	16.0%	$ 25.94		25, 54, 55, 56	115	115
Fuel Total	NC, Reno	Commissioning -Fossil Fuel	Whole building commissioning of new buildings to ensure optimized design, installation and operation of systems.	New Construction building with no commissioning performed	7	13.0%	$ 161.62		25, 54, 55, 56	115	115
Space Heating	NC	Integrated bldg design Tier I -Fossil Fuel	Reflects comprehensive, optimized design of new buildings addressing all end-uses and interactions between them on a systems basis. Measures include, but are not limited to, improved air barrier performance, minimum IAQ performance, lighting controls, improved lighting power density, improved mechanical equipment efficiency, and demand controlled ventilation.	New building conforming to ASHARE 90.1-2007	15	36.4%	$ 179.58		58	148	184
Space Heating	NC, Reno, Repl	High-efficiency fossil fuel furnace	Higher Efficiency (typically condensing) gas fired Furnace	Standard efficiency furnace (non-condensing for gas)	20	15.2%	$ 101.08		90	39	39
Space Heating	NC, Reno, Repl	High-efficiency boiler	Higher Efficiency gas or oil fired boiler, AFUE 85% or greater	Standard efficiency gas fired boiler, AFUE 80%	25	14.9%	$ 176.39		39	116	91
Space Heating	NC, Reno, Repl	High-efficiency boiler	Higher Efficiency gas or oil fired boiler, AFUE 85% or greater	Standard efficiency gas fired boiler, AFUE 75%	25	20.2%	$ 208.88		39	91, 116	91
Space Heating	NC, Reno, Repl	Condensing gas unit heater	High-efficiency power-vented unit heaters have a sealed flue which reduces losses when the heater is not firing	Power Driven Unit Heater (78% AFUE)	20	14.3%	$ 133.06		138	140	140
Space Heating	Ret	Condensing gas unit heater	High-efficiency power-vented unit heaters have a sealed flue which reduces losses when the heater is not firing	Gravity Driven Unit Heater (63% AFUE)	20	30.8%	$ 71.89		138	140	140
Space Heating	NC, Reno, Repl	High-efficiency gas infrared heater	High efficiency gas-fired infrared heating unit	Standard efficiency gas unit heater	17	17.4%	$ 15.20		91	91, 116	91
Water Heating	Ret	Gas boost H2O heater on HE dishwasher	Gas fired boost heater for intake hot water pipe on HE commercial dishwasher	Commercial dishwasher with the tank temperature set to deliver sanitized water (180° F) without a boost heater	20	38.0%	$ 3.49		117	97	97
Water Heating	NC, Reno, Repl	Gas HE tank-type water heater	Gas fired high efficiency stand-alone tank-type water heater	Stand-alone gas-fired tank type water heater with a thermal efficiency of .8	13	12.0%	$ 15.00		93	116	91
Water Heating	Ret	Gas HE tank-type water heater	Gas fired high efficiency stand-alone tank-type water heater	Stand-alone gas-fired tank type water heater with a thermal efficiency of .8	13	21.0%	$ 27.27		93	116	91
Space Heating	Ret	Programmable thermostat, fossil fuel heat	Programmable thermostat allows user to automatically cycle space heating equipment on and off to desired set point throughout the day using pre-programmed timers, for gas heat	Assume space heating equipment size of 1,000 Mbtu/h at 75% AFUE	12	5.3%	$ 11.65		93	116	91
Space Heating	MD	Duct insulation and sealing, FF heat	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	25	11.5%	$ 46.50		119	93	39
Space Heating	Ret	Duct insulation and sealing, FF heat	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	25	11.5%	$ 46.50		119	93	39
Water Heating	Ret	Low-flow showerhead, FF DHW	reduces flow rate on showers	Standard shower head (average rated at 3.25 GPM)	5	61.5%	$ 2.85		116	91, 1, 116	116
Water Heating	Ret	Faucet aerator, FF DHW	reduces flow rate on sinks	Standard faucet (average rated at 2.2 GPM)	5	31.8%	$ 22.42		93	91, 1, 116	116
Water Heating	NC, Reno	Commercial clothes washers, FF DHW	High efficiency commercial clothes washers save both kWh and MMBtu. 2.84 cu. ft. machine that meats CEE Tier II (1.60 MEF).	Regular efficiency commercial clothes washer hooked up to Gas-fired hot water (assumes 2.84 cu. ft. machine) at NAECA required efficiency of 1.04 MEF	12	43.4%	$ 174.09		91	94	94
Water Heating	Ret	Pre-rinse spray valves, FF DHW	Reduces flow rate for commercial food service dish pre-rinse sprayers	Pre-rinse spray valve at 3.2 gpm (1.5 hours/per day; 360 day/year. Water temperature rise 70F; gas heater thermal efficiency 0.8)	5	3.6%	$ 2.33		91	91	91, 177

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (kWh per MMBtu saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Water Heating	Ret	Water heater tank insulation, FF DHW	Wrapping a stand-alone water heater in insulating blanket	Stand-alone gas-fired water heater (thermal efficiency .8) without tank insulation	10	0.7%	$ 20.97		116	91, 1, 116	116
Water Heating	Ret	Hot water pipe insulation, FF DHW	Wrapping hot water send and return pipes in Insulation	Stand-alone gas-fired water heater (thermal efficiency .8) without outlet pipe insulation	10	0.4%	$ 3.43		116	91, 1, 116	116
Water Heating	NC, Reno	Hot water pipe insulation, FF DHW	Wrapping hot water send and return pipes in Insulation	Stand-alone gas-fired water heater (thermal efficiency .8) without outlet pipe insulation	10	0.4%	$ 3.43		116	91, 1, 116	116
Food Preparation	Ret	Gas kitchen equipment, 2 meal	High-efficiency commercial gas kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep fryer, griddle, grill) - 2 meals per day	Non-Energy Star gas-fired commercial kitchen equipment, prototype setup	12	32.7%	$ 138.67		91, 97	97	97
Food Preparation	NC, Reno, Repl	Gas kitchen equipment, 2 meal	High-efficiency commercial gas kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep fryer, griddle, grill) - 2 meals per day	Non-Energy Star gas-fired commercial kitchen equipment, prototype setup	12	0.0%	$ 15.21		91, 97	39	97
Food Preparation	Ret	Gas kitchen equipment, 3 meal	High-efficiency commercial gas kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep fryer, griddle) for a restaurant that serves 3 meals per day	Standard Food Preparation Equipment	12	29.2%	$ 168.79		91, 97	97	97
Food Preparation	NC, Reno, Repl	Gas kitchen equipment, 3 meal	High-efficiency commercial gas kitchen cooking/warming equipment (holding cabinet, steamer, combination oven, deep fryer, griddle) for a restaurant that serves 3 meals per day	Standard Food Preparation Equipment	12	29.2%	$ 15.78		91, 97	97	97
Space Heating	Ret	Behavioral Measures - Fossil Fuel Heat, DHW	Includes occupant training, interactive meters w/ real-time pricing capability.	No Behavioral Modification Program	1	2.0%	$ 5.00		185	39	39
Water Heating	NC, Reno	Point of use water heat, gas DHW	Electric water heating at point of use with no storage capacity	0	10	28.1%	$ 8.19		87, 91	97, 91	97, 91, 119
Food Preparation	NC, Reno, Repl	Turbo Pot	24 qt. Stock Pot	Standard stock pot	3	27.8%	$ 10.30		192	189, 190	190
Water Heating	NC, Reno, Repl, Ret	Ozone Laundry	Ozone Laundry systems for large laundromats and facilities with on-site laundry	Standard Laundry System	20	91.0%	$ 21.95	$4.06	193	194	194
Space Heating	Ret	Steam Traps	Replace steam traps for commercial steam heating systems	Failed Steam Traps	6	33.4%	$ 5.54		196	196	196
Space Heating	Ret	Fuel switch oil burner to dual fuel	replace oil burner with a burner using gas as primary fuel	Oil burner on commercial boiler	25	100.0%	$ 334.00	$0.89	90	39	39

Industrial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Data Sources: Measure Life Source	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Industrial Process	NC, Repl	Industrial process	Represents a comprehensive suite of industrial energy efficiency measures addressing electric process energy.	Standard efficiency for aggregated measures	14	21.5%	$ 0.09		181, 182	181, 182, 39	181, 182, 39
Industrial Process	Ret	Industrial process	Represents a comprehensive suite of industrial energy efficiency measures addressing electric process energy.	Standard efficiency for aggregated measures	14	21.3%	$ 0.09		181, 182	181, 182, 39	181, 182, 39
Indoor Lighting	NC, Reno, Repl	Industrial lighting	Represents a comprehensive suite of industrial energy efficiency measures addressing indoor lighting.	Standard efficiency for aggregated measures	12	25.4%	$ 0.15		181, 182	181, 182, 39	181, 182, 39
Indoor Lighting	Ret	Industrial lighting	Represents a comprehensive suite of industrial energy efficiency measures addressing indoor lighting.	Standard efficiency for aggregated measures	12	33.8%	$ 0.15		181, 182	181, 182, 39	181, 182, 39
Cooling	NC, Reno, Repl	Industrial space cooling	Represents a comprehensive suite of industrial energy efficiency measures addressing space cooling	Standard efficiency for aggregated measures	10	6.0%	$ 0.75		181, 182	181, 182, 39	181, 182, 39
Cooling	Ret	Industrial space cooling	Represents a comprehensive suite of industrial energy efficiency measures addressing space cooling	Standard efficiency for aggregated measures	10	6.0%	$ 0.75		181, 182	181, 182, 39	181, 182, 39
Motors-Pumps	Ret	Sensors and controls - Motors-Pumps	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Motors-Fans and Blowers	Ret	Sensors and controls - Motors-Fans and Blowers	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Motors-Compressed Air	Ret	Sensors and controls - Motors-Compressed Air	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Motors-Refrigeration	Ret	Sensors and controls - Motors-Refrigeration	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Process Heating-Drying and Curing	Ret	Sensors and controls - Process Heating-Drying and Curing	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Process Heating-Heat Treating	Ret	Sensors and controls - Process Heating-Heat Treating	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Process Heating-Heating	Ret	Sensors and controls - Process Heating-Heating	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Process Heating-Melting and Casting	Ret	Sensors and controls - Process Heating-Melting and Casting	Implement process control systems to improve the efficiency industrial processes. Sensors are inexpensive to install, reliable, and analyze in real-time.	Industrial processes with no-, inadequate, or inoperable controls and sensors/	15	3.0%	$ 0.10		11	11, 39	11, 39
Other-HVAC	Ret	Energy Management systems -Other-HVAC	Install energy management systems to properly monitor and control lighting and HVAC systems.	Facilities with no energy management systems	10	7.0%	$ 0.63		11	11, 39	11, 39
Other-Lighting	Ret	Energy Management systems -Other-Lighting	Install energy management systems to properly monitor and control lighting and HVAC systems.	Facilities with no energy management systems	10	7.0%	$ 0.63		11	11, 39	11, 39
Elec Total	Ret	Energy Information Systems	Install hardware-based systems providing real-time information (e.g., real-time pricing or load shedding requests) on energy usage to facility managers locally or over the internet	Facilities with no energy information systems	10	1.0%	$ 0.25		11	11, 39	11, 39
Elec Total	Ret	Efficient Transformers (Tier 2)	Install energy efficient transformers. All electric power passes through one or more dry-type transformers on its way to service equipment, lighting, and other loads. Energy efficient transformers save a fraction of every kWh delivered to the plant.	Standard efficiency transformers	30	1.6%	$ 1.07		11	11, 39	11, 39
Motors-Refrigeration	Ret	Duct/Pipe Insulation - Motors-Refrigeration	Install insulation to reduce heat loss from non-insulated surfaces that are above or below ambient conditions.	No-, inadequate, or damaged duct/pipe insulation	7	20.0%	$ 0.30		11	11, 39	11, 39

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Process Heating-Heating	Ret	Duct/Pipe Insulation - Process Heating-Heating	Install insulation to reduce heat loss from non-insulated surfaces that are above or below ambient conditions.	No-, inadequate, or damaged duct/pipe insulation	7	20.0%	$ 0.30		11	11, 39	11, 39
Other-HVAC	Ret	Duct/Pipe Insulation - Other-HVAC	Install insulation to reduce heat loss from non-insulated surfaces that are above or below ambient conditions.	No-, inadequate, or damaged duct/pipe insulation	7	20.0%	$ 0.30		11	11, 39	11, 39
Motors-Refrigeration	Ret	Cooling and storage	Utilize innovative designs of cooling/refrigeration equipment in food preservation. Specific to the food and beverage manufacturing industries.	Standard efficiency cooling/refrigeration equipment; no thermal storage	15	20.0%	$ 3.50		11	11, 39	11, 39
Elec Total	Ret	electric supply system improvements	Modify existing power supplies to reduce phase unbalance, voltage variations, and poor supply waveforms that reduce equipment efficiency and cause equipment damage.	Standard efficiency electric supply systems	5	3.0%	$ 0.04		11	11, 39	11, 39
Process Total	Ret	Microwave processing	Implement microwave processing. Microwave processing has a number of advantages such as precise control of the heating process, improved yield, higher production rate and improved product quality.	Conventional heating processes	10	3.0%	$ 1.25		11	11, 39	11, 39
Process Heating-Drying and Curing	Ret	RF heating and drying - Process Heating-Drying and Curing	Implement radio frequency (RF) heating and drying processes to provide a thermal profile that conventional heating and drying methods alone are not able to achieve.	Conventional heating and drying methods	10	1.0%	$ 1.25		11	11, 39	11, 39
Process Heating-Heating	Ret	RF heating and drying - Process Heating-Heating	Implement radio frequency (RF) heating and drying processes to provide a thermal profile that conventional heating and drying methods alone are not able to achieve.	Conventional heating and drying methods	10	1.0%	$ 1.25		11	11, 39	11, 39
Other-Lighting	Ret	Efficient lighting design -- Office	Implement efficient lighting design applicable to office space, warehouses, and production areas.	Standard efficiency lighting design	8	44.0%	$ 0.12		11	11, 39	11, 39
Other-Lighting	Ret	Efficient lighting design -- Manuf	Implement efficient lighting design applicable to office space, warehouses, and production areas.	Standard efficiency lighting design	8	23.0%	$ 0.14		11	11, 39	11, 39
Other-Lighting	Ret	Efficient lighting design -- Warehouse	Implement efficient lighting design applicable to office space, warehouses, and production areas.	Standard efficiency lighting design	8	86.0%	$ 0.14		11	11, 39	11, 39
Other-Lighting	Ret	Efficient lighting fixtures and lamps -- Office	Install efficient lamps and ballasts applicable to office space, warehouses, and production areas.	Standard efficiency lighting fixtures and lamps	12	17.0%	$ 3.68		11	11, 39	11, 39
Other-Lighting	Ret	Efficient lighting fixtures and lamps -- Manuf	Install efficient lamps and ballasts applicable to office space, warehouses, and production areas.	Standard efficiency lighting fixtures and lamps	14	40.0%	$ 0.93		11	11, 39	11, 39
Other-Lighting	Ret	Efficient lighting fixtures and lamps -- Warehouse	Install efficient lamps and ballasts applicable to office space, warehouses, and production areas.	Standard efficiency lighting fixtures and lamps	15	46.0%	$ 0.97		11	11, 39	11, 39
Motors Total	Ret	Advanced motor designs	Implement advanced motor system designs.	Standard efficiency motor systems designs	20	6.2%	$ 0.39		11	11, 39	11, 39
Motors Total	Ret	motor management	Implement motor rewind best practices so degradation of efficiency is minimized during the rewinding. Best practices include using low burn-out temperatures to remove old windings and rewinding per the original pattern.	Conventional motor rewind practices	20	0.8%	$ 0.18		11	11, 39	11, 39
Motors Total	Ret	Advanced lubricants	Replace conventional petroleum-based oils and greases with synthetic, engineered lubricants to reduce energy consumption and equipment wear while extending lubricant life.	Conventional lubricants	1	3.0%	$ 0.03		11	11, 39	11, 39
Motors-Pumps	Ret	Motor system optimization -Motors-Pumps	Improve systems performance by optimizing the flows in motor-driven systems, principally fan and pump systems, to meet end use requirements.	Non-optimized motor systems	10	1.2%	$ 0.07		11	11, 39	11, 39
Motors-Fans and Blowers	Ret	Motor system optimization -Motors-Fans and Blowers	Improve systems performance by optimizing the flows in motor-driven systems, principally fan and pump systems, to meet end use requirements.	Non-optimized motor systems	10	1.2%	$ 0.07		11	11, 39	11, 39

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Other-HVAC	Ret	Motor system optimization -Other-HVAC	Improve systems performance by optimizing the flows in motor-driven systems, principally fan and pump systems, to meet end use requirements.	Non-optimized motor systems	10	1.2%	$ 0.07		11	11, 39	11, 39
Motors-Compressed Air	Ret	Compressed air system management	Improve compressed air system performance by addressing the individual components, the supply and demand sides of the system, and the interaction between the components and the system. Savings opportunities include repairing leaks, eliminating inappropriate uses of compressed air, and optimizing system pressure level.	Non-optimized compressed air system	10	17.0%	$ 0.08		11	11, 39	11, 39
Motors-Compressed Air	Ret	Air Compressor Systems Advanced Controls	Install air compressor controls to efficiently match the air supply from the compressors with system demand.	Conventional compressor capacity controls	10	3.5%	$ 0.14		11	11, 39	11, 39
Motors-Pumps	Ret	Pump efficiency improvement	Improve pump system efficiency giving consideration to flow requirements, required delivered pressure, and the system effects.	Standard efficiency pump systems	10	20.0%	$ 0.13		11	11, 39	11, 39
Motors-Fans and Blowers	Ret	Fan system efficiency - Motors-Fans and Blowers	Improve fan systems efficiency by reducing air demand, improving control, and establishing proper maintenance.	Standard efficiency fan systems	10	6.0%	$ 0.33		11	11, 39	11, 39
Other-HVAC	Ret	Fan system efficiency - Other-HVAC	Savings in industrial fan systems include efficient fans, reduction in air demand, improved control and proper maintenance.	Standard efficiency fan systems	10	6.0%	$ 0.33		11	11, 39	11, 39
Motors-Refrigeration	Ret	Efficient refrigeration systems	Opportunities include system design, component design (e.g. adjustable speed drives), and improved operation and maintenance practices.	Standard efficiency refrigeration systems	15	10.0%	$ 0.45		11	11, 39	201, 39
Process Heating-Drying and Curing	Ret	Advanced Curing Technologies	Implement advanced curing technologies such as ultraviolet (UV) curing.	Conventional curing technologies	15	15.0%	$ 0.98		11	11, 39	11, 39
Process Heating-Heat Treating	Ret	Electric IR heating and drying -Process Heating-Heat Treating	Install electric infrared (IR) heating equipment to cure coatings in materials fabrication and other applications.	Conventional curing and drying technologies	18	15.0%	$ 2.91		11	11, 39	11, 39
Process Heating-Heating	Ret	Electric IR heating and drying -Process Heating-Heating	Install electric infrared (IR) heating equipment to cure coatings in materials fabrication and other applications.	Conventional curing and drying technologies	18	15.0%	$ 2.91		11	11, 39	11, 39
Process Heating-Drying and Curing	Ret	E-beam sterilization	Install electron-beam sterilization equipment in place of less efficient sterilization technologies	Conventional sterilization technologies	15	10.0%	$ 0.01		11	11, 39	11, 39
Process Total	Ret	industrial heat pumps	Install high-efficiency heat pumps for industrial process applications	Conventional process heating technologies	15	10.0%	$ 1.24		11	11, 39	11, 39

Industrial Fossil Fuel Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (kWh per MMBtu saved)	Data Sources: Measure Life Source	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Industrial Process	NC, Reno, Repl	Industrial Process - NG	Represents a comprehensive suite of industrial energy efficiency measures addressing Natural gas process energy.	Standard efficiency for aggregated measures	15	15.0%	$ 45.00		181, 182	39	39
Industrial Process	Ret	Industrial Process - NG	Represents a comprehensive suite of industrial energy efficiency measures addressing Natural gas process energy.	Standard efficiency for aggregated measures	15	15.0%	$ 45.00		181, 182	39	39
Industrial Process	NC, Reno, Repl	Industrial Process - Oil	Represents a comprehensive suite of industrial energy efficiency measures addressing Petroleum Fuels process energy.	Standard efficiency for aggregated measures	15	15.0%	$ 90.00		181, 182	39	39
Industrial Process	Ret	Industrial Process - Oil	Represents a comprehensive suite of industrial energy efficiency measures addressing Petroleum Fuels process energy.	Standard efficiency for aggregated measures	15	15.0%	$ 90.00		181, 182	39	39
Fuel Total	Ret	Improved process control	Install monitors and controls to maximize boiler combustion efficiency	Non-optimized boiler combustion efficiency	15	3.0%	$ 12.28		166	166	166
Fuel Total	Ret	Maintain boilers	Implement proper and timely boiler maintenance procedures	No- or inadequate boiler maintenance procedures	2	10.0%	$ 2.43		166	166	166
Fuel Total	Ret	Flue gas heat recovery/economizer	Use waste heat from boiler flue gas to preheat boiler intake water or provide space heating	No heat recovery systems	15	2.0%	$ 17.41		166	166	166
Fuel Total	Ret	Blowdown steam heat recovery	Use waste heat from boiler blowdown to preheat boiler intake water or provide space heating	No heat recovery systems	15	1.3%	$ 15.28		166	166	166
Fuel Total	Ret	Upgrade burner efficiency	Install more effcient burners on boilers	Standard efficiency burners	20	1.3%	$ 49.98		166	166	166
Fuel Total	Ret	Water treatment	Treat boiler water to reduce mineral buildup which reduces heat transfer efficiency	No- or inadequate water treatment technologies	10	1.0%	$ 6.34		166	166	166
Fuel Total	Ret	Load control	Install controls to properly stage boiler systems	No- or inadequate boiler staging controls	15	4.0%	$ 13.64		166	166	166
Fuel Total	Ret	Improved insulation	Install and maintain insulation on boiler piping	No-, inadequate, or damaged duct/pipe insulation	15	8.0%	$ 6.55		166	166	166
Fuel Total	Ret	Steam trap maintenance	Properly maintain steam traps to ensure rapid remediation of malfunctions	No- or inadequate steam trap maintenance procedures	2	12.5%	$ 0.84		166	166	166
Fuel Total	Ret	Automatic steam trap monitoring	Install automated monitors to allow diagnosis of steam trap conditon	No automatic steam trap monitoring	15	5.0%	$ 3.41		166	166	166
Fuel Total	Ret	Leak repair	Repair leaks in steam distribution lines and fittings	Unrepaired leaks in steam distribution system	2	4.0%	$ 1.08		166	166	166
Fuel Total	Ret	Condensate return	Reuse condensate water for boiler feedwater	No condensate reuse	15	10.0%	$ 9.57		166	166	166
Fuel Total	Ret	Improve ceiling insulation	Install and maintain ceiling insulation to reduce HVAC energy use	No- or standard efficiency ceiling insulation	20	24.3%	$ 85.70		166	166	166
Fuel Total	Ret	Install HE(95%) cond furnace/boiler	Install high efficiency furnaces and boilers for HVAC	Standard efficiency furnaces and boilers	20	18.0%	$ 37.88		166	166	166
Fuel Total	Ret	Stack heat exchanger	Install heat exchangers to recover heat from or reject heat to HVAC system exhaust air to minimize heating and cooling requirements	No heat recovery systems	20	5.0%	$ 18.41		166	166	166
Fuel Total	Ret	Duct insulation	Install and maintain insulation on HVAC ductwork	No-, inadequate, or damaged duct insulation	20	2.0%	$ 7.04		166	166	166
Fuel Total	Ret	EMS install	Installing energy management system to control HVAC systems	Facilities with no energy management systems	20	10.0%	$ 31.79		166	166	166
Fuel Total	Ret	EMS optimization	Optimize existing energy management system to control HVAC systems	Facilities with non-optimized energy management systems	5	1.0%	$ 0.61		166	166	166
Fuel Total	Ret	Process Controls & Management	Implement various computer-based process controls to maximize efficiency of process operations. Specific applications are dependent on industry type.	No- or inadequate process controls and management	8	5.4%	$ 4.99		166	166	166
Fuel Total	Ret	Heat Recovery	Recovering and reusing waste heat from manufacturing process for other processes or space heating	No heat recovery systems	20	20.4%	$ 92.06		166	166	166
Fuel Total	Ret	Efficient burners	Install more efficient burners for process applications	Standard efficiency burners	10	18.3%	$ 14.27		166	166	166
Fuel Total	Ret	Process integration	Optimize operations such that components and operations are well matched in terms of capacity and function across multiple processes.	Unintegrated processes	15	16.5%	$ 87.04		166	166	166
Fuel Total	Ret	Efficient drying	Install more efficient direct drying equipment	Conventional drying technologies	20	16.5%	$ 61.55		166	166	166
Fuel Total	Ret	Closed hood	Install enclosed hood on paper machines to reduce thermal energy requirements. Specific to paper manufacturing industries.	Open-hood paper machines	15	5.0%	$ 34.82		166	166	166
Fuel Total	Ret	Extended nip press	Install more efficient paper pressing technologies to reduce drying requirements. Specific to paper manufacturing industries.	Conventional paper press technologies	20	16.0%	$ 92.59		166	166	166

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (kWh per MMBtu saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Fuel Total	Ret	Improved separation processes	Implement improved separation processes such as combined reaction and distillation, ion exchange and bio-separation, and hybrid processes. Specific to chemical manufacturing facilities.	Conventional separation processes	20	10.0%	$ 26.30		166	166	166
Fuel Total	Ret	Thermal oxidizers	Install regenerative thermal oxidizers to recover waste heat from VOC incineration processes. Specific to chemical manufacturing facilities.	Conventional thermal oxidizers	15	60.0%	$ 208.90		166	166	166
Fuel Total	Ret	Flare gas controls and recovery	Install improved recovery systems to reduce or eliminate flaring. Specific to petroluem manufacturing industries.	Uncontrolled flare gas	15	50.0%	$ 87.04		166	166	166
Fuel Total	Ret	Fouling control	Implement improved controls and maintenance practices to reduce fouling of heat-exhange surfaces. Specific to petroluem manufacturing industries.	No specific fouling controls or maintenance practices	5	7.0%	$ 3.53		166	166	166
Fuel Total	Ret	Efficient furnaces	Implement various furnace design improvements to maximize furnace efficiency. Specific to petroluem manufacturing industries.	Standard efficiency furnaces	20	6.0%	$ 13.89		166	166	166
Fuel Total	Ret	Oxyfuel	Install oxy-fuel furnace, i.e., using oxygen rich combustion air, to improve furnace efficiency. Specific to nonmetallic mineral product manufacturing industries.	Standard efficiency furnaces	20	20.0%	$ 63.13		166	166	166
Fuel Total	Ret	Batch cullet preheating	Install a cullet (scraps of broken or waste glass) pre-heater utilizing furnace waste heat. Specific to nonmetallic mineral product manufacturing industries.	No heat recovery systems	15	16.0%	$ 27.85		166	166	166
Fuel Total	Ret	Preventative maintenance	Implement a preventative maintenance plan training personnel to increase energy-conserving behaviors	No- or inadequate preventative maintenance plans	5	2.0%	$ 1.21		166	166	166
Fuel Total	Ret	Combustion controls	Install controls to improve combustion efficiency. Specific to fabricated metal products manufacturing industries.	No- or inadequate combustion controls	8	8.0%	$ 5.32		166	166	166
Fuel Total	Ret	Optimize furnace operations	Implement various strategies to optimize combustion and heat transfer efficiency. Specific to fabricated metal products manufacturing industries.	Non-optimized furnace operations	10	10.0%	$ 9.52		166	166	166
Fuel Total	Ret	Insulation/reduce heat losses	Install insulation to reduce heat loss from non-insulated surfaces that are above or below ambient conditions. Specific to fabricated metal products manufacturing industries.	No-, inadequate, or damaged insulation	15	5.0%	$ 29.79		166	166	166

Residential Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Data Sources		
									Measure Life Source	Savings Data Sources	Costs Data Sources
Refrigeration	NC, Reno, Repl	Efficient Refrigerator, ESTAR	An Energy Star labeled refrigerator replaces a minimum federal standard efficiency unit	Federal standard efficiency refrigerator	17	20.0%	$ 0.81		168	168	168
Refrigeration	NC, Reno, Repl	Efficient Refrigerator Tier II	A high efficiency refrigerator replaces a minimum federal standard efficiency unit	Federal standard efficiency refrigerator	17	25.0%	$ 0.65		168	168	168
Cooling	NC, Reno, Repl	Efficient Window AC ESTAR	Replace room AC with energy star labeled unit; 8-13kbtu, >10.8 EER	Federal standard efficiency window air conditioner, EER 9.8	12	9.3%	$ 1.53		168	168	168
Cooling	NC, Reno, Repl	Efficient Window AC Tier I	Replace room AC with CEE tier 1 unit; 8-13kbtu, >11.3 EER	Federal standard efficiency window air conditioner, EER 9.8	12	13.3%	$ 2.14		168	168	168
Cooling	NC, Reno, Repl	Efficient Central AC ESTAR	Replace standard efficiency central AC with Energy Star qualified model (SEER 14.5, EER 12)	Federal standard efficiency central air conditioning system, SEER 13, EER 11	18	10.3%	$ 6.97		176	176	176
Cooling	Ret	Efficient Central AC ESTAR	Replace standard efficiency central AC with Energy Star qualified model (SEER 14.5, EER 12)	Federal standard efficiency central air conditioning system, SEER 13, EER 11	18	10.3%	$ 6.97		176	176	1005
Cooling	NC, Reno, Repl	Efficient Central AC Tier II	Replace or upgrade standard efficiency central AC with CEE Tier 2 model (SEER 15, EER 12.5)	Federal standard efficiency central air conditioning system, SEER 13, EER 11	18	13.3%	$ 6.59		168	168	1005
Cooling	Ret	Efficient Central AC Tier II	Replace or upgrade standard efficiency central AC with CEE Tier 2 model (SEER 15, EER 12.5)	Federal standard efficiency central air conditioning system, SEER 13, EER 11	18	13.3%	$ 6.59		168	168	1005
Cooling	Ret	Efficient CAC early Replacement	Replace existing low efficiency central AC with CEE Tier 2 model (SEER 15, EER 12.5)	Low efficiency central AC	18	42.0%	$ 6.78		168	168	168
Cooling	Ret	Window AC replacement	an existing, functioning window ac is replaced with an energy Star model	An existing, inefficient window AC	12	28.7%	$ 2.91		168	176	176
Cooling	NC, Reno, Repl	Air Source Heat Pump ESTAR -Cool	Replace existing electric ASHP cooling system with Energy Star qualified model (SEER 14.5, EER 12)	Standard efficiency, ducted, ASHP, 13 SEER, 11 EER	18	10.3%	$ 2.84		176	176	176
Space Heating	NC, Reno, Repl	Air Source Heat Pump ESTAR -Heat	Replace a standard efficiency electric ASHP with Energy Star qualified unit, min 8.2 HSPF	Standard efficiency, ducted, ASHP, 7.7 HSPF	18	6.1%	$ 1.32		176	176	176
Cooling	NC, Reno, Repl	ASHP, Cooling, Tier 2	Replace existing electric ASHP cooling systemwith CEE Tier 2 unit 15SEER, 12.5EER	Standard efficiency, ducted, ASHP, 13 SEER, 11 EER	18	13.3%	$ 1.71		176	176	1005
Space Heating	NC, Reno, Repl	ASHP, Heat, Tier 2	Replace a standar efficiency electric ASHP with a CEE Tier 2 qualified unit	Standard efficiency, ducted, ASHP, 7.7 HSPF	18	9.0%	$ 1.71		176	176	176
Cooling	NC, Reno, Repl	Efficient fan motor -Cool	Efficient furnace fan motor (ECM or BPM) to replace standard efficiency (PSC) motors	standard efficiency permanent split capacitor (PSC) motor for central AC	18	50.0%	$ 1.12		176	168	176
Cooling	ret	Efficient fan motor -Cool	Efficient furnace fan motor (ECM or BPM) to replace standard efficiency (PSC) motors	standard efficiency permanent split capacitor (PSC) motor for central AC	18	50.0%	$ 1.12		176	168	176
Space Heating	NC, Reno, Repl	Efficient fan motor -Heat	Efficient furnace fan motor (ECM or BPM) to replace standard efficiency (PSC) motors	standard efficiency permanent split capacitor (PSC) motor for heating system	18	50.0%	$ 0.83		176	168	176
Space Heating	ret	Efficient fan motor -Heat	Efficient furnace fan motor (ECM or BPM) to replace standard efficiency (PSC) motors	standard efficiency permanent split capacitor (PSC) motor for heating system	18	50.0%	$ 0.83		176	168	176
Cooling	Ret	Duct Sealing -Cool	Air-seal duct work to reduce loss of conditioned air into unconditioned space, cooling only	Leaky ductwork within unconditioned space	20	5.0%	$ 1.83		176	176	127
Space Heating	Ret	Duct Sealing, Heat Pump -Heat	Air-seal duct work to reduce loss of conditioned air into unconditioned space, heat pump	Leaky ductwork within unconditioned space	20	33.0%	$ 0.50		168	168	127
Space Heating	NC, Reno, Repl	High performance window - ESH	an R-5 window in place of a standard window	standard double pane window with vinyl sash	25	59.2%	$ 0.41		168	176	176
Space Heating	NC, Reno, Repl	High performance window - HP	an R-5 window in place of a standard window	standard double pane window with vinyl sash	25	59.2%	$ 0.76		168	176	176
Cooling	NC, Reno, Repl	High performance window - Cool	an R-5 window in place of a standard window	standard double pane window with vinyl sash	25	39.6%	$ 0.95		168	176	176
Space Heating	NC, Reno, Repl	WiFi T-stats - Elec Resistance	An internet enabled programmable thermostat is installed	standard non-programmable thermostat	15	13.0%	$ 0.19		176	39	39
Space Heating	NC, Reno, Repl	WiFi T-stats - HP	An internet enabled programmable thermostat is installed	standard non-programmable thermostat	15	13.0%	$ 0.41		176	39	39
Plug Loads	NC, Reno, Repl	Controlled Power Strip	Controlled power strips eliminate standby loads by turning off devices connected to the same power strip as the controlling appliance	Power strip with no control	4	81.6%	$ 0.28		176	176	176

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Plug Loads	NC, Reno, Repl	Desktop Computer, Energy Star labeled	Advanced new power supply designs offer more than 80% efficiency across a wide range of load conditions and often need no cooling fan.	Standard efficiency power supply	4	50.1%	$ 0.06		127	127	127
Indoor Lighting	RET	CFL Direct Install	Blend of specialty and standard CFLs replaces a blended baseline of halogen and incandescent bulbs. Lamp is installed directly by a contractor	A blended average of incandescent and halogen general service lamp	6	64.2%	$ 0.12		176	127	127
Indoor Lighting	RET	LED Direct Install	Standard LED A lamp replaces a blended baseline of halogen and incandescent bulbs. Lamp is installed directly by a contractor	A blended average of incandescent and halogen general service lamp	20	75.0%	$ 0.22		176	127	127
Indoor Lighting	NC, Reno, Repl	CFL - spiral retail	A CFL replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	6	64.2%	$ 0.03		176	176	176
Indoor Lighting	NC, Reno, Repl	CFL - specialty retail	A specialty CFL replaces a specialty incandescent or halogen general service lamp	A blended average of incandescent and halogen specialty lamp	7	75.0%	$ 0.10		176	176	176
Indoor Lighting	NC, Reno, Repl	CFL fixture, hardwired, interior retail	A CFL fixture replaces an incandescent or halogen general service fixture	A blended average of incandescent and halogen general service lamp	3	64.2%	$ 0.82		176	176	176
Indoor Lighting	NC, Reno, Repl	SSL fixture	An SSL fixture replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	20	81.5%	$ 0.51		176	176	176
Indoor Lighting	NC, Reno, Repl	CFL fixture, hardwired, exterior	A CFL fixture replaces an incandescent or halogen general service fixture	A blended average of incandescent and halogen general service lamp	7	64.2%	$ 0.30		176	176	176
Indoor Lighting	NC, Reno, Repl	Exterior Motion Sensor	A motion sensor controlled exterior fixture replaces and uncontrolled fixture	an exterior fixture without motion sensor or any other controls	15	60.4%	$ 0.18		127	127	127
Indoor Lighting	NC, Reno, Repl	Exterior SSL 450 to 1600 lumens	An exterior SSL replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	20	75.0%	$ 0.18		127	127	127
Indoor Lighting	NC, Reno, Repl	Exterior SSL >1600 lumens	An exterior SSL replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	20	75.0%	$ 0.09		127	127	127
Water Heating	NC, Reno, Repl	Clothes Washer - Retail	An efficient clothes washer is purchased in place of a conventional clothes washer. Includes dryer savings for average dryer energy mix	a new conventional clothes washer	14	26.9%	$ 1.16	0.001	176	176	176
Kitchen/Laundry	NC, Reno, Repl	Tier 2 Clothes Washer - Elec	An efficient clothes washer is purchased in place of a conventional clothes washer. Includes dryer savings for average dryer energy mix	a new conventional clothes washer	14	29.8%	$ 1.21		176	176	176
Water Heating	Ret	Clothes Washer - Early Replacement	Removal of an existing inefficient clothes washer prior to its natural end of life and replacement with a new unit exceeding ENERGY STAR standards. Includes dryer savings for average dryer energy mix	an existing conventional clothes washer	14	45.4%	$ 2.51	0.001	176	176	176
Miscellaneous	NC, Reno, Repl	Pool Pump	the purchase of a multi speed swimming pool pump capable of running at 50% speed and being run twice as many hours to move the same amount of water through the filter.	Single speed pool pump	10	87.4%	$ 0.28		176	176	176
Indoor Lighting	NC, Reno, Repl	LED Screw Based Lamp retail <450 Lumens	A SSL replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	20	79.0%	$ 0.25		176	176	176
Indoor Lighting	NC, Reno, Repl	LED Screw Based Lamp retail 450 to 1600 Lumens	A SSL replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	20	75.0%	$ 0.14		176	176	176
Indoor Lighting	NC, Reno, Repl	LED Screw Based Lamp retail >1600 Lumens	A SSL replaces an incandescent or halogen general service lamp	A blended average of incandescent and halogen general service lamp	20	56.0%	$ 0.12		176	176	176
Elec Total	Ret	Enhanced Behavior based Efficiency initiative	Customer is provided with feedback and guidance to save energy at home.	No Initiative	1	2.0%	$ 0.07		175	175	175
Refrigeration	Ret	Refrigerator Retirement	An extra refrigerator is taken out of service	A homeowner has an extra refrigerator running (often in basement, garage or porch)	8	100.0%	$ 0.33		176	176	176
Refrigeration	Ret	Refrigerator Early Replacement	An aging refrigerator is replaced with a new, energy star model.	An older, inefficient refrigerator remains in use until it dies.	12	17.3%	$ 1.58		176	176	176

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Measure Life Source	Savings Data Sources	Costs Data Sources
Water Heating	NC, Reno, Repl	Electric Heat Pump Water Heater >55gal	High efficiency heat pump water heater replaces electric resistance water heater, COP>2.0 Measure null; April 2015	Standard efficiency electric resistance water heater, >55 gallons, .90 EF	10	48.0%	$ 0.53		168	168	168
Water Heating	NC, Reno, Repl	Electric Heat Pump Water Heater <55gal	High efficiency heat pump water heater replaces electric resistance water heater, COP>2.0	Standard efficiency electric resistance water heater, <55 gallons, .90 EF	10	48.0%	$ 0.53		168	168	168
Water Heating	NC, Reno, Repl	Tank wrap, electric water heater	Additional R-20 insulation blanket, 50 gal water heater	Uninsulated, 50 gal storage water heater	5	4.5%	$ 0.22		176	176	176
Water Heating	NC, Reno, Repl	Pipe insulation, electric water heater	Add R-3.5 insulation to uninsulated hot water pipes	Uninsulated hot water pipes	15	0.8%	$ 0.12		176	176	176
Water Heating	Ret	LF Showerhead - Elec	a conventional showerhead is replaced with a low-flow showerhead	a conventional 2.5 gpm showerhead	10	20.0%	$ 0.10		176	176	176
Water Heating	Ret	Faucet Aerator - Elec	a conventional 2.2 gpm faucet aerator is replaced with a low-flow aerator	a conventional faucet aerator	5	20.0%	$ 0.41		176	176	176
Kitchen/Laundry	NC, Reno, Repl	ESTAR Clothes Dryers - Elec	an Energy Star Clothes Dryer is purchased in place of a standard efficiency clothes dryer.	Standard efficiency Clothes Dryer	14	15.0%	$ 0.94		176	176	176
Kitchen/Laundry	NC, Reno, Repl	SEDI Clothes Dryers - Elec	an Energy Star Clothes Dryer is purchased in place of a standard efficiency clothes dryer.	Standard efficiency Clothes Dryer	14	26.0%	$ 1.44		176	176	176
Cooling	Ret	Air Sealing -Cool	Reduce air leakage in building shell using blower door guidance and durable materials	The building's air leakage before reduction	15	15.0%	$ 1.29		176	176	1005
Space Heating	Ret	Air Sealing, Heat Pump - Heat	Reduce air leakage in building shell using blower door guidance and durable materials	The building's air leakage before reduction	15	5.0%	$ 0.89		176	176	1005
Cooling	Ret	Insulation -Cool	Add R-19 insulation to attic	modestly insulated attic (R-25)	25	10.0%	$ 0.35		176	176	1005
Space Heating	Ret	Insulation, Heat Pump - Heat	Add R-19 insulation to attic	modestly insulated attic (R-25)	25	43.2%	$ 3.55		176	176	1005
Refrigeration	NC, Reno, Repl	Energy Star Freezer	Customer purchases an Energy Star Freezer instead of baseline	Customer purchases a baseline freezer	12	11.5%	$ 0.59		176	176	176
Refrigeration	Ret	Freezer early retirement	An extra freezer is taken out of service	A homeowner has an extra freezer running (often in basement, garage or porch)	8	100.0%	$ 0.26		127	127	127
Refrigeration	NC, Reno, Repl	Multi Family refrigerator	An CEE tier 2 listed refrigerator is purchased in place of a minimum federal standard efficiency unit	Federal standard efficiency refrigerator	17	25.0%	$ 0.72		127	127	127
Refrigeration	Ret	Multi Family refrigerator, early replace	A CEE tier 2 listed refrigerator replaces an existing, inefficient refrigerator	An inefficient refrigerator remains in use	17	34.6%	$ 2.00		127	127	127
Water Heating	NC, Reno, Repl	Multi Family in-unit clothes washer	An CEE tier 2 listed clothes washer is purchased in place of a minimum federal standard efficiency clothes washer	A baseline clothes washer	14	24.5%	$ 1.23		127	127	127
Water Heating	Ret	Multi Family clothes washer early replace	A CEE tier 2 listed clothes washer replaces an existing, inefficient clothes washer	Standard efficiency clothes washer	14	33.9%	$ 2.53		127	127	127
Space Heating	NC, Reno, Repl	Resistance to NG Fuel Switch	a customer replaces or supplements electric heat with natural gas wall furnace	customer uses electric resistance space heat	25	100.0%	$ 0.06	(0.013)	176	168	168
Space Heating	NC, Reno, Repl	Resistance to Ductless mini split	a customer offsets electric resistance heat with a ductless heat pump	electric resistance heat	17	58.0%	$ 0.53		176	168	168
Water Heating	NC, Reno, Repl	Resistance to NG Fuel Switch	An electric resistance water heater is replaced by a Natural Gas fired water heater	electric resistance water heater	13	100.0%	$ 0.21	(0.018)	176	168	168

Residential Fossil Fuel Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	% Savings	Incre-mental Cost/kWh Saved	Annual Fossil Fuel Savings (kWh per MMBtu saved)	Data Sources: Measure Life Source	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Space Heating	Ret	Duct Sealing, Fossil Fuel -Heat	Air-seal duct work to reduce loss of conditioned air into unconditioned space, NG	Leaky ductwork within unconditioned space	20	33.0%	$ 19.74		168	168	127
Space Heating	NC, Reno, Repl	Gas Boiler ESTAR	High efficiency gas boiler meeting Energy Star criteria (>85 AFUE)	Gas boiler meeting minimum federal standards (82 AFUE)	18	8.9%	$ 78.89		176	168	176
Space Heating	NC, Reno, Repl	Gas Furnace ESTAR	High efficiency gas furnace meeting Energy Star criteria (>90 AFUE)	Gas furnace meeting minimum federal standards (80 AFUE)	18	11.1%	$ 52.87		168	168	168
Space Heating	NC, Reno, Repl	Oil Furnace ESTAR	High efficiency oil furnace meeting Energy Star criteria (>85 AFUE)	oil furnace meeting minimum federal standards (83 AFUE)	18	2.4%	$ 258.71		168	168	168
Space Heating	NC, Reno, Repl	High performance window - NG	an R-5 window in place of a standard window	standard double pane window with vinyl sash	25	59.2%	$ 98.81		168	176	176
Space Heating	NC, Reno, Repl	WiFi T-stats - NG	An internet enabled programmable thermostat is installed	standard non-programmable thermostat	15	14.0%	$ 45.92		176	39	39
Water Heating	NC, Reno, Repl	Tier 2 Clothes Washer - Gas	An efficient clothes washer is purchased in place of a conventional clothes washer. Includes dryer savings for average dryer energy mix	a new conventional clothes washer	14	30.0%	$ 342.47		176	176	176
Fuel Total	Ret	Enhanced Behavior based Efficiency initiative - FF	Customer is provided with feedback and guidance to save energy at home.	No Initiative	1	1.3%	$ 5.00		175	175	175
Water Heating	NC, Reno, Repl	Condensing Gas Water Heater >55gal	High efficiency gas condensing storage or on demand water heater	Standard efficiency gas water heater, >55 gallons, .58 EF	13	29.9%	$ 193.79		176	176	176
Water Heating	NC, Reno, Repl	Condensing Gas Water Heater <55gal	High efficiency gas condensing storage or on demand water heater	Standard efficiency gas water heater, <55 gallons, .58 EF	13	29.9%	$ 193.79		176	176	176
Water Heating	NC, Reno, Repl	Tankless water heater	An Energy Star tankless water heater replaces a standard efficiency unit	Standard efficiency gas water heater, <55 gallons, .58 EF	13	30.0%	$ 118.97		176	176	176
Water Heating	NC, Reno, Repl	High efficiency gas storage water heater	A high efficiency gas water heater replaces a standard efficiency unit	Standard efficiency gas water heater, <55 gallons, .58 EF	13	14.0%	$ 58.49		176	176	176
Water Heating	Ret	LF Showerhead - NG	a conventional showerhead is replaced with a low-flow showerhead	a conventional 2.5 gpm showerhead	10	20.0%	$ 21.33		176	176	176
Water Heating	Ret	Faucet Aerator - NG	a conventional 2.2 gpm faucet aerator is replaced with a low-flow aerator	a conventional faucet aerator	5	20.0%	$ 93.75		176	176	176
Kitchen/Laundry	NC, Reno, Repl	ESTAR Clothes Dryers - Gas	an Energy Star Clothes Dryer is purchased in place of a standard efficiency clothes dryer.	Standard efficiency Clothes Dryer	14	15.0%	$ 277.78		176	176	176
Kitchen/Laundry	NC, Reno, Repl	SEDI Clothes Dryers - Gas	an Energy Star Clothes Dryer is purchased in place of a standard efficiency clothes dryer.	Standard efficiency Clothes Dryer	14	26.0%	$ 427.35		176	176	176
Space Heating	Ret	Air Sealing, Fossil Fuel - Heat	Reduce air leakage in building shell using blower door guidance and durable materials	The building's air leakage before reduction	15	5.0%	$ 68.90		176	176	1005
Space Heating	Ret	Insulation, Fossil Fuel - Heat	Add R-19 insulation to attic	modestly insulated attic (R-25)	25	10.0%	$ 210.34		176	176	1005
Water Heating	NC, Reno, Repl	Water Heating, petroleum fuels	High-efficiency water heating by petroleum fuels	Standard efficiency petroleum-fueled water heating	18	10.0%	$ 182.42		176	127	127
Water Heating	Ret	Pipe insulation, gas water heater	Add R-3.5 insulation to uninsulated hot water pipes	un-insulated pipes	15	0.8%	$ 19.61		176	127	127
Space Heating	NC, Reno, Repl	Fossil to ductless mini split	a customer offsets LP or oil heat with a ductless heat pump	oil or lp heat	17	100.0%	$ 73.26	($97.33)	176	168	168
Water Heating	NC, Reno, Repl	Oil to HP fuel Switch	An oil-fired stand alone DHW tank is replaced by a heat pump water heater	oil fired standalong DHW tank	20	100.0%	$ 46.68	($81.57)	176	168	168
Water Heating	NC, Reno, Repl	LP to HP Fuel Switch	An LP-fired stand alone DHW tank is replaced by a heat pump water heater	LP fired standalong DHW tank	20	100.0%	$ 46.68	($81.57)	176	168	168