Business Program

Technical Reference Manual (TRM)
Standard Measures

Revision 05

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Measure Savings Algorithms and Cost Assumptions

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Summary of Measures, by Type

NEW indicates recently added measures. The three-part number preceding each measure indicates where this measure is located in this report.

9.1 LIGHTING		
	Measure	**Code**
	Highbay Fixtures	
9.1.1	**Highbay Fixture Replacement Option**	BPL91
	Linear Fluorescent and Occupancy Sensors	
9.1.2	**Fluorescent U-bend Relamp and reballast**	BPL40
9.1.3	**T12 to T8 (32 watt) Relamp and Reballast**	BPL60
9.1.4	**T12 to T8 (low wattage 28 watt) Relamp and reballast**	BPL41
9.1.5	**T12 to T8 (ultra low Wattage 25 watt) Relamp and reballast**	BPL42
9.1.6	**T8 to T5, or T8 to Reduced Wattage T8 Relamp and reballast**	BPL44
9.1.7	**T12 to T8 (17 watt – 2' lamp) Relamp and reballast**	BPL66 NEW
9.1.8	**New Fluorescent Fixtures**	BPL62
9.1.9	**T12 to T8 Fluorescent Fixtures with Reflectors**	BPL63
9.1.10	**T12 to T5 New Fluorescent fixture**	BPL43
9.1.11	**Single lamp T5 fluorescent fixture with reflector**	BPL45
9.1.12	**High Efficiency Fluorescent Fixtures**	BPL64
9.1.13	**Low Glare High Efficiency Recessed Fixtures**	BPL65
9.1.14	**Controls for T5 and High Performance T8 Systems**	BPL72
9.1.15	**Remote Mounted Occupancy Sensors**	BPL73
9.1.16	**Occupancy Sensors**	BPL74
9.1.17	**Remote Mounted Occupancy Sensors (Low Wattage)**	BPL79 NEW
	Incandescent Replacements	
9.1.18	**CFL Lamps**	On-line store
9.1.19	**LED Lamps**	BPL81
9.1.20	**LED Recessed Down Lamps**	BPL84
	Low Wattage Ceramic Metal Halide (CMH)	
9.1.21	**CMH Fixtures (replaces incandescent <100 watts)**	BPL85
9.1.22	**CMH Fixtures (replaces incandescent 100-350 watts)**	BPL89
9.1.23	**CMH Integral Ballast Lamps**	BPL86
	Hard-Wired CFL	
9.1.24	**Hard-Wired CFL Fixtures ≤30 Watts**	BPL87
9.1.25	**Hard-Wired CFL Fixtures >30 Watts**	BPL88
	Exterior HID (High Intensity Discharge) Fixtures	
9.1.26	**Exterior Lighting**	BPL50
9.1.27	**Canopy Lighting w/ electronic ballasts**	BPL51 discontinued (all exterior lighting merged into BPL50)
	LED Cooler/Freezer Lighting	
9.1.28	**Glass Door LED Cooler/Freezer Lighting**	BPL93
9.1.29	**Glass Door LED cooler/Freezer Lighting Controls/Sensors**	BPL94
	Miscellaneous	
9.1.30	**PSMH/CMH with Electronic Ballasts**	BPL75
9.1.31	**Controls for H.I.D. Systems**	BPL77
9.1.32	**LED Exit Signs**	BPL78
9.1.33	**LED Exit Sign Retro-fit Kit**	BPL82 NEW
9.1.34	**Permanent Lamp Removal**	NA

9.2 HVAC		
	Measure	**Code**
	Seasonal Tune-Ups	

9.2.1	**Air Conditioner Tune-Up**	BPC21
9.2.2	**Air-cooled Chiller Tune-Up**	BPC22 NEW
9.2.3	**Water-cooled Chiller Tune-Up**	BPC23 NEW
9.2.4	**Gas Boiler Tune-Up**	BPH1
9.2.5	**Gas Forced-Air Furnace Tune-Up**	BPH2
	New Cooling Equipment	
9.2.6	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (Up to 65,000 Btuh; Mimimum 14 SEER)**	BPC1
9.2.7	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (Up to 65,000 Btuh; Minimum: 15 SEER)**	BPC2
9.2.8	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (65,000 through 239,999 Btuh; Minimum 11.5 EER / 11.9 IPLV)**	BPC3
9.2.9	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (65,000 through 239,999 Btuh; Minimum 12 EER / 12.4 IPLV)**	BPC4
9.2.10	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (240,000 through 759,999 Btuh; Minimum 10.5 EER / 10.9 IPLV)**	BPC5
9.2.11	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (240,000 through 759,999 Btuh; Minimum 10.8 EER / 12.0 IPLV)**	BPC6
9.2.12	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (760,000 or more Btuh; Minimum 9.7 EER / 11.0 IPLV)**	BPC7
9.2.13	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (760,000 or more Btuh; Minimum 10.2 EER / 11.0 IPLV)**	BPC8
9.2.14	**Air-Cooled Chillers**	BPC12
	New Cooling Equipment	
9.2.15	**Room Air Conditioner (ENERGY STAR qualified)**	BPC13
9.2.16	**Room Air Conditioner (SEHA Tier 1)**	BPC14
9.2.17	**PTAC/PTHP**	BPC15
	New Heating Equipment	
9.2.18	**Gas Boiler Replacement (AFUE 85% minimum)**	BPH3
9.2.19	**Gas Boiler Replacement (Thermal Efficiency 90% minimum)**	BPH4
9.2.20	**Gas Furnace Replacement (90% AFUE)**	BPH5
9.2.21	**Gas Furnace Replacement (92% AFUE)**	BPH6
9.2.22	**Gas Furnace Replacement (94% AFUE)**	BPH7
	HVAC Controls	
9.2.23	**Variable Frequency Drive on HVAC Motor**	BPC20

9.3 LODGING		
	Measure	**Code**
	Lodging (HVAC)	
9.3.1	**Guest Room Energy Management (GREM) Controls (PTAC)**	BPLD1
9.3.2	**Guest Room Energy Management (GREM) Controls (PTHP)**	BPLD2

9.4 REFRIGERATION		
	Measure	**Code**
	Closers	
9.4.1	**Automatic Door Closer for Walk-In Freezer/Cooler (back access door) or Walk-In Cooler Door, or Walk-In Freezer Door**	BPR7
9.4.2	**Auto Closer for display case door; Reach-in Cooler Door, or Reach-in Freezer Door**	BPR13
	Curtains, Doors, Anti-Sweat Heater Controls, and Gaskets	
9.4.3	**Strip Curtain on Walk-in Coolers or Freezers**	BPR1
9.4.4	**Night Curtain for Open Cooler**	BPR12
9.4.5	**Anti-Sweat Heater Control (freezer)**	BPR33 (was BPR2)
9.4.6	**Anti-Sweat Heater Control (refrigerator)**	BPR34 (was BPR3)
9.4.7	**Door Gaskets**	BPR14 (Discontinued)
9.4.8	**Solid Door Freezer (up to 15 cu ft)**	BPR27
9.4.9	**Solid Door Freezer (15-30 cu ft)**	BPR28
9.4.10	**Solid Door Freezer (31-50 cu ft)**	BPR29
9.4.11	**Solid Door Freezer (51+ cu ft)**	BPR30

9.4.12	Glass Door Freezer (31-50 cu ft)	BPR31
9.4.13	Glass Door Freezer (51+ cu ft)	BPR32
9.4.14	Evaporator Fan Controls	BPR6
	Vending Macines and controls, and Ice Machines	
9.4.15	ENERGY STAR Vending Machine	BPR8
9.4.16	Beverage Machine Control	BPR9
9.4.17	Snack Machine Control	BPR10
9.4.18	High Efficiency Ice Makers (101-200 lbs/24hr capacity)	BPR20
9.4.19	High Efficiency Ice Makers (201-300 lbs/24hr capacity)	BPR21
9.4.20	High Efficiency Ice Makers (301-400 lbs/24hr capacity)	BPR22
9.4.21	High Efficiency Ice Makers (401-500 lbs/24hr capacity)	BPR23
9.4.22	High Efficiency Ice Makers (501-1000 lbs/24hr capacity)	BPR24
9.4.23	High Efficiency Ice Makers (1001-1500 lbs/24hr capacity)	BPR25
9.4.24	High Efficiency Ice Makers (Greater than 1500 lbs/24hr capacity)	BPR26
	EC Motors	
9.4.25	EC Motor for Walk-In Cooler	BPR4
9.4.26	EC Motor for Walk-In Freezer	BPR19
9.4.27	EC Motor for Reach-In Cooler	BPR5
9.4.28	EC Motor for Reach-In Freezer	BPR18
	Tune-up	
9.4.29	Refrigeration Tune-up	BPR11

9.5 MOTORS

	MOTORS	
9.5.1	Efficient Motors (ODP and TEFC) - 1-200 hp	discontinued
	VFD	
9.5.2	Variable Frequency Drives (VFD) for Motors	BPM1

9.6 WATER HEATERS

	Measure	Code
9.6.1	High Efficiency Tanked Water heater (electric)	BPWH1
9.6.2	High Efficiency Tankless Water Heater (electric)	BPWH2
9.6.3	High Efficiency Tankless Water Heater (gas)	BPWH3
9.6.4	High Efficiency Condensing Tanked Water Heater (gas)	BPWH4
9.6.5	High Efficiency Tanked Water Heater (gas)	BPWH5
9.6.6	Supplemental Plumbing Measures (gas)	None

9.7 COMMERCIAL KITCHEN EQUIPMENT

	Measure	Code
	Kitchen Equipment	
9.7.1	3-pan Steamer (electric)	BPCK1
9.7.2	4-pan Steamer (electric)	BPCK2
9.7.3	5-pan Steamer (electric)	BPCK3
9.7.4	6-pan Steamer (electric)	BPCK4
9.7.5	Hot Holding Cabinet (half)	BPCK5
9.7.6	Hot Holding Cabinet (3/4)	BPCK6
9.7.7	Hot Holding Cabinet (full)	BPCK7
9.7.8	Griddle (electric)	BPCK8
9.7.9	5-pan Steamer (gas)	BPCK9
9.7.10	6-pan Steamer (gas)	BPCK10
9.7.11	Griddle (gas)	BPCK11
9.7.12	Fryer (gas)	BPCK12
9.7.13	Dishwasher - High Temperature (includes booster heater)	BPCK13
9.7.14	Dishwasher - Low Temperature (no booster heater)	BPCK14
9.7.15	Green Nozzle	NA

9.8 AGRICULTURAL EQUIPMENT		
	Measure	**Code**
	Fans	
9.8.1	**High Efficiency High Speed Exhaust/ Ventilation Fans (24-35" diameter)**	BPA1
9.8.2	**High Efficiency High Speed Exhaust/ Ventilation Fans (36-47" diameter)**	BPA2
9.8.3	**High Efficiency High Speed Exhaust/ Ventilation Fans (48-71" diameter)**	BPA3
9.8.4	**High Efficiency Circulation Fans (24-35 " diameter)**	BPA4
9.8.5	**High Efficiency Circulation Fans (36-47" diameter)**	BPA5
9.8.6	**High Efficiency Circulation Fans (48-71" diameter)**	BPA6
9.8.7	**High Volume Low Speed (HVLS) Fans**	BPA7
	Heater Timers and Waterers	
9.8.8	**Equipment Heater Timers**	BPA8
9.8.9	**Live Stock Waterer (Electrically heated)**	BPA9
9.8.10	**Live Stock Waterer (ground source heated (non-electrical))**	BPA10

9.9 On-line Store		
	Measure	**Code**
	Free CFL offer (Expired 8-31-11)	
9.9.1	**3-pack (15/20/25W)**	NA
9.9.2	**3-pack (25W)**	NA
9.9.3	**6-pack (23W)**	NA
	CFLs	
9.9.4	**15W 975 lumens (mini)**	NA
9.9.5	**15W 1000 lumens**	NA
9.9.6	**20W 1300 lumens**	NA
9.9.7	**20W 1400 lumens**	NA
9.9.8	**25W 1725 lumens**	NA
9.9.9	**25W1800 lumens (micro max)**	NA
9.9.10	**30W 2050 lumens**	NA
9.9.11	**15W flood 750 lumens**	NA
9.9.12	**23W flood 1300 lumens**	NA
9.9.13	**14W globe 800 lumens**	NA
9.9.14	**15 flood (dimmable) 720 lumens**	NA
	LED Down Lights	
9.9.15	**12W 650 lumens (module)**	BPL84
9.9.16	**10.5W 650 lumens (module)**	NA
	LED Bulbs	
9.9.17	**LED Bulb 12W A19 2700**	NA
9.9.18	**LED Bulb 17W PAR38**	NA
9.9.19	**LED Bulb 7W PAR20**	NA
9.9.20	**LED Downlight 10.5W, 575 Lumens**	NA
9.9.21	**LED Downlight 10.5W, 650 Lumens**	NA
9.9.22	**LED Lightbulb 7W, 250 Lumens**	NA
9.9.23	**LED Lighbulb, 12.5W, 800 Lumens**	NA
9.9.24	**LED Lightbulb, 12W, 660 Lumens**	NA
9.9.25	**LED Lightbulb, 17W, 880 Lumens**	NA
	LED Exit Signs	
9.9.26	**4W, double sided with battery backup**	BPL78
9.9.27	**2.7W exit-sign bulbs**	BPL82
	Power Strips	
9.9.28	**10 outlet "Smart Strip"**	NA
9.9.29	**7 outlet "Smart Strip"**	NA
	T8 Lamps and Ballasts	
9.9.30	**32W, 1-2 lamp configuration**	NA

9.9.31	**32W, 2-3 lamp configuration**	NA
9.9.32	**32W, 3-4 lamp configuration**	NA
9.9.33	**Ballast T8 32W, 1 lamp configuration**	NA
9.9.34	**Ballast T8 32W, 2 lamp configuration**	NA
9.9.35	**Ballast T8 32W, 3 lamp configuration**	NA
9.9.36	**Ballast T8 32W, 4 lamp configuration**	NA
9.9.37	**32W T8 lamp 4' (case of 36) 30K**	NA
9.9.38	**32W T8 lamp 4' (case of 36) 41K**	NA
	Vending Machine Controls	
9.9.39	**Snack Miser (non-refrigerated) – wall mounted**	BPR10
9.9.40	**Snack Miser EZ (non-refrigerated) – machine mounted**	BPR10
9.9.41	**Vending Miser (refrigerated) – wall mounted**	BPR9
9.9.42	**Vending Miser EZ (refrigerated) – machine mounted**	BPR9
	Occupancy Sensor	
9.9.43	**Wall-switch (PIR, controls 0-800W)**	BPL73
9.9.44	**Motion-Sensing Wall Switch**	NA

9.10 STEAM TRAP		
	Measure	**Code**
9.10.1	**Steam Trap Survey (HVAC)**	BPST1 NEW
9.10.2	**Steam Trap Repair/Replacement (HVAC)**	BPST2 NEW
9.10.3	**Mass Replacement of Steam Traps (no survey conducted) (HVAC)**	BPST3 NEW
9.10.4	**Steam Trap Survey (Industrial Process)**	BPST4 NEW
9.10.5	**Steam Trap Repair/Replacement (Industrial Process)**	BPST5 NEW
9.10.6	**Mass Replacement of Steam Traps (no survey conducted) (Industrial Process)**	BPST6 NEW

1.0 Introduction

This reference manual provides methods, formulas, and default assumptions for estimating energy savings and peak reduction impacts from measures and projects that receive Standard cash incentives from the Ameren Illinois Business Program. The Custom, Demand Response (E-Smart thermostat), and Retro-Commissioning programs, and Competitive Large Project Incentive program are not addressed in this document.

The reference manual is organized by measure type (as identified in pages 6-9). Each section provides mathematical equations for determining savings (algorithms), as well as default assumptions for all equation parameters that are not based on site-specific information. In addition, any descriptions of calculation methods or baselines are provided, as appropriate. The parameters for calculating savings are listed in the same order for each measure. Algorithms are provided for estimating annual energy and demand impacts. Data assumptions are based on Illinois specific data, where available. Where Illinois data was not available, data from neighboring regions is used where available and in some cases, engineering judgment is used.

Data sources used, in the general order of preference, included, but were not limited to the following:

- AIU Energy Efficiency and Demand Response Plan (dated November 15, 2007)
- AIU Natural Gas Energy Efficiency Plan (dated February 11, 2008)
- 2004-2005 Database for Energy Efficiency Resources (CA DEER database)
- 2007-2008 Database for Energy Efficiency Resources (CA DEER database) Update
- ComEd Program Design Information
- Other EE Program Design Information (e.g. Efficiency Maine, Focus on Energy, etc.)
- GDS/SAIC Staff expertise

A number of programs and incentives were researched and considered for PY3, but were not included, for various reasons. Programs such as green houses, and commercial kitchen measures, such as fryers, convection ovens, dishwashers, etc. were researched but after consideration were not deemed suitable for program-year three. More information about measures not included can be obtained from the ActOnEnergy technical team.

NOTE:
This document represents the best available information as of October 24, 2011. Information is subject to change as the program evolves, market conditions change, and technologies improve.

2.0 Net-to-Gross Savings Calculation

The algorithms shown with each measure calculate gross customer electric savings without counting the effects of line losses from the generator to the customer, free ridership, spillover, or persistence. The algorithms do not distribute the savings among the different costing periods. The formulae for converting gross customer-level savings to net generation-level savings (counting free ridership, spillover and persistence) for the different costing periods are as follows:

$$\text{Net kWh}_i = \Delta\text{kWh} \times (1+\text{LLF}_i) \times (1\text{-FR+SPL}) \times \text{PF} \times \text{AF}_i$$

and

$$\text{Net kW}_j = \Delta\text{kW} \times (1+\text{LLF}_j) \times (1\text{-FR+SPL}) \times \text{PF} \times \text{CF}_j$$

where

NetkWh_i	=	kWh energy savings at generation-level, net of free riders and persistence, and including spillover, for period *i*
i	=	subscript used to denote variable energy rating periods (Winter Peak, Winter Off-Peak, Summer Peak, Summer Off-Peak)
ΔkWh	=	gross customer annual kWh savings for the measure
LLF_i	=	line loss factor for period *i*
FR	=	freeridership
SPL	=	spillover for measure
PF	=	persistence factor for measure
AF_i	=	allocation of annual energy savings by season for period *i*
netkW_j	=	kW demand savings, net of free riders and persistence, and including spillover, for season *j*
j	=	subscript used to denote variable seasonal peaks (Summer, Winter and Spring/Fall).
ΔkW	=	gross customer connected load kW savings for the measure
LLF_j	=	line loss factor for seasonal peak *j*
CF_j	=	the percent of kW savings that is concurrent with Illinois seasonal peak, for season *j*

All of the parameters except line loss factors (LLF), allocation factor (AF), and coincidence factor (CF) for the above equations may be found in the specific section for the measure. AF and CF are summarized in Table 6.0-1.

3.0 Interactive Effects

The TRM provides specific savings algorithms for many prescriptive measures. When a customer installs a prescriptive measure, the savings are determined according to these algorithms. In some cases these algorithms include the effects of interactions with other measures or end uses (e.g., cooling and heating effects from interior lighting waste heat). For "custom" measures, ActOnEnergy performs site-specific customized calculations. In this case, ActOnEnergy takes into account interactions between measures (e.g., individual savings from installation of window film and replacement of a chiller are not additive because the first measure reduces the cooling load met by the second measure). ActOnEnergy will calculate total savings for the package of custom measures being installed, either as a single package or in rank order of measures as described below. If a project includes both prescriptive and custom measures, the prescriptive measures will be calculated in the normal manner. However, the prescriptive measures will be assumed to be installed prior to determining the impacts for the custom measures. Custom interior lighting measures will use the standard prescriptive algorithm to estimate waste heat impacts.

4.0 Persistence

Persistence factors may be used to reduce lifetime measure savings in recognition that initial engineering estimates of annual savings may not persist long term. This might be because a measure is removed or stops functioning prior to the end of its normal engineering lifetime, because it is not properly maintained, it is overridden, it goes out of calibration (controls only), or for some other reason. Each measure algorithm contains an entry for persistence factor. The default value if none is indicated is 1.00 (100%). A value lower than 1.00 will result in a downward adjustment of lifetime savings and total resource benefits. For any measure with a persistence value less than 1.00, the normal measure life ("Engineering Measure Life") will be reduced to arrive at an "Adjusted Measure Life" for the purposes of measure screening, savings, Forward Capacity Market claims, and tracking. The "Adjusted Measure Life" used will be equal to the product of the Engineering Measure Life and the persistence factor. Both the Engineering Measure Life and the Adjusted Measure Life will be shown in each measure algorithm.

5.0 Glossary

The following glossary provides definitions for terms used in this document that are necessary assumptions needed to calculate measure savings.

AIB	"Ameren Illinois Business" database – the database used to record all activity in the ActOnEnergy business program.
Allocation of Annual Energy Savings by Season (AF):	Allocation factors for defined times of the year that describe when energy savings will be realized for a specific measure. Allocation factors have been developed for four time periods: winter on and off-peak; and summer on and off-peak.
Baseline Efficiency (η_{base}):	The assumed standard efficiency of equipment, absent an ActOnEnergy program.
Coincidence Factor (CF):	Coincidence factors represent the fraction of connected load expected to be "on" and using electricity coincident with a particular system peak period, on a diversified basis. Coincidence factors are provided for summer and winter peak periods.
Coincident Demand Savings	Same as Demand Savings
Coincident Diversity Factor	The value reflects the fact that the connected load may not be operating at 100% during the peak utility period.
Connected Load:	The maximum wattage of the equipment, under normal operating conditions, when the equipment is "on" (also "Peak Load").
DEER data	Database for Energy Efficient Resources – developed by the California PUC. www.DEEResources.com/
Demand Interactive Effects	The value reflects the impacts that the energy-efficient upgrade could have on other systems energy demand. For example, a lighting upgrade that reduces the energy demand also reduces the cooling load for a conditioned space. As such, there is a corresponding decrease in the cooling demand. Demand interactive effects factors greater than "1" indicate that there is an additional positive benefit to installation of the efficiency measure.
Demand Savings	Potential change to the peak load by making the upgrade to energy-efficient equipment .
Energy Interactive Effects	The value reflects the impacts that the energy-efficient upgrade could have on other systems energy use. For example, a lighting upgrade that reduces the energy use also reduces the cooling load for a conditioned space. As such, there is a corresponding decrease in the cooling energy use. Energy interactive effects factors greater than "1" indicate that there is an additional positive benefit to installation of the efficiency measure.
Energy Savings	The actual first year energy savings by making the upgrade to energy-efficient equipment.

Freeridership (FR):	A program's ***free ridership rate*** is the percentage of program participants deemed to be free riders. A ***free rider*** refers to a customer who received an incentive through an energy efficiency program who would have installed the same or a smaller quantity of the same high efficiency measure on their own within one year if the program had not been offered.
Full Load Hours (FLH):	The equivalent hours that equipment would need to operate at its peak capacity in order to consume its estimated annual kWh consumption (annual kWh/connected kW).
High Efficiency (η_{effic}):	The efficiency of the energy-saving equipment installed as a result of an efficiency program.
Hours of Operation (HOURS):	The annual hours that equipment is expected to operate.
Incremental Cost:	The cost difference between the installed cost of the high efficiency measure and the standard efficiency measure.
Installed Cost: High Performance	The cost of installing the item as specified, as an energy-efficient option.
Installed Cost: Standard Practice	The cost of installing the item as the "standard" non-energy-efficient option. A cost of zero ($0) indicates that the measure is operating and being replaced by a high performance replacement.
Lifetimes:	The number of years (or hours) that the new high efficiency equipment is expected to function. These are generally based on engineering lives, but sometimes adjusted based on expectations about frequency of remodeling or demolition.
Line Loss Factor (LLF):	The marginal electricity losses from the generator to the customer meter – expressed as a percent of meter-level savings. The Energy Line Loss Factors vary by period. The Peak Line Loss Factors reflect losses at the time of system peak, and are shown for two seasons of the year (winter and summer). Line loss factors are the same for all measures.
Load Factor (LF):	The fraction of full load (wattage) for which the equipment is typically run.
Measure Demand Savings	The calculation used to determine the savings for that particular job/measure – including variables such as quantities of units and hours of operation for that business.
Measure Energy Savings	The calculation used to determine the savings for that particular job/measure – including variables such as quantities of units and hours of operation for that business.
Non-coincident Demand Savings	Demand savings – per the unit specifications – the difference between the baseline and the proposed energy-efficient upgrade (entered as one when this does not apply to the measure)
Persistence Factor (PF):	The fraction of gross measure savings obtained over the measure life.

Spillover (SPL):	Spillover refers to energy-efficient equipment installed in any facility in the program service area due to program influences, but without any financial or technical assistance from the Program. It is expressed as a percent or fraction of the gross savings attributable to program participation.
Supplemental Information Collected on the Application	This indicates information collected on the application, in addition to quantities of units. Other pertinent information is also collected from the product specification sheets sent with the application.

6.0 Loadshapes

The following table includes a listing of measure end-uses and associated loadshapes.

Table 6.0-1 Measure End-Uses and Associated Loadshapes

#	End use	Coincidence Factor (CF)		Allocation of Annual Energy Savings by Season (AF)			
		Winter	Summer	Winter		Summer	
				Peak	Off Peak	Peak	Off Peak
1	Commercial Lighting	50%	70%	50%	10%	30%	10%
2	Commercial Motors	100%	100%	50%	10%	30%	10%
3	Commercial HVAC	1.5%	72%	15%	2.5%	60%	17.5%
4	Commercial Refrigeration	100%	0%	33%	37%	12%	18%
5	Commercial Flat	100%	100%	32%	35%	16%	18%

All loadshape numbers referenced in the measure characterizations correspond to the most recent generation of the loadshape as detailed in the loadshape table shown above. The coincidence factors in the standard load profile shown above are based on the listed assumptions for full load hours. To account for the effect on peak savings from a change in full load hours, use of full load hours different than the standard will result in an automatic adjustment of the coincident peak factors (% of connected load kW) used in screening and reported in the database, unless custom coincident peak factors are also entered. The coincidence factors are multiplied by the ratio of [custom full load hours]/[standard full load hours], with a maximum value of 100% for each factor. As a result, coincidence factors for particular measures may be higher or lower than the standard factors listed above even when a standard load profile is used.

8.0 Mapping Strategy

In many instances the DEER database was used as a basis for savings calculations. For those measures that used the DEER information the following strategy was used to map the building types between those in the DEER database and the building types used in the ActOnEnergy program.

DEER Market Sector	ActOnEnergy
Education - Primary School	School/College
Education - Secondary School	
Education - Community College	
Education - University	
Grocery	Grocery
Health/Medical - Hospital	Medical
Health/Medical - Nursing Home	
Lodging - Hotel	Hotel/Motel
Lodging - Motel	
Lodging – Guest Room	
Manufacturing - Light Industrial	Manufacturing/Industrial
Office - Large	Office
Office - Small	
Restaurant - Sit-Down	Restaurant
Restaurant - Fast-Food	
Retail - 3-Story Large	Retail/Service
Retail - Single-Story Large	
Retail - Small	
Storage - Conditioned	Warehouse/Distribution
Storage - Unconditioned	
Warehouse - Refrigerated	

9.0 Commercial Measures (Standard Programs)

Section 9 contains the pertinent information for each Standard (gas and electric) measure as well as the on-line store products of the ActOnEnergy Business Program. This document does not include information about: Custom (including New Construction), Demand Response (E-Smart Thermostat), Retro Commissioning (including Compressed Air (along with Leak Survey and Repair) and Healthcare), Staffing Grant, Plumbing measures, Ammonia Refrigeration (pilot in PY4) nor Competitive Large Project Incentive measures.

This section is organized in the following sub-categories:

9.1 Lighting
9.2 HVAC
9.3 Lodging
9.4 Refrigeration
9.5 Motors
9.6 Water Heaters
9.7 Commercial Kitchen Equipment
9.8 Agricultural Equipment
9.9 On-Line Store
9.10 Steam Traps

Within each section the measures are numbered (e.g, 9.1.1 is the first lighting measure) and within each measure there are four tables (numbered 1-4 (e.g., the first table in the second lighting measure is 9.1.2-1)). This numbering format is followed throughout this manual.

General layout for each measure

First page – general measure information. The reference documents listed here are available upon request.

Algorithms used to calculate Demand Savings and Energy Savings

Table 1 "*Energy Factor Assumptions*" by Building Type – Includes:

- Demand Interactive Effects
- Coincident Diversity Factor
- Energy Interactive Effects
- Annual Operating Hours
- Peak kW Savings (per Watt Reduced)
- kWh Savings (per Watt Reduced)

Table 2 "*Specifications and Calculated Non-coincident Demand Savings*" – Includes:

- Configuration (e.g., lists 4-foot and 8-foot lamps, if both are an option)
- Base Unit Type
- Base Unit Wattage
- Base Fixture Wattage
- Retrofit Unit Type
- Retrofit Unit Wattage
- Retrofit Fixture Wattage
- Non-Coincident Demand Savings (kW)

(This table is deleted when the incentive is calculated on a "watts reduced" basis.)

Table 3 "*Calculated Demand and Energy Savings by Type of Business*" – Includes:

- Demand Savings (kW)
- Energy Savings (kWh)

(This table is deleted when the incentive is calculated on a "watts reduced" basis.)

The formulas for Demand Savings and Energy Savings, shown in this table, are included immediately after the table.

Demand Savings Calculation

Non-coincident Demand Savings (from Table 2)*	X	Demand Interactive Effects (from Table 1)	X	Coincident Diversity Factor (from Table 1)

Energy Savings Calculation

Non-coincident Demand Savings (from Table 2)*	X	Energy Interactive Effects (Table 1)	X	Hours of Operation (from Table 1)

(these calculations are removed for gas measures)

*if the incentive is based on a "watts saved" calculation then the non-coincident demand savings is just ($Watts_{Base}$ – $Watts_{EE}$)

Table 4 "*Measure Costs and Incentive Levels*" – Includes:

- Installed Cost: High Performance
- Installed Cost: Standard Practice
- Incremental Cost
- Incentive Payment

9.1 Lighting

The following measures are included in the PY3 lighting program

9.1 LIGHTING		
	Measure	**Code**
	Highbay Fixtures	
9.1.1	**Highbay Fixture Replacement Option**	BPL91
	Linear Fluorescent and Occupancy Sensors	
9.1.2	**Fluorescent U-bend Relamp and reballast**	BPL40
9.1.3	**T12 to T8 (32 watt) Relamp and Reballast**	BPL60
9.1.4	**T12 to T8 (low wattage 28 watt) Relamp and reballast**	BPL41
9.1.5	**T12 to T8 (ultra low Wattage 25 watt) Relamp and reballast**	BPL42
9.1.6	**T8 to T5, or T8 to Reduced Wattage T8 Relamp and reballast**	BPL44
9.1.7	**T12 to T8 (17 Watt – 2' lamp) Relamp and reballast**	BPL66 NEW
9.1.8	**New Fluorescent Fixtures**	BPL62
9.1.9	**T12 to T8 Fluorescent Fixtures with Reflectors**	BPL63
9.1.10	**T12 to T5 New Fluorescent fixture**	BPL43
9.1.11	**Single lamp T5 fluorescent fixture with reflector**	BPL45
9.1.12	**High Efficiency Fluorescent Fixtures**	BPL64
9.1.13	**Low Glare High Efficiency Recessed Fixtures**	BPL65
9.1.14	**Controls for T5 and High Performance T8 Systems**	BPL72
9.1.15	**Remote Mounted Occupancy Sensors**	BPL73
9.1.16	**Occupancy Sensors**	BPL74
9.1.17	**Remote Occupancy Sensors (Low Wattage)**	BPL79 NEW
	Incandescent Replacements	
9.1.18	**CFL Lamps**	On-line store
9.1.19	**LED Lamps**	BPL81
9.1.20	**LED Recessed Down Lamps**	BPL84
	Low Wattage Ceramic Metal Halide (CMH)	
9.1.21	**CMH Fixtures: (replaces incandescent <100 Watts)**	BPL85
9.1.22	**CMH Fixtures: (replaces incandescent 100-350 Watts)**	BPL89
9.1.23	**CMH Integral Ballast Lamps**	BPL86
	Hard-Wired CFL	
9.1.24	**Hard-Wired CFL Fixtures ≤30 Watts**	BPL87
9.1.25	**Hard-Wired CFL Fixtures >30 Watts**	BPL88
	Exterior HID (High Intensity Discharge) Fixtures	
9.1.26	**Exterior Lighting**	BPL50
9.1.27	**Canopy Lighting w/ electronic ballasts**	BPL51
	LED Cooler/Freezer Lighting	
9.1.28	**Glass Door LED Cooler/Freezer Lighting**	BPL93
9.1.29	**Glass Door LED cooler/Freezer Lighting Controls/Sensors**	BPL94
	Miscellaneous	
9.1.30	**PSMH/CMH with Electronic Ballasts**	BPL75
9.1.31	**Controls for H.I.D. Systems**	BPL77
9.1.32	**LED Exit Signs**	BPL78
9.1.33	**LED Exit Sign Retro-fit Kit**	BPL82 NEW
9.1.34	**Permanent Lamp Removal**	NA

9.1.1 Highbay Fixture Replacement Option

Measure Code: BPL91

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised June 1, 2009
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace HID-type fixtures with T8 orT5 fluorescent fixtures with electronic ballasts

Eligibility Criteria for New Energy-Efficient Equipment:

- Fluorescent lamps and Ballasts must be listed on the CEE web site (www.cee1.org)
- Each unit must have a wattage greater than 100 Watts
- Must be installed in areas with ceiling heights of 16' or greater (if less than 16, call to see if your circumstances would allow this project to be eligible for incentive money)
- Overall fixture efficiency must exceed 80%
- NOTE: replacement of highbay incandescent fixtures with HIF must apply for incentive money through the ActOnEnergy Custom Program.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[1]: 15 years

Revision Details: 4-28-2011 incentive increased from $0.25/watt reduced to $0.30/watt reduced. Starting in PY2 (6-1-09) the incentive was reduced from 40 cents per watt reduced, to 25 cents per watt reduced. 4-28-2011 Reduced minimum wattage from 125 watts to 100 watts for new equipment.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls (REVISED - anything new for PY3?).

Bonus Incentives offered:

11/16/09 through 1/31/10 offered a 10% bonus

10/20/10 Early completion bonus offered – additional 5.5 cents per watt reduced if done by 3/31/11 (and FPW turned in within 30 days of project completion), OR an additional 4.5 cents per watt reduced if project is completed by 4/30/11 (and FPW turned in within 30 days).

Supplemental Information Collected on the Application: None

[1] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.1-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Annual Operating Hours	Peak kW Savings Per Watt Reduced	kWh Savings Per Watt Reduced
Office	1.25	0.81	1.17	2,808	0.001	3
School (K-12)	1.23	0.42	1.15	1,873	0.001	2
College/University	1.22	0.68	1.15	3,433	0.001	4
Retail/Service	1.19	0.88	1.11	4,210	0.001	5
Restaurant	1.26	0.68	1.15	5,278	0.001	6
Hotel/Motel	1.14	0.67	1.14	4,941	0.001	6
Medical	1.26	0.74	1.18	6,474	0.001	8
Grocery	1.25	0.81	1.13	5,824	0.001	7
Warehouse	1.09	0.84	1.06	4,160	0.001	4
Light Industry	1.08	0.99	1.04	4,290	0.001	4
Heavy Industry	1.08	0.99	1.04	4,290	0.001	4
Average = Miscellaneous	**1.19**	**0.77**	**1.12**	**4,325**	**0.001**	**5**

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($(W_{BASE} - W_{EE})$)	X	Demand Interactive Effects (from Table 9.1.1-1)	X	Coincident Diversity Factor (from Table 9.1.1-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($(W_{BASE} - W_{EE})$)	X	Energy Interactive Effects (from Table 9.1.1-1)	X	Hours of Operation (from Table 9.1.1-1)

Table 9.1.1-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost[2]	Incentive Payment
Fluorescent highbay system	Per invoice	N/A	$332 per fixture	$0.30 per watt reduced

[2] Used only for TRC calculation purposes

9.1.2 Fluorescent U-bend Relamp and Reballast

Measure Code: BPL40

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Upgrade an existing T12 U-Tube lamps and ballasts with T8 U-tube lamps and ballasts

Eligibility Criteria for New Energy-Efficient Equipment:

- 2 lamp fixtures
- Lamps and Ballasts must be listed on the CEE web site (cee1.org) (32 watt listed under High Performance, 28 and 25 watt listed under Reduced Wattage)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[3]: 11 years

Revision Details: 8-6-2011 Added criteria to replace existing T12 U-tube lamps and ballasts with T8 U-tube lamps and ballasts.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[3] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per 2-lamp fixture
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per 2-lamp fixture

Table 9.1.2-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.2-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
T8 U Tube Lamp 2-lamp, 4 foot	F40T12 / ES	40	89	F32T8 / ES	32	54	0.035

Source: ComEd

Table 9.1.2-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.035	115
School (K-12)	0.018	75
College/University	0.029	138
Retail/Service	0.037	167
Restaurant	0.030	212
Hotel/Motel	0.027	197
Medical	0.033	267
Grocery	0.035	230
Warehouse	0.032	133
Light Industry	0.037	156
Heavy Industry	0.037	156
Average = Miscellaneous	**0.032**	**176**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (from Table 9.1.2-2)	X	Demand Interactive Effects (from Table 9.1.2-1)	X	Coincident Diversity Factor (from Table 9.1.2-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (from Table 9.1.2-2)	X	Energy Interactive Effects (Table 9.1.2-1)	X	Hours of Operation (from Table 9.1.2-1)

Table 9.1.2-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
U-bend relamp and reballast	$35	$0 (replacement)	$35	$10.00/2-lamp fixture

9.1.3 T12 to T8 (32 Watt) Relamp and Reballast

Measure Code: BPL60

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised May 3, 2010
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Upgrade an existing T12 lamp/fixture with new T8

Eligibility Criteria for New Energy-Efficient Equipment:

- Lamps must be 32-Watt T8 (or up to 59-watt for 8' lamps)
- "High Performance" lamps and ballasts must be listed on the CEE web site (www.cee1.org)
- Cannot be combined with purchases from the On-line store

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[4]: 11 years

Revision Details: In PY3 (5-3-10) this measure was modified to include only replacement by high-performance (32W) T8 lamps. The replacement by the low-wattage T8 lamps (28w or 25 W) have been split out into their own measures. Also, upgrading T8 to low-wattage T8 lamps is now a custom measure and no longer included with this measure. This measure used to be $5/lamp, but now that the 32 watt lamps are their own category, this incentive has been reduced to $3/lamp.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[4] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.3-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Coincident Demand Savings (kW)	Energy Savings (kWh)
4-foot lamps – 1-, 2-, 3-, or 4-lamp HP T8 fixture						
Office	2,808	1.25	0.81	1.17	0.012	40.03
School (K-12)	1,873	1.23	0.42	1.15	0.006	26.24
College/University	3,433	1.22	0.68	1.15	0.010	48.09
Retail/Service	4,306	1.19	0.88	1.11	0.013	58.23
Restaurant	5,278	1.26	0.68	1.15	0.010	73.95
Hotel/Motel	4,941	1.14	0.67	1.14	0.009	68.62
Medical	8,736	1.26	0.74	1.18	0.011	125.59
Grocery	5,824	1.25	0.81	1.13	0.012	80.18
Warehouse	3,597	1.09	0.84	1.06	0.011	46.45
Light Industry	4,290	1.08	0.99	1.04	0.013	54.36
Heavy Industry	4,290	1.08	0.99	1.04	0.013	54.36
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**	**0.011**	**61.25**
8-foot lamps – 1-, 2-, 3-, or 4-lamp HP T8 fixture						
Office	2,808	1.25	0.81	1.17	0.016	53.39
School (K-12)	1,873	1.23	0.42	1.15	0.008	34.99
College/University	3,433	1.22	0.68	1.15	0.013	64.14
Retail/Service	4,306	1.19	0.88	1.11	0.017	77.66
Restaurant	5,278	1.26	0.68	1.15	0.014	98.63
Hotel/Motel	4,941	1.14	0.67	1.14	0.012	91.52
Medical	8,736	1.26	0.74	1.18	0.015	167.51
Grocery	5,824	1.25	0.81	1.13	0.016	106.94
Warehouse	3,597	1.09	0.84	1.06	0.015	61.95
Light Industry	4,290	1.08	0.99	1.04	0.017	72.50
Heavy Industry	4,290	1.08	0.99	1.04	0.017	72.50
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**	**0.015**	**81.69**

Source: DEER database

Table 9.1.3-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)	Weight Percent-age
Four Foot Lamps								
4-lamp	F40T12 / ES	34	144	F32T8 / ES	28	96	0.012	35%
3-lamp	F40T12 / ES	34	103	F32T8 / ES	28	72	0.010	25%
1-lamp	F40T12 / ES	34	43	F32T8 / ES	28	25	0.018	10%
2-lamp	F40T12 / ES	34	72	F32T8 / ES	28	48	0.012	30%
Weighted Average		----	----	----	----	----	**0.012**	----
Eight Foot Lamps								
2 lamp	F96T12 / ES	60	132	F96T8	57	100	0.016	75%
1-lamp	F96T12 / ES	60	77	F96T8	57	60	0.017	25%
Weighted Average		----	----	----	----	----	**0.016**	----

Source: ComEd

Table 9.1.3-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Energy Savings (kWh)
	4-foot Lamp		**8-foot Lamp**	
Office	0.012	40.03	0.016	53.39
School (K-12)	0.006	26.24	0.008	34.99
College/University	0.010	48.09	0.013	64.14
Retail/Service	0.013	58.23	0.017	77.66
Restaurant	0.010	73.95	0.014	98.63
Hotel/Motel	0.009	68.62	0.012	91.52
Medical	0.011	125.59	0.015	167.51
Grocery	0.012	80.18	0.016	106.94
Warehouse	0.011	46.45	0.015	61.95
Light Industry	0.013	54.36	0.017	72.50
Heavy Industry	0.013	54.36	0.017	72.50
Average = Miscellaneous	**0.011**	**61.25**	**0.015**	**81.69**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.3-2) X Demand Interactive Effects (from Table 9.1.3-1) X Coincident Diversity Factor (from Table 9.1.3-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.3-2) X Energy Interactive Effects (from Table 9.1.3-1) X Hours of Operation (from Table 9.1.3-1)

Table 9.1.3-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Four-foot, 1-Lamp Systems	$28	$0	$28	$3/system
Four-foot, 2-Lamp Systems	$32	$0	$32	$6/system
Four-foot, 3-Lamp Systems	$42	$0	$42	$9/system
Four-foot, 4-Lamp Systems	$47	$0	$47	$12/system
Eight-foot, 4-Lamp Systems	$47	$0	$47	$12/system
Measure Average	**$39**	**$0**	**$39**	**$3/lamp**

9.1.4 T12 to T8 (Low Wattage 28 Watt) Relamp and Reballast

Measure Code: BPL41

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Upgrade an existing T12 lamp/fixture with new reduced wattage T8

Eligibility Criteria for New Energy-Efficient Equipment:

- Lamps must be 28 Watt T8
- "Reduced Wattage" lamps and ballast combinations must be listed on the CEE1.org web site**

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[5]: 11 years

Revision Details: 8-6-2011 Added 4 ft qualifier to incentive calculation. 4-28-2011 Added qualifier "Cannot be combined with on-line store purchase."

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[5] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.4-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,210	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.4-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)	Weight Percent-age
T8 Relamp and Reballast (28W) – four foot								
4-lamp	F40T12 / ES	34	144	F28T8 / ES	28	96	0.012	35%
3-lamp	F40T12 / ES	34	113	F28T8 / ES	28	72	0.014	25%
1-lamp	F40T12 / ES	34	43	F28T8 / ES	28	25	0.018	10%
2-lamp	F40T12 / ES	34	72	F32T8 / ES	28	48	0.012	30%
Weighted Average		----	----	----	----	----	**0.013**	

Source: ComEd

Table 9.1.4-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.013	43.04
School (K-12)	0.007	28.22
College/University	0.011	51.72
Retail/Service	0.014	61.22
Restaurant	0.011	79.51
Hotel/Motel	0.010	73.79
Medical	0.012	100.08
Grocery	0.013	86.21
Warehouse	0.012	57.77
Light Industry	0.014	58.45
Heavy Industry	0.014	58.45
Average = Miscellaneous	0.012	63.46

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.4-2)	X	Demand Interactive Effects (from Table 9.1.4-1)	X	Coincident Diversity Factor (from Table 9.1.4-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.4-2)	X	Energy Interactive Effects (from Table 9.1.4-1)	X	Hours of Operation (from Table 9.1.4-1)

Table 9.1.4-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Four-foot, 1-Lamp Systems	$28	$0	$28	$5/system
Four-foot, 2-Lamp Systems	$32	$0	$32	$10/system
Four-foot, 3-Lamp Systems	$42	$0	$42	$15/system
Four-foot, 4-Lamp Systems	$47	$0	$47	$20/system

9.1.5 T12 to T8 (Ultra Low Wattage 25 Watts) Relamp and Reballast

Measure Code: BPL42

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Upgrade an existing T12 lamp/fixture with new ultra-low wattage T8

Eligibility Criteria for New Energy-Efficient Equipment:

- Lamps must be 25 Watt T8 (ultra-low wattage)
- "Reduced Wattage" lamps and ballast combinations must be listed on the CEE1.org web site

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[6]: 11 years

Revision Details: 8-6-2011 Added 4 ft qualifier to incentive calculation.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[6] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.5-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,210	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.5-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)	Weight Percent-age
T8 Relamp and Reballast (25W) – four foot								
4-lamp	F40T12 / ES	34	144	F28T8 / ES	25	90	0.014	35%
3-lamp	F40T12 / ES	34	113	F28T8 / ES	25	65	0.016	25%
1-lamp	F40T12 / ES	34	43	F28T8 / ES	25	22	0.021	10%
2-lamp	F40T12 / ES	34	72	F32T8 / ES	25	41	0.016	30%
Weighted Average		----	----	----	----	----	**0.016**	----

Source: ComEd

Table 9.1.5-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.016	51.91
School (K-12)	0.008	34.03
College/University	0.013	62.38
Retail/Service	0.017	73.83
Restaurant	0.014	95.90
Hotel/Motel	0.012	89.00
Medical	0.015	120.70
Grocery	0.016	103.98
Warehouse	0.014	69.67
Light Industry	0.017	70.49
Heavy Industry	0.017	70.49
Average = Miscellaneous	**0.011**	**76.54**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.5-2)	X	Demand Interactive Effects (from Table 9.1.5-1)	X	Coincident Diversity Factor (from Table 9.1.5-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.5-2)	X	Energy Interactive Effects (from Table 9.1.5-1)	X	Hours of Operation (from Table 9.1.5-1)

Table 9.1.5-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Four-foot, 1-Lamp Systems	$28	$0	$28	$5/system
Four-foot, 2-Lamp Systems	$32	$0	$32	$10/system
Four-foot, 3-Lamp Systems	$42	$0	$42	$15/system
Four-foot, 4-Lamp Systems	$47	$0	$47	$20/system

9.1.6 T8 to T5, or T8 to Reduced Wattage T8 Relamp and Reballast

Measure Code: BPL44

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Upgrade an existing 32watt T8 with T5 or reduced wattage T8 system

Eligibility Criteria for New Energy-Efficient Equipment:

- T5 fixtures must use 28 watt T5 lamps (T5HO are not eligible (54 watt)).
- T5 ballasts must be UL listed and have minimum warranty of five years
- T8 fixtures must use 28 watt or 25 watt T8 lamps and ballasts
- "Reduced wattage" lamp and ballast combinations must be listed on the CEE1.org website

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[7]: 11 years

Revision Details: 8-6-2011 Added reduced wattage T8 option to measure. In PY4 added 3 criteria: (1) T5 ballasts must be UL listed and have minimum warranty of five years; (2) T8 fixtures must use 28 watt or 25 watt T8 lamps and ballasts; (3) "Reduced wattage" lamp and ballast combinations must be listed on the CEE1.org website. In PY4 measure was changed from "T8 to T5 Relamp and Reballast" to "T8 to T5, or T8 to reduced wattage T8 Relamp and Reballast."

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[7] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.6-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,210	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.6-1) X Coincident Diversity Factor (from Table 9.1.6-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.6-1) X Hours of Operation (from Table 9.1.6-1)

Table 9.1.6-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
4 lamp T8 to 3 lamp 28W T5	$28	0	$28	$0.25/watt reduced

9.1.7 T12 to T8 (17 watt – 2' lamp) Relamp and Reballast

Measure Code: BPL66

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: April 28, 2011
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Upgrade an existing 2' T12 lamp/fixture with two new 2' lamps
- OR Upgrade an existing 4' T12 u-bend lamp/fixture with two new 2' lamps

Eligibility Criteria for New Energy-Efficient Equipment:

- Lamps must be up to 17-watt 2' T8 lamps
- Ballast warranty must be at least three years
- CRI >80

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[8]: 11 years

Revision Details: None

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

Supplemental Information Collected on the Application: lamps per fixture

[8] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.7-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	8,736	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.7-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Wattage (watts)	Retrofit Lamp Wattage (watts)	Non-Coincident Demand Savings (kW)
T12 to T8 (17 watt – 2' lamp) Relamp and Reballast	34	17	0.012

Source: ComEd

Table 9.1.7-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.006	20.015
School (K-12)	0.003	13.12
College/University	0.005	24.045
Retail/Service	0.0065	29.115
Restaurant	0.005	36.975
Hotel/Motel	0.0045	34.31
Medical	0.0055	62.795
Grocery	0.006	40.09
Warehouse	0.0055	23.225
Light Industry	0.0065	27.18
Heavy Industry	0.0065	27.18
Average = Miscellaneous	**0.0055**	**30.625**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.7-2)	X	Demand Interactive Effects (from Table 9.1.7-1)	X	Coincident Diversity Factor (from Table 9.1.7-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.7-2)	X	Energy Interactive Effects (from Table 9.1.7-1)	X	Hours of Operation (from Table 9.1.7-1)

Table 9.1.7-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
T12 to T8 (17 watt – 2' lamp) Relamp and Reballast	$221	$0	$221	$2 per 2 ft lamp

9.1.8 New Fluorescent Fixtures

Measure Code: BPL62

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace T12 fixture with T5 or T8 fixture

Eligibility Criteria for New Energy-Efficient Equipment:

- May use 32W T8, 28W T8, 25W T8, 28W T5, or 54W T5 (T5HO) lamps
- T5 ballasts must be UL listed and have minimum warranty of five years
- Lamps and Ballasts must be listed on the CEE web site (www.cee1.org)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[9]: 15 years

Revision Details: 8-6-2011 Changed eligibility criteria from "Replace T12 with T5, or high performance or low wattage T8 fixture" to "Replace an existing T12 fixture with T5 or T8 fixture." In PY4 added criteria T5 ballasts must be UL listed and have minimum warranty of five years.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[9] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.8-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,210	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.8-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)	Weight Percent-age
Four Foot Lamps								
4-lamp	F40T12 / ES	34	144	F32T8 / ES	28	96	0.012	35%
3-lamp	F40T12 / ES	34	103	F32T8 / ES	28	72	0.010	25%
1-lamp	F40T12 / ES	34	43	F32T8 / ES	28	25	0.018	10%
2-lamp	F40T12 / ES	34	72	F32T8 / ES	28	48	0.012	30%
Weighted Average		----	----	----	----	----	**0.012**	----
Eight Foot Lamps								
2 lamp	F96T12 / ES	60	132	F96T8	57	100	0.016	75%
1-lamp	F96T12 / ES	60	77	F96T8	57	60	0.017	25%
Weighted Average		----	----	----	----	----	**0.016**	----

Source: ComEd

Table 9.1.8-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Energy Savings (kWh)
	4-foot Lamp		**8-foot Lamp**	
Office	0.012	40.03	0.016	53.39
School (K-12)	0.006	26.24	0.008	34.99
College/University	0.010	48.09	0.013	64.14
Retail/Service	0.013	58.23	0.017	77.66
Restaurant	0.010	73.95	0.014	98.63
Hotel/Motel	0.009	68.62	0.012	91.52
Medical	0.011	125.59	0.015	167.51
Grocery	0.012	80.18	0.016	106.94
Warehouse	0.011	46.45	0.015	61.95
Light Industry	0.013	54.36	0.017	72.50
Heavy Industry	0.013	54.36	0.017	72.50
Average = Miscellaneous	**0.011**	**61.25**	**0.015**	**81.69**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.8-2)	X	Demand Interactive Effects (from Table 9.1.8-1)	X	Coincident Diversity Factor (from Table 9.1.8-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.8-2)	X	Energy Interactive Effects (from Table 9.1.8-1)	X	Hours of Operation (from Table 9.1.8-1)

Table 9.1.8-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Four-foot, 1-Lamp Systems	$64	$0	$64	$5/system
Four-foot, 2-Lamp Systems	$75	$0	$75	$10/system
Four-foot, 3-Lamp Systems	$84	$0	$84	$15/system
Four-foot, 4-Lamp Systems	$98	$0	$98	$20/system
Eight-foot, 4-Lamp Systems	$98	$0	$98	$20/system
Measure Average	**$82**	**$0**	**$82**	**$5/lamp**

9.1.9 T12 to T8 Fluorescent Fixtures with Reflectors

Measure Code: BPL63

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace an existing T12 fixture with T8 fixture, with a reflector

Eligibility Criteria for New Energy-Efficient Equipment:

- May use 32W T8, 28W T8, or 25W T8 lamps
- Lamps and Ballasts must be listed on the CEE web site (www.cee1.org)
- Each unit must include an aluminum/silver or new white integral reflector with a minimum surface reflectivity of 87%
- Retrofit reflector kits are not eligible

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[10]: 15 years

Revision Details: PY2 allowed T5 or T8 to be installed. 8-6-2011 changed eligibility criteria from "Replace T12 fixture with high performance or low wattage T8 fixture, with a reflector" to "Replace an existing T12 fixture with T8 fixture, with a reflector." 4-28-2011 Added criteria retrofit reflector kits are not eligible.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[10] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.9-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Four-foot lamps, 1-, 2-, 3-, or 4-lamp fixtures, HP T8				
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	8,736	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**
Eight-foot lamps, 1- or 2-lamp fixtures, HP T8				
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	8,736	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**

Table 9.1.9-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)	Weight Percent-age
Four Foot Lamps								
4-lamp	F40T12 / ES	34	144	F32T8 / ES	28	96	0.012	35%
3-lamp	F40T12 / ES	34	103	F32T8 / ES	28	72	0.010	25%
1-lamp	F40T12 / ES	34	43	F32T8 / ES	28	25	0.018	10%
2-lamp	F40T12 / ES	34	72	F32T8 / ES	28	48	0.012	30%
Weighted Average		----	----	----	----	----	**0.012**	----
Eight Foot Lamps								
2 lamp	F96T12 / ES	60	132	F96T8	57	100	0.016	75%
1-lamp	F96T12 / ES	60	77	F96T8	57	60	0.017	25%
Weighted Average		----	----	----	----	----	**0.016**	----

Source: ComEd

Table 9.1.9-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Demand Savings (kW)	Energy Savings (kWh)
	4-foot Lamp		**8-foot Lamp**	
Office	0.012	40.03	0.016	53.39
School (K-12)	0.006	26.24	0.008	34.99
College/University	0.010	48.09	0.013	64.14
Retail/Service	0.013	58.23	0.017	77.66
Restaurant	0.010	73.95	0.014	98.63
Hotel/Motel	0.009	68.62	0.012	91.52
Medical	0.011	125.59	0.015	167.51
Grocery	0.012	80.18	0.016	106.94
Warehouse	0.011	46.45	0.015	61.95
Light Industry	0.013	54.36	0.017	72.50
Heavy Industry	0.013	54.36	0.017	72.50
Average = Miscellaneous	**0.011**	**61.25**	**0.015**	**81.69**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.9-2) X Demand Interactive Effects (from Table 9.1.9-1) X Coincident Diversity Factor (from Table 9.1.9-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (weighted average from Table 9.1.9-2) X Energy Interactive Effects (from Table 9.1.9-1) X Hours of Operation (from Table 9.1.9-1)

Table 9.1.9-4 Typical Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Four-foot, 1-Lamp Systems	$67	$0	$67	$7/system
Four-foot, 2-Lamp Systems	$67	$0	$67	$14/system
Four-foot, 3-Lamp Systems	$81	$0	$81	$21/system
Four-foot, 4-Lamp Systems	$81	$0	$81	$28/system
Measure Average	**$77**	**$0**	**$77**	**$7/lamp**

9.1.10 T12 to T5 New Fluorescent Fixture

Measure Code: BPL43

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace an existing T12 system with a T5 fixture

Eligibility Criteria for New Energy-Efficient Equipment:

- May use 28W T5, 49W T5 (T5HO), or 54W T5 (T5HO)
- T5 ballasts must be UL listed and have minimum warranty of five years
- Specular reflector kits are NOT eligible for this incentive (see highbay measure)
- New fixture does not have to have a reflector

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[11]: 12 years

Revision Details: 8-6-2011 Changed criteria from "Replace an existing T12 system with T5 high efficiency fixture" to "Replace an existing T12 system with a T5 fixture." In PY4 added criteria T5 ballasts must be UL listed and have minimum warranty of five years.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[11] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.10-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,210	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.10-1) X Coincident Diversity Factor (from Table 9.1.10-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.10-1) X Hours of Operation (from Table 9.1.10-1)

Table 9.1.10-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Replace T12 fixture with T5 fixture	Per invoice	N/A	$180/fixture	$0.25/watt reduced

9.1.11 Single Lamp T5 Fluorescent Fixture with Reflector

Measure Code: BPL45

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace an existing HID fixture for aisle lighting with T5 fixture

Eligibility Criteria for New Energy-Efficient Equipment:

- Single lamp T5 fixture with reflector(white or specular)
- T5 ballasts must be UL listed and have minimum warranty of five years
- May use 28W T5 or 54W T5 (T5HO)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[12]: 11 years

Revision Details: 8-6-2011 Changed criteria from "Replace an existing HID fixture for aisle lighting in a warehouse/distribution facility" with "Replace an existing HID fixture for aisle lighting with T5 fixture." In PY4 added criteria T5 ballasts must be UL listed and have minimum warranty of five years.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls

Bonus Incentives offered: T12 ramp-down bonus (see Appendix B)

Supplemental Information Collected on the Application: None

[12] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.11-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	8,736	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$)) X Demand Interactive Effects (from Table 9.1.11-1) X Coincident Diversity Factor (from Table 9.1.11-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.11-1) X Hours of Operation (from Table 9.1.11-1)

Table 9.1.11-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
T5 Lamp Fixture	$65	$0	$65	$0.25 per watt reduced

9.1.12 High Efficiency Fluorescent Fixtures

Measure Code: BPL64

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace T12 recessed or surface mounted troffer (lensed) or parabolic (egg crate) fixture with T5 T8 fixture

Eligibility Criteria for New Energy-Efficient Equipment:

- Recessed or surface mounted T5 orT8 troffer or parabolic fixture
- T5 ballasts must be UL listed and have minimum warranty of five years
- Lamps and Ballasts must be listed on the CEE web site (www.cee1.org)**
- May use 28W T5 or 54W T5 (T5HO)
- Overall fixture efficiency must exceed 83% for prismatic lensed fixtures and 75% for parabolic fixtures

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[13]: 15 years

Revision Details: 8-6-2011 Changed criteria from "Replace 3 or 4 lamp T12 recessed or surface mounted troffer (lensed) or parabolic (egg crate) fixture with T5 or high performance T8 lamps and ballasts" to "Replace T12 recessed or surface mounted troffer (lensed) or parabolic (egg crate) fixture with T5 or T8 fixture." In PY4 removed criteria for high performance T8. In PY4 added criteria T5 ballasts must be UL listed and have minimum warranty of five years.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[13] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \text{ x } ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \text{ x } ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.12-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	8,736	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.12-1) X Coincident Diversity Factor (from Table 9.1.12-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.12-1) X Hours of Operation (from Table 9.1.12-1)

Table 9.1.12-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
HE Fluorescent Fixture	$120	$0	$120	$0.25 per watt reduced

9.1.13 Low Glare High Efficiency Recessed Fixtures

Measure Code: BPL65

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised May 3, 2010
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace T12 recessed or surface mounted fixture with semi-indirectT5 or T8 fixtures

Eligibility Criteria for New Energy-Efficient Equipment:

- New recessed or surface mounted T5 or T8 semi-indirect fixture
- T5 ballasts must be UL listed and have minimum warranty of five years
- Lamps and Ballasts must be listed on the CEE web site (www.cee1.org)**
- May use 28W T5 or 54W T5 (T5HO)
- Overall fixture efficiency must exceed 80%
- Must be a new fixture incorporating advanced glare control features (semi-indirect lighting)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[14]: 15 years

Revision Details: In PY3 (5-3-10) this measure was modified so the new fixtures going in were not limited to two or three lamp fixtures with one ballast – the new fixture could be any number of lamps. The incentive was also changed from $20/fixture to $0.25 per watt reduced. 8-6-2011 Changed criteria from "Replace 3 or 4 lamp T12 recessed or surface mounted low glare (semi-indirect) fixture with T5 or high performance T8 lamps and ballast" to "Replace T12 recessed or surface mounted fixture with semi-indirect T5 or T8 fixtures." In PY4 removed criteria for high-performance T8. In PY4 added criteria T5 ballasts must be UL listed and have minimum warranty of five years.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

[14] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times h$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture
h =hours

Table 9.1.13-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,306	1.19	0.88	1.11
Restaurant	5,278	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	8,736	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	3,597	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,489**	**1.19**	**0.77**	**1.12**

Source: DEER database

Demand Savings Calculation (per watt reduced) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.13-1) X Coincident Diversity Factor (from Table 9.1.13-1)

Energy Savings Calculation (per watt reduced) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.13-1) X Hours of Operation (from Table 9.1.13-1)

Table 9.1.13-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost*	Incentive Payment
Recessed semi-indirect fluorescent fixture	Per invoice	N/A	$337	$0.25 per watt reduced

*low glare, high efficiency recessed fixture

9.1.14 Controls for T5 and High Performance T8 Systems

Measure Code: BPL72

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installation – may not replace existing control

Eligibility Criteria for New Energy-Efficient Equipment:

- May be used for Highbay applications
- Controls for HIF Systems
- Incentive may not be combined with other control incentives
- Ballast must be automatically controlled based on occupancy or daylight
- Wall, ceiling, or fixture mounted only – cannot be switch plate mounted
- Must control from 125 through 800 watts (over 800 watts is custom)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[15]: 10 years

Revision Details: 4-28-2011 incentive increased from $15 per control to $30 per control. PY2 did not have a limit of 800 watts, only "control a minimum of 125 watts". 4-28-2011 Removed 7 criteria requirements: (1) Occupancy Control (Hi/Lo HIF) or Daylight Dimming Controls (DDS HIF); (2) Microprocessor controlled, all digital PIR sensor; (3) Zero arc point switching to reduce stress on relay; (4) Multiple output; (5) Selectable multiple mounting heights; (6) Supports multiple mounting heights; (7) Multiple passive infrared options.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. For high-occupancy buildings (offices, retails, etc) the Time Off is 20% (source: DEER). For low-occupancy buildings (warehouses, etc) the Time Off is 50%. The Annual Operating Hours are taken from DEER's non-CFL Table, except for Guest Rooms operating hours, which have been corrected to 1,145 hrs.

Bonus Incentives offered:
T12 and controls bonus (10%) 11/16/09-1/31/10

Supplemental Information Collected on the Application: Wattage controlled, per control

[15] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times W_{CTRL} \times N_C \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times W_{CTRL} \times N_C \times ISR$

ΔkW = Gross customer connected load kW savings per watt controlled for the measure
ΔkW_S = Demand savings per watts controlled
W_{CTRL} = Watts controlled by HIF control
N_C = Number of controls being installed
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer kWh savings for the measure
ΔkWh_S = Energy savings per watt controlled

Table 9.1.14-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings*	kWh Savings*
Daylight Sensors and Occupancy Sensors (Hi/Lo)						
Office	2,808	1.25	0.81	1.17	0.0002025	0.66
School (K-12)	1,873	1.23	0.42	1.15	0.0001033	0.43
College/University	3,433	1.22	0.68	1.15	0.0001659	0.79
Retail/Service	4,210	1.19	0.88	1.11	0.0002094	0.93
Restaurant	5,278	1.26	0.68	1.15	0.0001714	1.21
Hotel/Motel	4,941	1.14	0.67	1.14	0.0001528	1.13
Medical	6,474	1.26	0.74	1.18	0.0001865	1.53
Grocery	5,824	1.25	0.81	1.13	0.0002025	1.32
Warehouse	4,160	1.09	0.84	1.06	0.0004578	2.20
Light Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Heavy Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**	**0.0002656**	**1.33**

Source: DEER database
* Per Watt Controlled

Demand Savings Calculation (ΔkW_S) =

Peak kW Savings
(from Table 9.1.14-1)

Energy Savings Calculation (ΔkWh_S) =

kWh Savings
(from Table 9.1.14-1)

Table 9.1.14-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Incremental Cost	Incentive Payment
Occupancy Sensor – Hi/Lo	$50	$30/control

9.1.15 Remote Mounted Occupancy Sensors

Measure Code: BPL73

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installation – may not replace existing control

Eligibility Criteria for New Energy-Efficient Equipment:

- Wall or ceiling mounted only – cannot be fixture or switch plate mounted
- Must control from 125 through 800 watts (over 800 watts is custom)
- Ultrasonic or Passive Infrared sensor controlling non-highbay fixtures

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[16]: 10 years

Revision Details: 4-28-2011 incentive amount changed from $25 per control to $30 per control. PY2 did not have a limit of 800 watts, only "control a minimum of 125 watts"

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. For high-occupancy buildings (offices, retail, etc) the Time Off is 20% (source: DEER). For low-occupancy buildings (warehouses, etc) the Time Off is 50%. The Annual Operating Hours are taken from DEER's non-CFL Table, except for Guest Rooms operating hours, which have been corrected to 1,145 hrs.

Bonus Incentives offered:
T12 and controls bonus (10%) 11/16/09-1/31/10

Supplemental Information Collected on the Application: Wattage controlled, per control

[16] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times W_{CTRL} \times N_{OS} \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times W_{CTRL} \times N_{OS} \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per watts controlled
W_{CTRL} = Watts controlled by HIF control
N_{OS} = Number of occupancy sensors being installed

ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per watts controlled

Table 9.1.15-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings*	kWh Savings*
Office	2,808	1.25	0.81	1.17	0.0002025	0.66
School (K-12)	1,873	1.23	0.42	1.15	0.0001033	0.43
College/University	3,433	1.22	0.68	1.15	0.0001659	0.79
Retail/Service	4,210	1.19	0.88	1.11	0.0002094	0.93
Restaurant	5,278	1.26	0.68	1.15	0.0001714	1.21
Hotel/Motel	4,941	1.14	0.67	1.14	0.0001528	1.13
Medical	6,474	1.26	0.74	1.18	0.0001865	1.53
Grocery	5,824	1.25	0.81	1.13	0.0002025	1.32
Warehouse	4,160	1.09	0.84	1.06	0.0004578	2.20
Light Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Heavy Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**	**0.0002656**	**1.33**

Source: DEER database
* Per Watt Controlled

Demand Savings Calculation (ΔkW_S) =

Peak kW Savings
(from Table 9.1.15-1)

Energy Savings Calculation (ΔkWh_S) =

Peak kWh Savings
(from Table 9.1.15-1)

Table 9.1.15-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Incremental Cost	Incentive Payment
Remote Mounted Occupancy Sensor	$145	$30/control

9.1.16 Occupancy Sensors

Measure Code: BPL74

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installation – may not replace existing control

Eligibility Criteria for New Energy-Efficient Equipment:

- Manual On/Auto Off Occupancy Sensor OR Auto On/Auto Off Occupancy Sensor
- Must control from 125 through 800 watts (over 800 watts is custom)
- Wall switch plate controls only – cannot be wall, ceiling, or fixture mounted
- Ultrasonic or Passive Infrared sensor controlling non-highbay fixtures
- Socket-based and fixture-mounted occupancy sensors do not qualify
- Cannot be combined with purchases from the On-line store

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[17]: 10 years

Revision Details: 4-28-2011 incentive increased from $25 per control to $30 per control.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. For high-occupancy buildings (offices, retails, etc) the Time Off is 20% (source: DEER). For low-occupancy buildings (warehouses, etc) the Time Off is 50%. The Annual Operating Hours are taken from DEER's non-CFL Table, except for Guest Rooms operating hours, which have been corrected to 1,145 hrs.

Bonus Incentives offered:
T12 and controls bonus (10%) 11/16/09-1/31/10

Supplemental Information Collected on the Application: Wattage controlled, per control

[17] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times W_{CTRL} \times N_{OS} \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times W_{CTRL} \times N_{OS} \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per watts controlled
W_{CTRL} = Watts controlled by HIF control
N_{OS} = Number of occupancy sensors being installed
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per watts controlled

Table 9.1.16-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings*	kWh Savings*
Office	2,808	1.25	0.81	1.17	0.0002025	0.66
School (K-12)	1,873	1.23	0.42	1.15	0.0001033	0.43
College/University	3,433	1.22	0.68	1.15	0.0001659	0.79
Retail/Service	4,210	1.19	0.88	1.11	0.0002094	0.93
Restaurant	5,278	1.26	0.68	1.15	0.0001714	1.21
Hotel/Motel	4,941	1.14	0.67	1.14	0.0001528	1.13
Medical	6,474	1.26	0.74	1.18	0.0001865	1.53
Grocery	5,824	1.25	0.81	1.13	0.0002025	1.32
Warehouse	4,160	1.09	0.84	1.06	0.0004578	2.20
Light Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Heavy Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**	**0.0002656**	**1.33**

Source: DEER database
* Per Watt Controlled

Demand Savings Calculation (ΔkW_S) =

Peak kW Savings
(from Table 9.1.16-1)

Energy Savings Calculation (ΔkWh_S) =

kWh Savings
(from Table 9.1.16-1)

Table 9.1.16-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Incremental Cost	Incentive Payment
Occupancy Sensor	$50	$30/control

9.1.17 Remote Mounted Occupancy Sensors (Low Wattage)

Measure Code: BPL79

Version Date & Revision History:

Draft date: August 6, 2011
Effective date: August 6, 2011
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- None

Eligibility Criteria for New Energy-Efficient Equipment:

- Wall, ceiling, or switch plate mounted only – cannot be fixture mounted
- Must control from 50 through 124 watts
- Occupancy control or daylight dimming control

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[18]: 10 years

Revision Details: None

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. For high-occupancy buildings (offices, retail, etc) the Time Off is 20% (source: DEER). For low-occupancy buildings (warehouses, etc) the Time Off is 50%. The Annual Operating Hours are taken from DEER's non-CFL Table, except for Guest Rooms operating hours, which have been corrected to 1,145 hrs.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: Wattage controlled, per control

[18] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times W_{CTRL} \times N_{OS} \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times W_{CTRL} \times N_{OS} \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per watts controlled
W_{CTRL} = Watts controlled by HIF control
N_{OS} = Number of occupancy sensors being installed

ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per watts controlled

Table 9.1.17-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings*	kWh Savings*
Office	2,808	1.25	0.81	1.17	0.0002025	0.6571
School (K-12)	1,873	1.23	0.42	1.15	0.0001033	0.4307
College/University	3,433	1.22	0.68	1.15	0.0001659	0.7895
Retail/Service	4,210	1.19	0.88	1.11	0.0002094	0.9347
Restaurant	5,278	1.26	0.68	1.15	0.0001714	1.2139
Hotel/Motel	4,941	1.14	0.67	1.14	0.0001528	1.1264
Medical	6,474	1.26	0.74	1.18	0.0001865	1.5279
Grocery	5,824	1.25	0.81	1.13	0.0002025	1.3162
Warehouse	4,160	1.09	0.84	1.06	0.0004578	2.2048
Light Industry	4,290	1.08	0.99	1.04	0.0005346	2.2308
Heavy Industry	4,290	1.08	0.99	1.04	0.0005346	2.2308
Average = Miscellaneous	4,325	1.19	0.77	1.12	0.0002656	1.3330

Source: **ComEd standard lighting measure savings**
* Per Watt Controlled

Demand Savings Calculation* (ΔkW_S) =

Peak kW Savings
(from Table 9.1.17-1)

Energy Savings Calculation* (ΔkWh_S) =

kWh Savings
(from Table 9.1.17-1)

Table 9.1.17-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Incremental Cost	Incentive Payment
Remote Mounted Occupancy Sensor (low wattage)	$145	$5/control

9.1.18 CFL Lamps

Measure Code: None

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacement of incandescent, or CFL bulbs (limit 100 per year)

Eligibility Criteria for New Energy-Efficient Equipment:

- Ameren Illinois Utility business customers with an electric delivery service rate of DS-2 ("small businesses") are eligible to use the On-line store at the ActOnEnergy.com web site

Was incentivized in PY1 – then moved to the on-line store only in PY2.

See ActOnEnergy.com (For my business – Small business on-line store) for discounted CFLs.

9.1.19 LED Lamps

Measure Code: BPL81

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace 100W or less incandescent or halogen lamps

Eligibility Criteria for New Energy-Efficient Equipment:

- Minimum efficacy of 40 lumens/watt
- Minimum25,000 hour rated life at L70
- Minimum CRI of 75 or more
- 3-year warranty on LEDs
- 3-year warranty on drivers
- UL-listed

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[19]: 8 years

Revision Details: 8-6-2011 Removed criteria that lamps must be listed on ENERGY STAR website. In PY4 changed minimum efficacy from 35 to 40 lumens per watt. In PY4 removed criteria for medium base (Edison or candelabra base only). In PY4 changed from 18,000 hour rate life to 25,000 hour rated life at L70. In PY4 added four criteria: minimum CRI of 75 or more; 3-year warranty on LEDs; 3-year warranty on drivers; UL listed. In PY4 added halogen lamps to eligible replacement equipment.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[19] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.19-1 Energy Factor Assumptions

ComEd Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
Office	2,616	1.25	0.81	1.17	0.023	68
School (K-12)	1,873	1.23	0.42	1.15	0.012	48
College/University	3,433	1.22	0.68	1.15	0.019	88
Retail/Service	4,117	1.19	0.88	1.11	0.023	102
Restaurant	4,816	1.26	0.68	1.15	0.019	124
Hotel/Motel	4,941	1.14	0.67	1.14	0.017	126
Medical	6,474	1.26	0.74	1.18	0.021	171
Grocery	5,824	1.25	0.81	1.13	0.023	147
Warehouse	4,160	1.09	0.84	1.06	0.020	98
Light Industry	4,290	1.08	0.99	1.04	0.024	100
Heavy Industry	4,290	1.08	0.99	1.04	0.024	100
Average = Miscellaneous	**4,257**	**1.19**	**0.77**	**1.12**	**0.020**	**106**

Source: DEER database

Table 9.1.19-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
LED Lamp	Incandescent	28	n/a	LED	6	n/a	0.022

Source: ComEd

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (from Table 9.1.19-2)	X	Demand Interactive Effects (from Table 9.1.19-1)	X	Coincident Diversity Factor (from Table 9.1.19-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (from Table 9.1.19-2)	X	Energy Interactive Effects (from Table 9.1.19-1)	X	Hours of Operation (from Table 9.1.19-1)

Table 9.1.19-3 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
LED lamp	$20	0	$20	$10/lamp

9.1.20 LED Recessed Down Lamps

Measure Code: BPL84

Version Date & Revision History:

Draft date: December 17, 2008
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Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace 60-100W incandescent lamps

Eligibility Criteria for New Energy-Efficient Equipment:

- LED recessed downlight ≤ 18 Watts
- Minimum efficiency of 40 lumens/Watt
- Minimum 25,000 hour rated life at L70
- Minimum CRI of 75 or more
- 3-year warranty on LEDs
- 3-year warranty on drivers
- UL listed
- Cannot be combined with purchases from the On-line store

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[20]: 16 years

Revision Details: 8-6-2011 Eligibility criteria changed from "Lamps must be listed on ENERGY STAR website" to "ENERGY STAR qualified, **OR** meets all of the following:" In PY4, minimum efficiency changed from 35 lumen/watt to 40 lumens/watt. In PY4, added 5 criteria: minimum 25,000 hour rated life at L70; minimum CRI of 75 or more; 3-year warranty on LEDs; 3-year warranty on drivers; UL listed.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[20] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.20-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,616	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,117	1.19	0.88	1.11
Restaurant	4,816	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,257**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.20-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Lamp Wattage (watts)	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Lamp Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
LED Recessed Down Lamp	Incandescent	75	75	LED	12	12	0.063

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (from Table 9.1.20-2)	X	Demand Interactive Effects (from Table 9.1.20-1)	X	Coincident Diversity Factor (from Table 9.1.20-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (from Table 9.1.20-2)	X	Energy Interactive Effects (from Table 9.1.20-1)	X	Hours of Operation (from Table 9.1.20-1)

Table 9.1.20-3 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
LED Recessed Down Lamp	$100	n/a	$100	$10/fixture

9.1.21 CMH Fixtures: (Replaces incandescent <100 Watts)

Measure Code: BPL85

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised May 3, 2010
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace incandescent fixtures less than 100 watts

Eligibility Criteria for New Energy-Efficient Equipment:

- Permanently-wired fixtures
- Containing FUL or cUL listed CMH lamps and ballast

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[21]: 12 years

Revision Details: In PY3 (5-3-10) this was split into two measures – it used to include the CMH fixtures that are 100-350 watts too – that is now its own measure (BPL89).

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[21] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Saving $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.21-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,616	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,117	1.19	0.88	1.11
Restaurant	4,816	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,257**	**1.19**	**0.77**	**1.12**

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.21-1) X Coincident Diversity Factor (from Table 9.1.21-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.21-1) X Hours of Operation (from Table 9.1.21-1)

Table 9.1.21-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
CMH fixture < 100 watts	$221	n/a	$221	$20/fixture

9.1.22 CMH Fixtures (Replaces incandescent 100-350 Watts)

Measure Code: BPL89

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace incandescent fixtures 100-350 watts

Eligibility Criteria for New Energy-Efficient Equipment:

- Permanently-wired fixtures
- Containing FUL or cUL listed CMH lamps and ballast

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[22]: 12 years

Revision Details: In PY3 (5-3-10) this was split into two measures – it used to include the CMH fixtures that are 100-350 watts too – that is now its own measure (BPL89)

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[22] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.22-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,616	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,117	1.19	0.88	1.11
Restaurant	4,816	1.26	0.68	1.15
Hotel/Motel	4,941	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,257**	**1.19**	**0.77**	**1.12**

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.22-1) X Coincident Diversity Factor (from Table 9.1.22-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$)) X Energy Interactive Effects (from Table 9.1.22-1) X Hours of Operation (from Table 9.1.22-1)

Table 9.1.22-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
CMH fixture 100 < fixture < 350 watts	$221	$0	$221	$35/fixture

9.1.23 CMH Integral Ballast Lamps

Measure Code: BPL86

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace existing 70-100W incandescent or flood lamps

Eligibility Criteria for New Energy-Efficient Equipment:

- CMH lamps <= 25W
- CMH lamps must be UL or cUL listed
- Requires reflector lamp and integrated ballast
- Minimum 10,500 hour rated life

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[23]: 5 years

Revision Details: (None)

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[23] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_L \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_L \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per lamp
N_L = Number of lamps being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per lamp

Table 9.1.23-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,808	1.00	1.00	1.00
School (K-12)	1,873	1.00	1.00	1.00
College/University	3,433	1.00	1.00	1.00
Retail/Service	4,210	1.00	1.00	1.00
Restaurant	5,278	1.00	1.00	1.00
Hotel/Motel	4,941	1.00	1.00	1.00
Medical	6,474	1.00	1.00	1.00
Grocery	5,824	1.00	1.00	1.00
Warehouse	4,160	1.00	1.00	1.00
Light Industry	4,290	1.00	1.00	1.00
Heavy Industry	4,290	1.00	1.00	1.00
Average = Miscellaneous	**4,325**	**1.00**	**1.00**	**1.00**

Table 9.1.23-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
CMH Integral Ballast Lamps	Incandescent	70	CMH	25	0.045

Table 9.1.23-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.045	126
School (K-12)	0.045	84
College/University	0.045	154
Retail/Service	0.045	189
Restaurant	0.045	238
Hotel/Motel	0.045	222
Medical	0.045	291
Grocery	0.045	262
Warehouse	0.045	187
Light Industry	0.045	193
Heavy Industry	0.045	193
Average = Miscellaneous	**0.045**	**195**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (from Table 9.1.21-2)	X	Demand Interactive Effects (from Table 9.1.23-1)	X	Coincident Diversity Factor (from Table 9.1.23-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (from Table 9.1.23-2)	X	Energy Interactive Effects (from Table 9.1.23-1)	X	Hours of Operation (from Table 9.1.23-1)

Table 9.1.23-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
CMH Integral Ballast Lamps	$20	n/a	$20	$5/lamp

9.1.24 Hard-wired CFL Fixtures ≤ 30 Watts

Measure Code: BPL87

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace incandescent with permanently-wired CFL

Eligibility Criteria for New Energy-Efficient Equipment:

- Permanently-wired fixtures with Electronic Ballast
- Up to or equal to 30 Watts

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[24]: 15 years

Revision Details: In PY4 this measure was changed from "Hard-wired CFL Fixtures ≤ 30 Watts" to "Hard-wired CFL Fixtures < 30 Watts."

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[24] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings

Table 9.1.24-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,616	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,117	1.19	0.88	1.11
Restaurant	4,816	1.26	0.68	1.15
Hotel/Motel	6,206	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,372**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.24-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
Hard-wired CFL Fixtures < 30 watts	Incandescent	77	CFL	20	0.057

Table 9.1.24-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.058	175
School (K-12)	0.030	123
College/University	0.047	225
Retail/Service	0.060	261
Restaurant	0.049	316
Hotel/Motel	0.044	404
Medical	0.053	436
Grocery	0.058	376
Warehouse	0.052	252
Light Industry	0.061	255
Heavy Industry	0.061	255
Average = Miscellaneous	**0.052**	**280**

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (from Table 9.1.24-2)	X	Demand Interactive Effects (from Table 9.1.24-1)	X	Coincident Diversity Factor (from Table 9.1.24-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (from Table 9.1.24-2)	X	Energy Interactive Effects (from Table 9.1.24-1)	X	Hours of Operation (from Table 9.1.24-1)

Table 9.1.24-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Hard-wired CFL Fixtures < 30 watts	$46	n/a	$46	$25/fixture

9.1.25 Hard-wired CFL Fixtures > 30 Watts

Measure Code: BPL88

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace incandescent with permanently-wired CFL

Eligibility Criteria for New Energy-Efficient Equipment:

- Permanently-wired fixtures Electronic Ballast
- More than 30 Watts

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[25]: 15 years

Revision Details: (None)

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[25] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings

Table 9.1.25-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	2,616	1.25	0.81	1.17
School (K-12)	1,873	1.23	0.42	1.15
College/University	3,433	1.22	0.68	1.15
Retail/Service	4,117	1.19	0.88	1.11
Restaurant	4,816	1.26	0.68	1.15
Hotel/Motel	6,206	1.14	0.67	1.14
Medical	6,474	1.26	0.74	1.18
Grocery	5,824	1.25	0.81	1.13
Warehouse	4,160	1.09	0.84	1.06
Light Industry	4,290	1.08	0.99	1.04
Heavy Industry	4,290	1.08	0.99	1.04
Average = Miscellaneous	**4,372**	**1.19**	**0.77**	**1.12**

Source: DEER database

Table 9.1.25-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
Hard-wired CFL Fixtures > 30 watts	Incandescent	160	CFL	47	0.113

Table 9.1.25-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.114	344
School (K-12)	0.058	242
College/University	0.093	444
Retail/Service	0.118	514
Restaurant	0.096	623
Hotel/Motel	0.086	796
Medical	0.105	859
Grocery	0.114	740
Warehouse	0.103	496
Light Industry	0.120	502
Heavy Industry	0.120	502
Average = Miscellaneous	0.103	551

Demand Savings Calculation (ΔkW_S) =

Non-coincident Demand Savings (from Table 9.1.25-2)	X	Demand Interactive Effects (from Table 9.1.25-1)	X	Coincident Diversity Factor (from Table 9.1.25-1)

Energy Savings Calculation (ΔkWh_S) =

Non-coincident Demand Savings (from Table 9.1.25-2)	X	Energy Interactive Effects (from Table 9.1.25-1)	X	Hours of Operation (from Table 9.1.25-1)

Table 9.1.25-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Hard-wired CFL Fixture > 30 watts	$100	n/a	$100	$35/fixture

9.1.26 Exterior Lighting

Measure Code: BPL50

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised 5-31-11
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacement of exterior HID fixtures such as mercury vapor, high pressure sodium, and metal halide

Eligibility Criteria for New Energy-Efficient Equipment:

- Must have electronic ballast.
- Fixtures must be controlled by exterior photocell or time clock
- UL listed
- If the new lights are LEDs:
  - Minimum efficacy of 40 lumens/watt
  - Minimum 25,000 hour rated life at L70
  - Minimum CRI of 70
  - Three-year warranty on LEDs and drivers
- Ameren Delivery Service rate DS-5 customers are eligible for this measure only if the fixtures are not Ameren owned.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[26]: 15 years

Revision Details: 8-6-2011 Removed reference to magnetic ballast. 8-6-2011 Added criteria "Ameren Delivery Service rate DS-5 customers are eligible for this measure only if the fixtures are not Ameren owned." In PY4 added criteria for LEDs (minimum efficacy of 40 lumens/watt; minimum 25,000 hour rated life at L70; minimum CRI of 70; three-year warranty on LEDs and drivers). In PY4 added criteria that equipment must be UL listed. 4-28-2011 incentive amount changed from $0.25/watt reduced to $0.30/watt reduced. 5-31-11 Merged BPL51 with this measure so all exterior lighting is now covered in BPL50, and measure title was changed from "Garage Type Fixtures with Electronic Ballast" to "Exterior Lighting."

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: Hours of operation (dusk to dawn, or other (specify)

[26] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \text{ x } ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \text{ x } ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.26-1 Energy Factor Assumptions

Building Types	Operating Hours*	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	4380	1.0	0.0	1.0
School (K-12)	4380	1.0	0.0	1.0
College/University	4380	1.0	0.0	1.0
Retail/Service	4380	1.0	0.0	1.0
Restaurant	4380	1.0	0.0	1.0
Hotel/Motel	4380	1.0	0.0	1.0
Medical	4380	1.0	0.0	1.0
Grocery	4380	1.0	0.0	1.0
Warehouse	4380	1.0	0.0	1.0
Light Industry	4380	1.0	0.0	1.0
Heavy Industry	4380	1.0	0.0	1.0
Average = Miscellaneous	**4380**	**1.0**	**0.0**	**1.0**

* Dusk-dawn controls required so annual operating hours are 8760/2 or 4380 annual hours. But, if customer indicates hours less than 4380 then the lesser number is used in the calculation.

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.26-1) X Coincident Diversity Factor (from Table 9.1.26-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.26-1) X Hours of Operation (from Table 9.1.26-1)

Table 9.1.26-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Retrofit HID Kit	$200	$0	$200.00	$0.30 watt reduced
New HID Fixture with Pulse Start and Electronic ballast	$300	$0	$300.00	$0.30 watt reduced

9.1.27 Canopy Lighting w/Electronic Ballasts

Measure Code: BPL51
Discontinued – all exterior lighting merged into BPL50

Version Date & Revision History:

Draft date: May 3, 2010
Effective date: May 3, 2010
Revised NA
End date: 5-31-11

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacement of HID fixtures such as mercury vapor, high pressure sodium, and metal halide
- Must be mounted under a canopy

Eligibility Criteria for New Energy-Efficient Equipment:

- Must have electronic ballast
- Fixtures must be controlled by exterior photocell or time clock to qualify

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[27]: 15 years

Revision Details: This measure was discontinued in PY4.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: Hours of operation (dusk to dawn, or other (specify)

[27] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.27-1 Energy Factor Assumptions

Building Types	Operating Hours*	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	4380	1.0	0	1.0
School (K-12)	4380	1.0	0.0	1.0
College/University	4380	1.0	0.0	1.0
Retail/Service	4380	1.0	0.0	1.0
Restaurant	4380	1.0	0.0	1.0
Hotel/Motel	4380	1.0	0.0	1.0
Medical	4380	1.0	0.0	1.0
Grocery	4380	1.0	0.0	1.0
Warehouse	4380	1.0	0.0	1.0
Light Industry	4380	1.0	0.0	1.0
Heavy Industry	4380	1.0	0.0	1.0
Average = Miscellaneous	**4380**	**1.0**	**0.0**	**1.0**

* Dusk-dawn controls required so annual operating hours are 8760/2 or 4380 annual hours.

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.27-1) X Coincident Diversity Factor (from Table 9.1.27-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.27-1) X Hours of Operation (from Table 9.1.27-1)

Table 9.1.27-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Retrofit HID Kit	$200	$0	$200.00	$0.25 watt reduced
New HID Fixture with Pulse Start and Electronic ballast	$300	$0	$300.00	$0.25 watt reduced

9.1.28 Glass Door LED Cooler/Freezer Lighting

Measure Code: BPL93

Version Date & Revision History:

Draft date: September 29, 2009
Effective date: September 29, 2009
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Refrigerated case lighting, replacing T-8, T-10, and or T-12 fluorescent lamps with LED lighting

Eligibility Criteria for New Energy-Efficient Equipment:

- To be installed on low- and medium-temperature main coolers and freezers; or low- and medium temperature reach-in coolers and freezers (-10 through +41 degrees F)
- Qualifying LED lighting system must replace existing five-foot equivalent fluorescent lighting in existing low-temperature or medium- temperature display cases. Minimum wattage requirement for these sources is 18 watts.
- The product must be tested to IES LM79 and IES LM80 by a third party DOE accredited lab and carry a warranty on the light source and power supplies for five years or more.
- The LED luminaires must have a minimum efficacy of 35 lumens per watt and have a CRI of 75 or above.
- Minimum 25,000 hour rated life at L70
- 3-year warranty on LEDs
- 3-year warranty on drivers
- UL-listed

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[28]: 11 years

Revision Details: In PY4 added four criteria (1) Minimum 25,000 hour rated life at L70; (2) 3-year warranty on LEDs; (3) 3-year warranty on drivers; (4) UL-listed.

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 9-10-09 Light Calcs, PECI LED Case Lighting With and Without Motion Sensors presentation dated 1-5-10, and EVALUATION OF FLUORESCENT, LED, AND FIBER OPTIC LIGHTING SYSTEMS IN LOW TEMPERATURE REACH-IN FREEZER DISPLAY CASES, Refrigeration & Thermal Test Center Design & Engineering Services, Southern California Edison, 12-4-07, and New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs, dated 10-15-10.

[28] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Bonus Incentives offered:

T12 bonus (10%) T12 replacements are eligible for a 10% bonus beginning June 1, 2011, through October 31, 2011. On October 17, 2011, the bonus was extended through the end of PY4, to May 31, 2012. In addition, an early completion bonus is available for projects submitted by March 31, 2012 (customers will receive a 10% bonus coupon to use for any eligible gas or electric program in PY5, which runs from June 1, 2012 through May 31, 2013).

T12 Ramp down bonus (15%) 6/15/10-12/31/10

T12 Ramp down bonus (10%) 1/1/11-TBD (5/31/11?)

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_D \times N_D \text{ x } ISR \text{ x } (1+CF/CEF)$

Measure Energy Savings $\Delta kWh = \Delta kWh_D \text{ x } N_D \text{ x } ICR \text{ x } (1+CF/CEF)$

ΔkW = Gross customer connected load kW savings for the measure

ΔkW_D = Demand Savings per unit

N_D = Number of doors with associated fixtures being replaced

ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%

ΔkWh = Gross customer annual kWh savings for the measure

ΔkWh_D = Energy Savings per unit

h = Annual operating hours

CF/CEF = Compressor Factor /Commercial Efficiency Factor (Is equal to 0.45. Figure is arrived at by bending the figure of 0.45 for compressors and the figure of 0.45 for commercial units, estimating each represents 50% of the units encountered. The compressor factor is arrived at by blending the figure of 0.40 for refrigerators and coolers, and the figure of 0.51 for freezers.

[The factors are based on effective refrigeration compressor EER values of 6.7 (1.8 kW/ton) and 5.25 Btu/Wh (2.3 kW/ton), respectively, and the assumption that 20% of the case lighting load is not converted into a case cooling load.
Compressor Factor = 0.28 ton/kW x 1.8 kW/ton x 0.8 = 0.40 for refrigerators and coolers, and 0.28 ton/kW x 2.3 kW/ton x 0.8 = 0.51 for freezers
The commercial efficiency factor figure is arrived at by blending the figure of 0.41 for refrigerators and coolers, and the figure of 0.52 for freezers. [The factors are based on starting values of 0.51 for refrigerators and coolers and 0.65 for freezers, respectively, and the assumption that 20% of the case lighting load is not converted into a case cooling load. Commercial Efficiency Factor = 0.51 x 0.8 = 0.41 for refrigerators and coolers, and 0.65 x 0.8 = 0.52 for freezers

Table 9.1.28-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Grocery	5,824	1.0	1.0	1.0

Source: DEER database

Table 9.1.28-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Fixture Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
LED Cooler/freezer Lighting (per door)	81.0	42	0.039

(watts are per door)

Table 9.1.28-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Grocery (per door)	0.057	329.6

Demand Savings Calculation (ΔkW_D) =

Non-coincident Demand Savings (weighted average from Table 9.1.28-2)	X	Demand Interactive Effects (average from Table 9.1.28-1)	X	Coincident Diversity Factor (average from Table 9.1.28-1)

Energy Savings Calculation (ΔkWh_D) =

Non-coincident Demand Savings (weighted average from Table 9.1.28-2)	X	Energy Interactive Effects (average from Table 9.1.28-1)	X	Hours of Operation (average from Table 9.1.28-1)

Table 9.1.28-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Incremental Cost	Incentive Payment
LED Refrigerated Display Case Lighting	$300/system	$25/door

9.1.29 Glass Door LED Cooler/Freezer Lighting Controls

Measure Code: BPL94

Version Date & Revision History:

Draft date: September 29, 2009
Effective date: September 29, 2009
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installation or replacement of failed control

Eligibility Criteria for New Energy-Efficient Equipment:

- To be installed on low- and medium-temperature main coolers and freezers; or low- and medium temperature reach-in coolers and freezers (-10 through +41 degrees F)
- Wall, ceiling, or case- mounted controls
- Must control at least 70 watts

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[29]: 11 years

Revision Details: (None)

Referenced Documents:
PECI LED Case Lighting With and Without Motion Sensors presentation dated 1-5-10, and EVALUATION OF FLUORESCENT, LED, AND FIBER OPTIC LIGHTING SYSTEMS IN LOW TEMPERATURE REACH-IN FREEZER DISPLAY CASES, Refrigeration & Thermal Test Center Design & Engineering Services, Southern California Edison, 12-4-07, and New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs, dated 10-15-10. Still waiting on report from SCE Refrigeration Technology Center. Will keep checking with them to get report once it is complete.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[29] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_{CTRL} \times N_{CTRL}$ x ISR x (1+CF/CEF) = 0

Measure Energy Savings $\Delta kWh = \Delta kWh_{CTRL}$ x N_{CTRL} x ICR x (1+CF/CEF) x SFPHC

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_{CTRL} = Demand Savings per unit
W_{CTRL} = Watts controlled by installing control unit, found in table below
N_{CTRL} = Number of controls being installed
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
SFPHC = Sensor full-power hours coefficient. For LED lights, it is expected the sensors will turn off the lights 30% of the time. The factor is then 0.3
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_{CTRL} = Energy Savings per unit
CF/CEF = Compressor Factor /Commercial Efficiency Factor (Is equal to 0.45)
Figure is arrived at by bending the figure of 0.45 for compressors and the figure of 0.45 for commercial units, estimating each represents 50% of the units encountered. The compressor factor is arrived at by blending the figure of 0.40 for refrigerators and coolers, and the figure of 0.51 for freezers.
[The factors are based on effective refrigeration compressor EER values of 6.7 (1.8 kW/ton) and 5.25 Btu/Wh (2.3 kW/ton), respectively, and the assumption that 20% of the case lighting load is not converted into a case cooling load. Compressor Factor = 0.28 ton/kW x 1.8 kW/ton x 0.8 = 0.40 for refrigerators and coolers, and 0.28 ton/kW x 2.3 kW/ton x 0.8 = 0.51 for freezers. The commercial efficiency factor figure is arrived at by blending the figure of 0.41 for refrigerators and coolers, and the figure of 0.52 for freezers.
[The factors are based on starting values of 0.51 for refrigerators and coolers and 0.65 for freezers, respectively, and the assumption that 20% of the case lighting load is not converted into a case cooling load. Commercial Efficiency Factor = 0.51 x 0.8 = 0.41 for refrigerators and coolers, and 0.65 x 0.8 = 0.52 for freezers

Table 9.1.29-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Grocery	0	1.0	0.0	1.0

Table 9.1.29-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Watts Controlled (per door)	Non-Coincident Demand Savings (kW)
LED Cooler/Freezer Lighting Controls	42	0.057

Table 9.1.29-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Grocery	0	106.4

Demand Savings Calculation (ΔkW_{CTRL}) =

Non-coincident Demand Savings (weighted average from Table 9.1.29-2)	X	Demand Interactive Effects (average from Table 9.1.29-1)	X	Coincident Diversity Factor (average from Table 9.1.29-1)

Energy Savings Calculation (ΔkWh_{CTRL}) =

Non-coincident Demand Savings (weighted average from Table 9.1.29-2)	X	Energy Interactive Effects (average from Table 9.1.29-1)	X	Hours of Operation (average from Table 9.1.29-1)

Table 9.1.29-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Incremental Cost	Incentive Payment
LED Refrigerated Case Lighting Controls	$300/system	$12/sensor

9.1.30 PSMH/CMH with Electronic Ballasts

Measure Code: BPL75

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacement of 400W HID with 320/350W PSMH/CMH lamps and electronic ballast

Eligibility Criteria for New Energy-Efficient Equipment:

- 320/350W Pulse-Start Metal-Halide (PSMH) or Ceramic Metal-Halide (CMH) lamps and electronic ballast

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[30]: 16 years

Revision Details: (None)

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Light Calcs – FINAL ComEd.xls.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[30] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_W \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_W \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_W = Demand Savings per fixture
W_{BASE} = Baseline connected kW from current fixture
W_{EE} = Energy efficient connected kW from proposed fixture
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_W = Energy Savings per fixture

Table 9.1.30-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects		
Office	2,616	1.25	0.81	1.17		
School (K-12)	1,873	1.23	0.42	1.15		
College/University	3,433	1.22	0.68	1.15		
Retail/Service	4,117	1.19	0.88	1.11		
Restaurant	4,816	1.26	0.68	1.15		
Hotel/Motel	6,206	1.14	0.67	1.14		
Medical	6,474	1.26	0.74	1.18		
Grocery	5,824	1.25	0.81	1.13		
Warehouse	4,160	1.09	0.84	1.06		
Light Industry	4,290	1.08	0.99	1.04		
Heavy Industry	4,290	1.08	0.99	1.04		
Average = Miscellaneous	**4,372**	**1.19**	**0.77**	**1.12**		

Source: DEER database

Demand Savings Calculation (ΔkW_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Demand Interactive Effects (from Table 9.1.30-1) X Coincident Diversity Factor (from Table 9.1.30-1)

Energy Savings Calculation (ΔkWh_W) =

Non-coincident Demand Savings ($W_{BASE} - W_{EE}$) X Energy Interactive Effects (from Table 9.1.30-1) X Hours of Operation (from Table 9.1.30-1)

Table 9.1.30-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
PSMH and/or CMH lamps (250 watt and 320 watt)	$206	n/a	$206	$40/fixture

9.1.31 Controls for H.I.D. Systems

Measure Code: BPL77

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- May replace existing control, or new installation

Eligibility Criteria for New Energy-Efficient Equipment:

- Fixture mounted only – cannot be wall, ceiling, or switch plate mounted
- Ballast must be automatically controlled based on occupancy or daylight
- Must provide for continuous dimming or stepped dimming of at least 50%
- Integrated HID control module and passive infrared occupancy sensor
- Must control from 125 through 800 watts (over 800 watts is custom)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[31]: 10 years

Revision Details: 4-28-2011 Removed criteria Controls for occupancy based on high low control (Hi/Lo HIF) or Daylight control (DDS HIF).

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. For high-occupancy buildings (offices, retails, etc.) the Time Off is 20% (source: DEER). For low-occupancy buildings (warehouses, etc) the Time Off is 50%. The Annual Operating Hours are taken from DEER's non-CFL Table, except for Guest Rooms operating hours, which have been corrected to 1,145 hrs.

Bonus Incentives offered:
T12 and controls bonus (10%) 11/16/09-1/31/10

Supplemental Information Collected on the Application: Wattage controlled, per control

[31] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times W_{CTRL} \times N_C \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times W_{CTRL} \times N_C \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings per watts controlled
W_{CTRL} = Watts controlled by HIF control
N_C = Number of controls being installed
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings per watts controlled

Table 9.1.31-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings*	kWh Savings*
Daylight Sensor, Occupancy Sensor (Hi/Lo)						
Office	2,808	1.25	0.81	1.17	0.0002025	0.66
School (K-12)	1,873	1.23	0.42	1.15	0.0001033	0.43
College/University	3,433	1.22	0.68	1.15	0.0001659	0.79
Retail/Service	4,210	1.19	0.88	1.11	0.0002094	0.93
Restaurant	5,278	1.26	0.68	1.15	0.0001714	1.21
Hotel/Motel	4,941	1.14	0.67	1.14	0.0001528	1.13
Medical	6,474	1.26	0.74	1.18	0.0001865	1.53
Grocery	5,824	1.25	0.81	1.13	0.0002025	1.32
Warehouse	4,160	1.09	0.84	1.06	0.0004578	2.20
Light Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Heavy Industry	4,290	1.08	0.99	1.04	0.0005346	2.23
Average = Miscellaneous	**4,325**	**1.19**	**0.77**	**1.12**	**0.0002656**	**1.33**

Source: DEER database
* Per Watt Controlled

Demand Savings Calculation (ΔkW_S) =

Peak kW Savings
(from Table 9.1.31-1)

Energy Savings Calculation (ΔkWh_S) =

kWh Savings
(from Table 9.1.31-1)

Table 9.1.31-2 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
Controls for H.I.D. Systems	$165	n/a	$165	$40/control

9.1.32 LED Exit Signs

Measure Code: BPL78

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Retrofit of existing incandescent or fluorescent fixture only

Eligibility Criteria for New Energy-Efficient Equipment:

- LED, T-1 or Electroluminescent Exit Signs
- Signs may be one or two-sided
- Cannot be combined with purchases from the On-line store

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[32]: 15 years

Revision Details: (None)

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Coincident Diversity Factors, Demand Interactive Effects and Energy Interactive Effects are taken from DEER database.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[32] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings

Table 9.1.32-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
Office	8,760	1.18	1.00	1.11	0.041	342
School (K-12)	8,760	1.18	1.00	1.11	0.041	342
College/University	8,760	1.18	1.00	1.11	0.041	342
Retail/Service	8,760	1.18	1.00	1.11	0.041	342
Restaurant	8,760	1.18	1.00	1.11	0.041	342
Hotel/Motel	8,760	1.18	1.00	1.11	0.041	342
Medical	8,760	1.18	1.00	1.11	0.041	342
Grocery	8,760	1.18	1.00	1.11	0.041	342
Warehouse	8,760	1.18	1.00	1.11	0.041	342
Light Industry	8,760	1.18	1.00	1.11	0.041	342
Heavy Industry	8,760	1.18	1.00	1.11	0.041	342
Average = Miscellaneous	**8,760**	**1.18**	**1.00**	**1.11**	**0.041**	**342**

Source: DEER database

Table 9.1.32-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
LED Exit Sign	Incandescent	40	LED	5	0.035

Demand Savings Calculation (per lamp) =

Non-coincident Demand Savings (from Table 9.1.32-2)	X	Demand Interactive Effects (from Table 9.1.32-1)	X	Coincident Diversity Factor (from Table 9.1.32-1)

Energy Savings Calculation (per lamp) =

Non-coincident Demand Savings (from Table 9.1.32-2)	X	Energy Interactive Effects (from Table 9.1.32-1)	X	Hours of Operation (from Table 9.1.32-1)

Table 9.1.32-3 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
LED Exit Sign	$35	n/a	$35	$20/sign

9.1.33 LED Exit Sign Retro-fit Kit

Measure Code: BPL82

Version Date & Revision History:

Draft date: September 26, 2011
Effective date: September 26, 2011
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Must be retrofitting an incandescent exit sign

Eligibility Criteria for New Energy-Efficient Equipment:

- Maximum total wattage of replacement 6-watts
- UL-listed
- (Cannot be combined with ActOnEnergy On-Line Store purchase)

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes[33]: 15 years

Revision Details: (None)

Referenced Documents: The incremental costs are from the GDS Model Ameren IL Lighting dated 6-9-08. Coincident Diversity Factors, Demand Interactive Effects and Energy Interactive Effects are taken from DEER database.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

[33] Measure Life Study prepared for The Massachusetts Joint Utilities by ERS. November 17, 2005.

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_F \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_F \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Demand savings
N_F = Number of fixtures being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Energy savings

Table 9.1.33-1 Energy Factor Assumptions

Building Types	Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
Office	8,760	1.18	1.00	1.11	0.041	342
School (K-12)	8,760	1.18	1.00	1.11	0.041	342
College/University	8,760	1.18	1.00	1.11	0.041	342
Retail/Service	8,760	1.18	1.00	1.11	0.041	342
Restaurant	8,760	1.18	1.00	1.11	0.041	342
Hotel/Motel	8,760	1.18	1.00	1.11	0.041	342
Medical	8,760	1.18	1.00	1.11	0.041	342
Grocery	8,760	1.18	1.00	1.11	0.041	342
Warehouse	8,760	1.18	1.00	1.11	0.041	342
Light Industry	8,760	1.18	1.00	1.11	0.041	342
Heavy Industry	8,760	1.18	1.00	1.11	0.041	342
Average = Miscellaneous	**8,760**	**1.18**	**1.00**	**1.11**	**0.041**	**342**

Source: DEER database

Table 9.1.33-2 Specifications and Calculated Non-coincident Demand Savings

Configuration	Base Lamp Type	Base Fixture Wattage (watts)	Retrofit Lamp Type	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
LED Exit Sign retrofit kit	Incandescent	40	LED	5	0.035

Demand Savings Calculation (per sign) =

Non-coincident Demand Savings (from Table 9.1.33-2)	X	Demand Interactive Effects (from Table 9.1.33-1)	X	Coincident Diversity Factor (from Table 9.1.33-1)

Energy Savings Calculation (per sign) =

Non-coincident Demand Savings (from Table 9.1.33-2)	X	Energy Interactive Effects (from Table 9.1.33-1)	X	Hours of Operation (from Table 9.1.33-1)

Table 9.1.33-4 Measure Costs (Parts and Labor) and Incentive Levels

Fixture Technology	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
LED exit sign retro-fit kit	$35	$0 (replacement)	$35	$10.00/kit

(Cannot be combined with ActOnEnergy On-Line Store purchase)

9.1.34 Permanent Lamp Removal

Measure Code: None

Version Date & Revision History:

Draft date: February 6, 2009
Effective date: February 6, 2009
Revised PY2
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Removal of linear fluorescent lamps

Eligibility Criteria for New Energy-Efficient Equipment:

- A minimum of 100,000 kWh reduced per year is required to be eligible for this Custom incentive

Revision Details: Was split out into its own measure and included in the Custom Application in PY2.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

9.2 HVAC Systems

The following measures are included in the PY3 HVAC program.

9.2 HVAC		
	Measure	**Code**
Seasonal Tune-Ups		
9.2.1	**Air Conditioner Tune-Up**	BPC21
9.2.2	**Air-cooled Chiller Tune-Up**	BPC22
9.2.3	**Water-cooled Chiller Tune-Up**	BPC23
9.2.4	**Gas Boiler Tune-Up**	BPH1
9.2.5	**Gas Forced-Air Furnace Tune-Up**	BPH2
New Cooling Equipment		
9.2.6	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (Up to 65,000 Btuh; Minimum 14 SEER)**	BPC1
9.2.7	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (Up to 65,000 Btuh; Minimum: 15 SEER)**	BPC2
9.2.8	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (65,000 through 239,999 Btuh; Minimum 11.5 EER / 11.9 IPLV)**	BPC3
9.2.9	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (65,000 through 239,999 Btuh; Minimum 12 EER / 12.4 IPLV)**	BPC4
9.2.10	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (240,000 through 759,999 Btuh; Minimum 10.5 EER / 10.9 IPLV)**	BPC5
9.2.11	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (240,000 through 759,999 Btuh; Minimum 10.8 EER / 12.0 IPLV)**	BPC6
9.2.12	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (760,000 or more Btuh; Minimum 9.7 EER / 11.0 IPLV)**	BPC7
9.2.13	**Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (760,000 or more Btuh; Minimum 10.2 EER / 11.0 IPLV)**	BPC8
9.2.14	**Air-Cooled Chillers**	BPC12
New Cooling Equipment		
9.2.15	**Room Air Conditioner (ENERGY STAR qualified)**	BPC13
9.2.16	**Room Air Conditioner (SEHA Tier 1)**	BPC14
9.2.17	**PTAC/PTHP**	BPC15
New Heating Equipment		
9.2.18	**Gas Boiler Replacement (AFUE 85% minimum)**	BPH3
9.2.19	**Gas Boiler Replacement (Thermal Efficiency 90% minimum)**	BPH4
9.2.20	**Gas Furnace Replacement (90% AFUE)**	BPH5
9.2.21	**Gas Furnace Replacement (92% AFUE)**	BPH6
9.2.22	**Gas Furnace Replacement (94% AFUE)**	BPH7
HVAC Controls		
9.2.23	**Variable Frequency Drive on HVAC Motor**	BPC20

9.2.1 Air Conditioner Tune-up

Measure Code: BPC21

Version Date & Revision History:

Draft date: January 19, 2009
Effective date: January 19, 2009
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Cannot have standing maintenance contract, or tune-up within the past 12 months

Eligibility Criteria for New Energy-Efficient Equipment:

- Minimum 3-ton unit
- Unitary, rooftop, and split systems only
- Complete tune-up, as specified in "Tune-up Certification" tab

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: The measure life is three years.

Revision Details: 3-1-2011 Removed criteria "Pre-approval is required for all tune-ups (even if the incentive request is less than $5,000)."

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application:
Required Supplemental Documentation:

- Include a copy of contractor invoices that detail the work performed to identify tune-up items, as well as additional labor and parts to improve/repair air conditioner performance

Tune-up requirements (to be completed by an Ameren approved technician)

- Check refrigerant charge
- Identify and repair leaks if refrigerant charge is low
- Measure and record refrigerant pressures
- Measure and record temperature drop at indoor coil
- Clean condensate drain line
- Clean outdoor coil and straighten fins
- Clean and straighten indoor and outdoor fan blades
- Clean indoor coil with spray-on cleaner and straighten fins
- Repair damaged insulation – suction line
- Change air filter
- Measure and record blower amp draw
- Measure and record compressor integrity (MOhm)
- Measure and record condenser fan motor amp draw

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times T \times N_T \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times T \times N_T \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
T = Tonnage of unit being tuned
N_T = Number of units being tuned-up
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.1-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.39	878
School (K-12)	1.0	1.0	1.0	0.39	878
College/University	1.0	1.0	1.0	0.39	878
Retail/Service	1.0	1.0	1.0	0.39	878
Restaurant	1.0	1.0	1.0	0.39	878
Hotel/Motel	1.0	1.0	1.0	0.39	878
Medical	1.0	1.0	1.0	0.39	878
Grocery	1.0	1.0	1.0	0.39	878
Warehouse	1.0	1.0	1.0	0.39	878
Light Industry	1.0	1.0	1.0	0.39	878
Heavy Industry	1.0	1.0	1.0	0.39	878
Average = Miscellaneous	**1.0**	**1.0**	**1.0**	**0.39**	**878**

Table 9.2.1-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Services Provided	Non-Coincident Demand Savings (kW)*
Air Conditioner Tune-up	As listed in the application form	1.0

Table 9.2.1-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Savings
All	0.39	878	0

Table 9.2.1-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment*
Air Conditioner Tune-up	$35	$25/ton of cooling

*The incentive is capped at 50% of the tune-up cost, excluding replacement-part costs. Customers already under an existing service contract, or a service agreement in the past 12 months, do not qualify for incentives. Tune ups are performed by a contractor approved by Ameren Illinois Utilities.

9.2.2 Air-cooled Chiller Tune-Up

Measure Code: BPC22

Version Date & Revision History:

Draft date: June 20, 2011
Effective date: June 20, 2011
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Cannot have standing maintenance contract or tune-up within the past 12 months

Eligibility Criteria for New Energy-Efficient Equipment:

- Complete tune-up, as specified in "Tune-up Certification" tab

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: The measure life is three years.

Revision Details: None

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application:
Required Supplemental Documentation:

- Include a copy of contractor invoices that detail the work performed to identify tune-up items, as well as additional labor and parts to improve/repair air conditioner performance

Tune-up requirements:

- Air cooled condenser coil cleaning
- System pressure check and adjust
- Filter inspect or replace
- Belt inspect or replace
- Economizer condition check and repair
- Contactors condition
- Evaporator condition
- Compressor amp draw
- Supply motor amp draw
- Condenser fan(s) amp draw
- Liquid line temperature
- Sub-cooling and super heat
- Suction pressure and temperature
- Oil level and pressure
- Low pressure controls
- High pressure controls
- Crankcase heater operation
- Condenser tube cleaning
- Evaporator tube cleaning

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times T \times N_T \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times T \times N_T \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
T = Tonnage of unit being tuned
N_T = Number of units being tuned-up
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.2-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.096	120
School (K-12)	1.0	1.0	1.0	0.096	120
College/University	1.0	1.0	1.0	0.096	120
Retail/Service	1.0	1.0	1.0	0.096	120
Restaurant	1.0	1.0	1.0	0.096	120
Hotel/Motel	1.0	1.0	1.0	0.096	120
Medical	1.0	1.0	1.0	0.096	120
Grocery	1.0	1.0	1.0	0.096	120
Warehouse	1.0	1.0	1.0	0.096	120
Light Industry	1.0	1.0	1.0	0.096	120
Heavy Industry	1.0	1.0	1.0	0.096	120
Average = Miscellaneous	**1.0**	**1.0**	**1.0**	0.096	120

Table 9.2.2-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Services Provided	Non-Coincident Demand Savings (kW)*
Air-cooled Chiller Tune-Up	As listed in the application form	0.096

Table 9.2.2-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Annual Hours of Operation	Demand Savings (kW) per Ton of Cooling Out	Energy Savings (kWh) per Ton of Chiller Capacity	Therm Savings
All	1,000	0.096	120	0

The numbers are identical for units <=500 tons, and < 500 tons

Table 9.2.2-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment*
Air-cooled Chiller Tune-Up	$35	$8/ton of cooling

*The incentive is capped at 50% of the tune-up cost, excluding replacement-part costs. Customers already under an existing service contract, or a service agreement in the past 12 months, do not qualify for incentives.

Supplemental Information

Air-Cooled		
<=500tons	>500 tons	Description
1.20	1.20	kW electricity in per ton of cooling out
1000	1000	annual hours of operation
10.0%	10.0%	kWh savings fraction
8.0%	8.0%	kW savings fraction
120	120	kWh savings per ton of chiller capacity
0.096	0.096	kW peak demand reduction per ton of chiller capacity

9.2.3 Water-cooled Chiller Tune-Up

Measure Code: BPC23

Version Date & Revision History:

Draft date: June 20, 2011
Effective date: June 20, 2011
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Cannot have standing maintenance contract or tune-up within the past 12 months

Eligibility Criteria for New Energy-Efficient Equipment:

- Complete tune-up, as specified in "Tune-up Certification" tab

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: The measure life is three years.

Revision Details: None

Referenced Documents: None

Bonus Incentives offered: None

Supplemental Information Collected on the Application:
Required Supplemental Documentation:

- Include a copy of contractor invoices that detail the work performed to identify tune-up items, as well as additional labor and parts to improve/repair air conditioner performance

Tune-up requirements:

- Air cooled condenser coil cleaning
- System pressure check and adjust
- Filter inspect or replace
- Belt inspect or replace
- Economizer condition check and repair
- Contactors condition
- Evaporator condition
- Compressor amp draw
- Supply motor amp draw
- Condenser fan(s) amp draw
- Liquid line temperature
- Sub-cooling and super heat
- Suction pressure and temperature
- Oil level and pressure
- Low pressure controls
- High pressure controls
- Crankcase heater operation
- Condenser tube cleaning
- Evaporator tube cleaning

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times T \times N_T \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times T \times N_T \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
T = Tonnage of unit being tuned
N_T = Number of units being tuned-up
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.3-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.048	60
School (K-12)	1.0	1.0	1.0	0.048	60
College/University	1.0	1.0	1.0	0.048	60
Retail/Service	1.0	1.0	1.0	0.048	60
Restaurant	1.0	1.0	1.0	0.048	60
Hotel/Motel	1.0	1.0	1.0	0.048	60
Medical	1.0	1.0	1.0	0.048	60
Grocery	1.0	1.0	1.0	0.048	60
Warehouse	1.0	1.0	1.0	0.048	60
Light Industry	1.0	1.0	1.0	0.048	60
Heavy Industry	1.0	1.0	1.0	0.048	60
Average = Miscellaneous	**1.0**	**1.0**	**1.0**	0.048	**60**

Table 9.2.3-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Services Provided	Non-Coincident Demand Savings (kW)*
Water-cooled Chiller Tune-Up	As listed in the application form	0.048

Table 9.2.3-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Annual Hours of Operation	Demand Savings (kW) per Ton of Cooling Out	Energy Savings (kWh) per Ton of Chiller Capacity	Therm Savings
All	1,000	0.048	60	0

The numbers are identical for units <=500 tons, and < 500 tons

Table 9.2.3-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment*
Water-cooled Chiller Tune-Up	$35	$4/ton of cooling

*The incentive is capped at 50% of the tune-up cost, excluding replacement-part costs. Customers already under an existing service contract, or a service agreement in the past 12 months, do not qualify for incentives.

Supplemental Information

Water-Cooled		
<=500tons	>500 tons	Description
0.60	0.60	kW electricity in per ton of cooling out
1000	1000	annual hours of operation
10.0%	10.0%	kWh savings fraction
8.0%	8.0%	kW savings fraction
60	60	kWh savings per ton of chiller capacity
0.048	0.048	kW peak demand reduction per ton of chiller capacity

9.2.4 Gas Boiler Tune-up

Measure Code: BPH1

Version Date & Revision History:

Draft date: February 6, 2009
Effective date: January 19, 2009
Revised August 31, 2010
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Cannot have standing maintenance contract, or tune-up within the past 12 months

Eligibility Criteria for New Energy-Efficient Equipment:

- Complete tune-up, as specified in "Tune-up Certification" tab

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 3 years

Revision Details: 8-31-10 incentive reduced from 50 cents per kBthu to 25 cents per kBtuh. 3-1-2011 removed requirement "Pre-approval is required for all tune-ups (even if the incentive request is less than $5,000)." In PY4 removed requirement that customer must be GDS-2, as GDS-2, 3, and 4 customers are now eligible for this measure.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application:
Required Supplemental Documentation:

- Include a copy of contractor invoices that detail the work performed to identify tune-up items, as well as additional labor and parts to improve/repair boiler performance

Tune-up requirements (to be completed by an Ameren approved technician)

- Clean fireside surfaces.
- Inspect all refractory. Patch and wash coat as required.
- Inspect gaskets on front and rear doors and replace as necessary.
- Seal and close front and rear doors properly.
- Clean low and auxiliary low water cut-off controls, then re-install using new gaskets.
- Clean plugs in control piping.
- Remove all hand hole and man hole plates. Flush boiler with water to remove loose scale and sediment.
- Replace all hand hole and man hole plates with new gaskets.
- Open feedwater tank manway, inspect and clean as required. Replace manway plate with new gasket.
- Clean burner and burner pilot.
- Check pilot electrode and adjust or replace.
- Clean air damper and blower assembly.
- Clean motor starter contacts and check operation.
- Make necessary adjustments to burner for proper combustion.
- Perform all flame safeguard and safety trip checks.
- Check all hand hole plates and man hole plates for leaks at normal operating temperatures and pressures.
- Troubleshoot any boiler system problems as requested by on-site personnel.

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG	= Gross customer annual natural gas savings for the measure, therms
NG_I	= Boiler natural gas input, kbtu
T_S	= Annual natural gas savings for the measure (0.572283737 therms for all gas boilers)

Table 9.2.4-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Annual Operating Hours
Office	1.0	1.0	1.0	NA
School (K-12)	1.0	1.0	1.0	NA
College/University	1.0	1.0	1.0	NA
Retail/Service	1.0	1.0	1.0	NA
Restaurant	1.0	1.0	1.0	NA
Hotel/Motel	1.0	1.0	1.0	NA
Medical	1.0	1.0	1.0	NA
Grocery	1.0	1.0	1.0	NA
Warehouse	1.0	1.0	1.0	NA
Light Industry	1.0	1.0	1.0	NA
Heavy Industry	1.0	1.0	1.0	NA
Average = Miscellaneous	**1.0**	**1.0**	**1.0**	**NA**

Table 9.2.4-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Services Provided	Non-Coincident Demand Savings (kW)*
Gas Boiler Tune-up	As listed in the application form	0

Table 9.2.4-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Savings
All	NA	NA	0.572283737

Table 9.2.4-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment*
Gas Boiler Tune-up	$35	$0.50/kBtuh input

*The incentive is capped at 50% of the tune-up cost, excluding replacement-part costs. Customers already under an existing service contract, or a service agreement in the past 12 months, do not qualify for incentives. Tune ups are performed by a contractor approved by Ameren Illinois Utilities.

9.2.5 Gas Forced-Air Furnace Tune-up

Measure Code: BPH2

Version Date & Revision History:

Draft date: February 6, 2009
Effective date: January 19, 2009
Revised August 31, 2010
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Cannot have standing maintenance contract, or tune-up within the past 12 months

Eligibility Criteria for New Energy-Efficient Equipment:

- Complete tune-up, as specified in "Tune-up Certification" tab

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 3 years

Revision Details: 8-31-10 – the incentive was reduced from 50 cents per kButh to 25 cents. 3-1-2011 removed requirement "Pre-approval is required for all tune-ups (even if the incentive request is less than $5,000)." In PY4 removed requirement that customer must be GDS-2, as GDS-2, 3, and 4 are now eligible for this measure.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application:
Required Supplemental Documentation:

- Include a copy of contractor invoices that detail the work performed to identify tune-up items, as well as additional labor and parts to improve/repair boiler performance

Tune-up requirements (to be completed by an Ameren approved technician)

- Record pre-tune-up and post-tune-up measurements of boiler/furnace combustion efficiency
- Adjust draft control
- Maintain constant draft through the system to ensure complete combustion accounting for temperature and barometric changes
- Install flue restrictions in the flue stack to control flow
- Check completeness of combustion with CO and O2 sensors (Results from this testing will affect the fuel input/air input measure)
- Clean fire side of heat exchanger
- Scrub HX manually to remove buildup from combustion gases and more efficiently transfer heat from the source to the stream/water
- Seal combustion chamber with a ceramic sealant to reduce heat loss from chamber
- Optimize fuel input based on combustion completeness results

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG = Gross customer annual natural gas savings for the measure, therms
NG_I = Forced-air furnace natural gas input, kbtu
T S = Annual natural gas savings for the measure (0.572283737 therms for all gas forced-air furnaces)

Table 9.2.5-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Annual Operating Hours
Office	0	1.0	1.0	NA
School (K-12)	0	1.0	1.0	NA
College/University	0	1.0	1.0	NA
Retail/Service	0	1.0	1.0	NA
Restaurant	0	1.0	1.0	NA
Hotel/Motel	0	1.0	1.0	NA
Medical	0	1.0	1.0	NA
Grocery	0	1.0	1.0	NA
Warehouse	0	1.0	1.0	NA
Light Industry	0	1.0	1.0	NA
Heavy Industry	0	1.0	1.0	NA
Average = Miscellaneous	**0**	**1.0**	**1.0**	**NA**

Table 9.2.5-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Services Provided	Non-Coincident Demand Savings (kW)
Forced Air Furnace Tune-up	As listed in the application form	0

Table 9.2.5-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Savings
All	NA	NA	0.572283737

Table 9.2.5-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment*
Gas Forced-Air Furnace Tune-up	$35	$0.50/kBtuh input

*The incentive is capped at 50% of the tune-up cost, excluding replacement-part costs. Customers already under an existing service contract, or a service agreement in the past 12 months, do not qualify for incentives. Tune ups are performed by a contractor approved by Ameren Illinois Utilities.

9.2.6 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (up to 65,000 btuh input, minimum 14 SEER)

Measure Code: BPC1

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- Up to 65,000 Btuh input
- Minimum efficiency: 14 SEER

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.6-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.30831	766.14
Medical	1.0	1.0	1.0	0.27797	1236.81
Restaurant	1.0	1.0	1.0	0.42035	1031.19
Grocery	1.0	1.0	1.0	0.35884	942.58
School/College	1.0	1.0	1.0	0.37191	749.31
Warehouse	1.0	1.0	1.0	0.26084	489.56
Retail/Service	1.0	1.0	1.0	0.37191	749.31
Mfg. Industrial	1.0	1.0	1.0	0.36222	787.24
Hotel/Motel	1.0	1.0	1.0	0.32121	1449.9
Other	1.0	1.0	1.0	0.33928	911.34

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.6-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.6-1

Table 9.2.6-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.30831	766.14
School/College	0.37191	749.31
Retail/Service	0.37191	749.31
Grocery	0.35884	942.58
Restaurant	0.42035	1031.19
Hotel/Motel	0.32121	1449.9
Medical	0.27797	1236.81
Warehouse	0.26084	489.56
Manufacturing/Industrial	0.36222	787.24
Other	0.33928	911.34

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.6-2)	X	Demand Interactive Effects (average from Table 9.2.6-1)	X	Coincident Diversity Factor (average from Table 9.2.6-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.6-2)	X	Energy Interactive Effects (average from Table 9.2.6-1)	X	Hours of Operation (average from Table 9.2.6-1)

Table 9.2.6-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
<65,000 Btuh Minimum SEER 14	$113	$15 per ton

9.2.7 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (up to 65,000 btuh input, minimum 15 SEER)

Measure Code: BPC2

Version Date & Revision History:

Draft date:	December 17, 2008
Effective date:	December 17, 2008
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- Up to 65,000 Btuh input
- Minimum efficiency: 15 SEER

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: Previous incentive was $30

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.7-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Facility Type	1.0	1.0	1.0	0.36545	908.14
Office	1.0	1.0	1.0	0.33511	1491.06
Medical	1.0	1.0	1.0	0.47749	1171.37
Restaurant	1.0	1.0	1.0	0.41598	1092.68
Grocery	1.0	1.0	1.0	0.42905	864.44
School/College	1.0	1.0	1.0	0.31799	596.8
Warehouse	1.0	1.0	1.0	0.42905	864.44
Retail/Service	1.0	1.0	1.0	0.41937	911.43
Mfg. Industrial	1.0	1.0	1.0	0.37835	1707.83
Hotel/Motel	1.0	1.0	1.0	0.39643	1064.83

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.7-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.7-1

Table 9.2.7-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.36545	908.14
School/College	0.42905	864.44
Retail/Service	0.42905	864.44
Restaurant	0.47749	1171.37
Hotel/Motel	0.37835	1707.83
Medical	0.33511	1491.06
Grocery	0.41598	1092.68
Warehouse	0.31799	596.8
Manufacturing/Industrial	0.41937	911.43
Other	0.39643	1064.83

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.7-2)	X	Demand Interactive Effects (average from Table 9.2.7-1)	X	Coincident Diversity Factor (average from Table 9.2.7-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.7-2)	X	Energy Interactive Effects (average from Table 9.2.7-1)	X	Hours of Operation (average from Table 9.2.7-1)

Table 9.2.7-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
<65,000 Btuh Minimum SEER 15	$172	$60 per ton

9.2.8 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (65,000 thru 239,999 btuh input, minimum 11.5 EER / 11.9 IPLV)

Measure Code: BPC3

Version Date & Revision History:

Draft date:	December 17, 2008
Effective date:	December 17, 2008
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- 65,000 through 239,999 Btuh
- Minimum efficiency: 11.5 EER / 11.9 IPLV

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.8-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.33143	833.59
Medical	1.0	1.0	1.0	0.30546	1409.6
Restaurant	1.0	1.0	1.0	0.44875	1162.35
Grocery	1.0	1.0	1.0	0.37691	972.41
School/College	1.0	1.0	1.0	0.39704	865.89
Warehouse	1.0	1.0	1.0	0.29032	552.75
Retail/Service	1.0	1.0	1.0	0.37691	972.41
Mfg. Industrial	1.0	1.0	1.0	0.38984	866.37
Hotel/Motel	1.0	1.0	1.0	0.34725	1606.73
Other	1.0	1.0	1.0	0.36266	1026.9

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.8-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.8-1

Table 9.2.8-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.33143	833.59
School/College	0.39704	865.89
Retail/Service	0.37691	972.41
Restaurant	0.44875	1162.35
Hotel/Motel	0.34725	1606.73
Medical	0.30546	1409.6
Grocery	0.37691	972.41
Warehouse	0.29032	552.75
Manufacturing/Industrial	0.38984	866.37
Other	0.36266	1026.9

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.8-2)	X	Demand Interactive Effects (average from Table 9.2.8-1)	X	Coincident Diversity Factor (average from Table 9.2.8-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.8-2)	X	Energy Interactive Effects (average from Table 9.2.8-1)	X	Hours of Operation (average from Table 9.2.8-1)

Table 9.2.8-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
>=65,000 Btuh and <240,000 Btuh Min. 11.5 EER	$73	$15 per ton

9.2.9 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (65,000 through 239,999 btuh input, minimum 12 EER / 12.4 IPLV)

Measure Code: BPC4

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- 65,000 through 239,999 Btuh
- Minimum efficiency: 12 EER / 12.4 IPLV

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: Previous incentive was $30

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.9-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.36941	894.81
Medical	1.0	1.0	1.0	0.33546	1517.25
Restaurant	1.0	1.0	1.0	0.4904	1247.78
Grocery	1.0	1.0	1.0	0.43094	1060.22
School/College	1.0	1.0	1.0	0.43537	925.56
Warehouse	1.0	1.0	1.0	0.32572	608.4
Retail/Service	1.0	1.0	1.0	0.43094	1060.22
Mfg. Industrial	1.0	1.0	1.0	0.4343	927.71
Hotel/Motel	1.0	1.0	1.0	0.38652	1729.24
Other	1.0	1.0	1.0	0.40434	1107.91

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.9-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.9-1

Table 9.2.9-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.36941	894.81
School/College	0.43537	925.56
Retail/Service	0.43094	1060.22
Restaurant	0.4904	1247.78
Hotel/Motel	0.38652	1729.24
Medical	0.33546	1517.25
Grocery	0.43094	1060.22
Warehouse	0.32572	608.4
Manufacturing/Industrial	0.4343	927.71
Other	0.40434	1107.91

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.9-2)	X	Demand Interactive Effects (average from Table 9.2.9-1)	X	Coincident Diversity Factor (average from Table 9.2.9-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.9-2)	X	Energy Interactive Effects (average from Table 9.2.9-1)	X	Hours of Operation (average from Table 9.2.9-1)

Table 9.2.9-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
>=65,000 Btuh and <240,000 Btuh Min. 12 EER	$97	$60 per ton

9.2.10 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (240,000 thru 759,999 btuh, minimum 10.5 EER / 10.9 IPLV)

Measure Code: BPC5

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- 240,000 through 759,999 Btuh
- Minimum efficiency: 10.5 EER / 10.9 IPLV

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.10-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.33106	618.09
Medical	1.0	1.0	1.0	0.25409	886.22
Restaurant	1.0	1.0	1.0	0.4087	485.76
Grocery	1.0	1.0	1.0	0.34249	524.27
School/College	1.0	1.0	1.0	0.3225	553.63
Warehouse	1.0	1.0	1.0	0.2478	106.63
Retail/Service	1.0	1.0	1.0	0.34249	524.27
Mfg. Industrial	1.0	1.0	1.0	0.35207	495.54
Hotel/Motel	1.0	1.0	1.0	0.27358	1205.26
Other	1.0	1.0	1.0	0.31942	599.97

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.10-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.10-1

Table 9.2.10-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.33106	618.09
School/College	0.3225	553.63
Retail/Service	0.34249	524.27
Restaurant	0.4087	485.76
Hotel/Motel	0.27358	1205.26
Medical	0.254089	886.22
Grocery	0.34249	524.27
Warehouse	0.2478	106.63
Manufacturing/Industrial	0.35207	495.54
Other	0.31942	599.97

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.10-2) X Demand Interactive Effects (average from Table 9.2.10-1) X Coincident Diversity Factor (average from Table 9.2.10-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.10-2) X Energy Interactive Effects (average from Table 9.2.10-1) X Hours of Operation (average from Table 9.2.10-1)

Table 9.2.10-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
>=240,000 Btuh and <760,000 Btuh Min. 10.5 EER	$193	$15 per ton

9.2.11 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (240,000 thru 759,999 btuh, minimum 10.8 EER / 12.0 IPLV)

Measure Code: BPC6

Version Date & Revision History:

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Effective date:	December 17, 2008
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- 240,000 through 759,999 Btuh
- Minimum efficiency 10.8 EER / 12.0 IPLV

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: Previous incentive was $30

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.11-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.27388	808.21
Medical	1.0	1.0	1.0	0.27925	919.19
Restaurant	1.0	1.0	1.0	0.44415	516.06
Grocery	1.0	1.0	1.0	0.37583	556.19
School/College	1.0	1.0	1.0	0.35157	575.14
Warehouse	1.0	1.0	1.0	0.27458	118.09
Retail/Service	1.0	1.0	1.0	0.37583	556.19
Mfg. Industrial	1.0	1.0	1.0	0.38471	517.59
Hotel/Motel	1.0	1.0	1.0	0.27134	1122.45
Other	1.0	1.0	1.0	0.33679	632.13

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.11-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.11-1

Table 9.2.11-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.27388	808.21
School/College	0.35157	575.14
Retail/Service	0.37583	556.19
Restaurant	0.44415	516.06
Hotel/Motel	0.27134	1122.45
Medical	0.27925	919.19
Grocery	0.37583	556.19
Warehouse	0.27458	118.09
Manufacturing/Industrial	0.38471	517.59
Other	0.33679	632.13

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.11-2)	X	Demand Interactive Effects (average from Table 9.2.11-1)	X	Coincident Diversity Factor (average from Table 9.211-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.11-2)	X	Energy Interactive Effects (average from Table 9.2.11-1)	X	Hours of Operation (average from Table 9.2.11-1)

Table 9.2.11-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
>=240,000 Btuh and <760,000 Btuh Min. 10.8 EER	$247	$60 per ton

9.2.12 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (760,00 or more btuh input, minimum 9.7 EER / 11.0 IPLV)

Measure Code: BPC7

Version Date & Revision History:

Draft date:	December 17, 2008
Effective date:	December 17, 2008
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- 760,000 or more Btuh
- Minimum efficiency 9.7 EER / 11.0 IPLV

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.12-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.19654	712.55
Medical	1.0	1.0	1.0	0.20095	200.95
Restaurant	1.0	1.0	1.0	0.32325	412.63
Grocery	1.0	1.0	1.0	0.27359	457.45
School/College	1.0	1.0	1.0	0.25193	499.47
Warehouse	1.0	1.0	1.0	0.20371	87.73
Retail/Service	1.0	1.0	1.0	0.27359	457.45
Mfg. Industrial	1.0	1.0	1.0	0.28233	448.37
Hotel/Motel	1.0	1.0	1.0	0.21853	1124.73
Other	1.0	1.0	1.0	0.24716	489.04

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.12-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.12-1

Table 9.2.12-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.19654	712.55
School/College	0.25193	499.47
Retail/Service	0.27359	457.45
Restaurant	0.32325	412.63
Hotel/Motel	0.21853	1124.73
Medical	0.20095	815.43
Grocery	0.27359	457.45
Warehouse	0.20371	87.73
Manufacturing/Industrial	0.28233	448.37
Other	0.24716	557.31

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.12-2)	X	Demand Interactive Effects (average from Table 9.2.12-1)	X	Coincident Diversity Factor (average from Table 9.2.12-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.12-2)	X	Energy Interactive Effects (average from Table 9.2.12-1)	X	Hours of Operation (average from Table 9.2.12-1)

Table 9.2.12-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
>=760,000 Btuh min. 9.7 EER	$167	$15 per ton

9.2.13 Unitary and Split Air Conditioning Systems and Air Source Heat Pumps (760,000 or more btuh input, minimum 10.2 EER / 11.0 IPLV)

Measure Code: BPC8

Version Date & Revision History:

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Effective date:	December 17, 2008
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

- 760,000 or more Btuh
- Minimum efficiency 10.2 EER / 11.0 IPLV

Unitary refers to the fact that all of the components necessary to heat, cool, dehumidify, filter, and move air are included in one or more factory-made assemblies. Unitary equipment is available as single package or as split systems. Single package units include all of the necessary functions and components in one package that is installed outside the building. Split systems are made up of an indoor unit (fan and cooling/heating coils) and an outdoor unit (condenser and compressor). An air source heat pump is a type of heat pump that uses the outside air as a heat source or heat sink to heat or cool an interior space.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls. The efficiency of split systems is based on an Air Conditioning and Refrigeration Institute (ARI) reference number. Water-cooled systems, evaporative coolers, and water-source heat pumps do not qualify under this program, but may qualify under the Custom Incentive Program. Unitary and split system cooling equipment must meet ARI standards (210/240, 320 or 340/360), be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). All required efficiencies are based on the Consortium for Energy Efficiency (CEE) high efficiency commercial air conditioning and heat pump specifications (www.cee1.org).

Bonus Incentives offered: Previous incentive was $30

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings,

Table 9.2.13-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings Per Ton	kWh Savings Per Ton
Office	1.0	1.0	1.0	0.24424	769.29
Medical	1.0	1.0	1.0	0.24907	878.4
Restaurant	1.0	1.0	1.0	0.39096	470.5
Grocery	1.0	1.0	1.0	0.33727	518.41
School/College	1.0	1.0	1.0	0.30746	540.56
Warehouse	1.0	1.0	1.0	0.23028	109.61
Retail/Service	1.0	1.0	1.0	0.33727	518.41
Mfg. Industrial	1.0	1.0	1.0	0.34469	490.5
Hotel/Motel	1.0	1.0	1.0	0.24357	1080.15
Other	1.0	1.0	1.0	0.29831	597.32

Note: Table above is based on DEER 2005 information for Sacramento/Zone 12 then adjusted to Ameren service territory based on Cooling Degree Days difference.

Table 9.2.13-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Unitary and Split Air Conditioning Systems and Air Source Heat Pumps	NA	NA	See Table 9.2.13-1

Table 9.2.13-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Office	0.24424	769.29
School/College	0.30746	540.56
Retail/Service	0.33727	518.41
Restaurant	0.39096	470.5
Hotel/Motel	0.24357	1080.15
Medical	0.24907	878.4
Grocery	0.33727	518.41
Warehouse	0.23028	109.61
Manufacturing/Industrial	0.34469	490.5
Other	0.29831	597.32

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.13-2)	X	Demand Interactive Effects (average from Table 9.2.13-1)	X	Coincident Diversity Factor (average from Table 9.2.13-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.13-2)	X	Energy Interactive Effects (average from Table 9.2.13-1)	X	Hours of Operation (average from Table 9.2.13-1)

Table 9.2.13-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
>=760,000 Btuh min. 10.2 EER	$203	$60 per ton

9.2.14 Air-Cooled Chillers

Measure Code: BPC12

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace any size existing air-cooled chiller

Eligibility Criteria for New Energy-Efficient Equipment:

- 1.04 kW/ton – IPLV (Integrated Part Load Value)
- Air-cooled only, no water-cooled chillers

The chiller efficiency rating must be based on ARI standard 550/590–2003 for IPLV conditions and not based on full-load conditions. The chillers must meet ARI standards 550/590–2003, be UL listed, and use a minimum ozone-depleting refrigerant (e.g., HCFC or HFC). The ARI net capacity value should be used to determine the chiller tons. A manufacturer specification sheet with the rated kW/ton-IPLV or COP-IPLV must accompany the application.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 20 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings table below
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For prescriptive measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.14-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.14-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Air Cooled Chiller	NA	NA	See Table 9.2.14-3

Table 9.2.14-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Grocery	0.25666	270.6
Hotel/Motel	0.2672	457.45
Manufacturing/Industrial	0.27742	259.46
Medical	0.263	360.47
Office	0.26443	295.77
Other	0.26435	307.66
Retail/Service	0.25666	270.6
School/College	0.26509	239.23

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.14-3)	X	Demand Interactive Effects (average from Table 9.2.14-1)	X	Coincident Diversity Factor (average from Table 9.2.14-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.14-3)	X	Energy Interactive Effects (average from Table 9.2.14-1)	X	Hours of Operation (average from Table 9.2.14-1)

Table 9.2.14-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Air-Cooled Chillers	$126.70/ton	$20/ton

9.2.15 Room Air Conditioners (Tier 2)

Measure Code: BPC13

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

BPC13	• Less than 8000 Btuh input • 10.7 EER (ENERGY STAR® qualified)
	• 8000 through 19,9990 Btuh input • 10.8 EER (ENERGY STAR qualified)
	• 14,000 through 19,999 Btuh input • 10.7 EER (ENERGY STAR qualified)
	• 20,000 or more Btuh input • 9.4 EER (ENERGY STAR qualified)

- Room air conditioning units are through-the-wall (or built-in) self-contained units that are two tons or less.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 9 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls
A unit can either qualify under ENERGY STAR® standards or under Super Efficient Home Appliance (SEHA) Tier 1 standards. The minimum requirements and eligible equipment that meet CEE high efficiency room air conditioning specifications can be found at www.cee1.org. There are two eligible efficiency levels as listed by the CEE. These units are with and without louvered sides, without reverse cycle (i.e., heating), and casement.

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.15-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.15-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Room Air Conditioner (Tier 2)	NA	NA	See Table 9.2.15-3

Table 9.2.15-3 Calculated Demand and Energy Savings by Type of Business

Building Type	Demand Savings (kW savings/ton)				Energy Savings (kWh savings/ton)			
	<8,000 btuh	8000 to 13,999 btuh	14,000 to 19,999 btuh	>20,000 btuh	<8,000 btuh	8000 to 13,999 btuh	14,000 to 19,999 btuh	>20,000 btuh
Grocery	0.2	0.2	0.2	0.23	912.77	904.31	912.77	1,039
Hotel/Motel	0.2	0.2	0.2	0.23	533.77	528.82	533.77	607.58
Medical	0.2	0.2	0.2	0.23	671.31	665.1	671.31	764.16
Mfg/Industrial	0.2	0.2	0.2	0.23	692.69	686.27	692.69	788.49
Office	0.2	0.2	0.2	0.23	679.82	673.53	679.82	773.84
Restaurant	0.2	0.2	0.2	0.23	822.52	814.19	822.52	936.27
Retail/Service	0.2	0.2	0.2	0.23	607.19	601.57	607.19	691.16
School/College	0.2	0.2	0.2	0.23	450.84	446.67	450.84	513.19
Warehouse	0.2	0.2	0.2	0.23	472.61	468.24	472.61	537.97
Other	0.2	0.2	0.2	0.23	450.84	446.67	450.84	513.19

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.15-3) X Demand Interactive Effects (average from Table 9.2.15-1) X Coincident Diversity Factor (average from Table 9.2.15-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.15-3) X Energy Interactive Effects (average from Table 9.2.15-1) X Hours of Operation (average from Table 9.2.15-1)

Table 9.2.15-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Room Air Conditioner (Tier 2)	$138.53	$25/ton

9.2.16 Room Air Conditioners

Measure Code: BPC14

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replacing existing unit of equivalent size

Eligibility Criteria for New Energy-Efficient Equipment:

BPC14	• Less than 8000 Btuh input • 11.2 EER (SEHA Tier 1)
	• 8000 through 13,999 Btuh input • 11.3 EER (SEHA Tier 1)
	• 14,000 through 19,999 Btuh input • 11.2 EER (SEHA Tier 1)
	• 20,000 or more Btuh input • 9.8 EER (SEHA Tier 1)

- Room air conditioning units are through-the-wall (or built-in) self-contained units that are two tons or less.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 9 years

Revision Details: (None)

Referenced Documents: HVAC Standard Measures v3.xls
A unit can either qualify under ENERGY STAR® standards or under Super Efficient Home Appliance (SEHA) Tier 1 standards. The minimum requirements and eligible equipment that meet CEE high efficiency room air conditioning specifications can be found at www.cee1.org. There are two eligible efficiency levels as listed by the CEE. These units are with and without louvered sides, without reverse cycle (i.e., heating), and casement.

Bonus Incentives offered: Previous incentive was $30

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW S = Gross customer connected load kW savings
N U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.16-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.16-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Room Air Conditioner	NA	NA	See Table 9.2.16-3

Table 9.2.16-3 Calculated Demand and Energy Savings by Type of Business

Building Type	Demand Savings (kW savings/ton)				Energy Savings (kWh savings/ton)			
	<8,000 btuh	8000 to 13,999 btuh	14,000 to 19,999 btuh	>20,000 btuh	<8,000 btuh	8000 to 13,999 btuh	14,000 to 19,999 btuh	>20,000 btuh
Office	0.25	0.25	0.25	0.28	851.8	842.41	851.8	952.83
Medical	0.25	0.25	0.25	0.28	841.14	831.86	841.14	940.9
Restaurant	0.25	0.25	0.25	0.28	1,030.60	1,019.23	1,030.60	1,152.82
Grocery	0.25	0.25	0.25	0.28	1,143.67	1,131.06	1,143.67	1,279.31
School/College	0.25	0.25	0.25	0.28	564.89	558.66	564.89	631.89
Warehouse	0.25	0.25	0.25	0.28	592.17	585.64	592.17	662.4
Retail/Service	0.25	0.25	0.25	0.28	760.8	752.4	760.8	851.03
Mfg/Industrial	0.25	0.25	0.25	0.28	867.92	858.35	867.92	970.86
Hotel/Motel	0.25	0.25	0.25	0.28	668.8	661.42	668.8	748.11
Other	0.25	0.25	0.25	0.28	564.89	558.66	564.89	631.89

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.16-3)	X	Demand Interactive Effects (average from Table 9.2.16-1)	X	Coincident Diversity Factor (average from Table 9.2.16-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.16-3)	X	Energy Interactive Effects (average from Table 9.2.16-1)	X	Hours of Operation (average from Table 9.2.16-1)

Table 9.2.16-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Room Air Conditioner Tier 1	$80.89	$60/ton

9.2.17 PTAC/PTHP

(Package Terminal Air Conditioner / Package Terminal Heat Pump)

Measure Code: BPC15

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Replace any size existing PTAC/PTHP units

Eligibility Criteria for New Energy-Efficient Equipment:

- EER must be greater than: 13.08 – (0.2556*Btuh Capacity/1000). All EER values must be rated at 95°F outdoor dry-bulb temperature.

Description: A PTAC is a packaged terminal air conditioner that cools and heats. A PTAC provides warm air through an electric resistance heater (heat strip). A PTHP is a packaged terminal heat pump. A PTHP uses its compressor year round to heat or cool. In warm weather, it efficiently captures heat from inside your building and pumps it outside for cooling. In cool weather, it captures heat from outdoor air and pumps it into your home, adding heat from electric heat strips as necessary to efficiently provide heat.

Loadshape: Loadshape #1 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: In PY4 removed criteria for through the wall self contained units of two tons (24,000 Btuh or less).

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_U \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_U \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_U = Number of units (tons capacity) being replaced
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.17-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.17-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
PTAC/PTHP	NA	NA	See Table 9.2.17-3

Table 9.2.17-3 Calculated Demand and Energy Savings by Type of Business

Description	kW Savings/ton		kWh Savings/ton	
	All Sizes, Retrofit	All Sizes, New Construction	All Sizes, Retrofit	All Sizes, New Construction
Office	0.239	0.0083	180.84	6.28
Medical	0.239	0.0083	212.51	7.38
Restaurant	0.239	0.0083	212.51	7.38
Grocery	0.239	0.0083	244.18	8.48
School/College	0.239	0.0083	102.37	3.56
Warehouse	0.239	0.0083	180.84	6.28
Retail/Service	0.239	0.0083	244.18	8.48
Mfg/Industrial	0.239	0.0083	212.51	7.38
Hotel/Motel	0.239	0.0083	212.51	7.38
Other	0.239	0.0083	212.51	7.38

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.17-3) X Demand Interactive Effects (average from Table 9.2.17-1) X Coincident Diversity Factor (average from Table 9.2.17-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.17-3) X Energy Interactive Effects (average from Table 9.2.17-1) X Hours of Operation (average from Table 9.2.17-1)

Table 9.2.17-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
PTAC/PTHP	$80	$15

9.2.18 Gas Boiler Replacement (AFUE 85% minimum)

Measure Code: BPH3

Version Date & Revision History:

Draft date: February 6, 2009
Effective date: February 6, 2009
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Must replace an existing natural-gas fueled boiler
- Existing equipment may be steam

Eligibility Criteria for New Energy-Efficient Equipment:

- Hot water only (no steam)
- Less than or equal to 300 kBtuh input
- AFUE 85% minimum

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: In PY4 removed criteria Customer must have GDS-2 gas account, as GDS-2, 3, and 4 customer are now eligible for this measure. In PY4 added criteria Existing equipment may be steam.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG = Gross customer annual natural gas savings for the measure, therms
NG_I = Boiler natural gas input, kbtu
T_S = Annual natural gas savings for the measure (1.216102941 therms for all gas boilers)

Table 9.2.18-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.18-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Gas Boiler Replacement (< 300 kBtuh input)	NA	NA	0

Table 9.2.18-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Saving
All	NA	NA	1.216102941

Table 9.2.18-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Gas Boiler Replacement (≤300 kbtuh input)	$3,200	$1.00/kButh input

9.2.19 Gas Boiler Replacement (Thermal Efficiency 90%)

Measure Code: BPH4

Version Date & Revision History:

Draft date: February 6, 2009
Effective date: February 6, 2009
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Must replace an existing natural-gas fueled boiler
- Existing equipment may be steam

Eligibility Criteria for New Energy-Efficient Equipment:

- Hot water only (no steam)
- Greater than 300 kBtuh input
- Thermal Efficiency 90% minimum

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: In PY4 removed criteria that customer must be GDS-2, as GDS-2, 3 and 4 customers are now eligible for gas incentives. In PY4 added criteria existing equipment may be steam.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: 9-1-10 bonus increased by 50% (to $3.00) for the remainder of PY3

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG = Gross customer annual natural gas savings for the measure, therms
NG_I = Boiler natural gas input, kbtu
T_S = Annual natural gas savings for the measure (2.432205882 therms for all gas boilers)

Table 9.2.19-1 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Gas Boiler Replacement (> 300 kBtuh input)	NA	NA	0

Table 9.2.19-2 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Savings
All	NA	NA	2.432205882

Table 9.2.19-3 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Gas Boiler Replacement (>300 kBtuh input)	$5,000	$2.00/kButh input

9.2.20 Gas Furnace Replacement (90% AFUE)

Measure Code: BPH5

Version Date & Revision History:

Draft date:	February 6, 2009
Effective date:	February 6, 2009
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Must replace an existing natural-gas fueled furnace

Eligibility Criteria for New Energy-Efficient Equipment:

- ENERGY STAR qualified furnace (90% AFUE)

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: In PY4 removed criteria that customer must be GDS-2 account, as GDS-2, 3 and 4 customers are now eligible for gas incentives.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: None

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG = Gross customer annual natural gas savings for the measure, therms
NG_I = Gas furnace natural gas input, kbtu
T_S = Annual natural gas savings for the measure (2.432205882 therms for all gas furnaces)

Table 9.2.20-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.20-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Gas Furnace Replacement (90% AFUE)	NA	NA	0

Table 9.2.20-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm savings
All	NA	NA	2.432205882

Table 9.2.20-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Gas Furnace Replacement (90% AFUE)	$111 per 12,000 btuh of heating capacity	$2.00/kBtuh input

9.2.21 Gas Furnace Replacement (92% AFUE)

Measure Code: BPH6

Version Date & Revision History:

Draft date:	February 6, 2009
Effective date:	February 6, 2009
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Must replace an existing natural gas fueled furnace

Eligibility Criteria for New Energy-Efficient Equipment:

- ENERGY STAR qualified furnace (92% AFUE)

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: In PY4 removed criteria that customer must be GDS-2 account, as GDS-2, 3 and 4 customers are now eligible for gas incentives.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: 9-1-10 bonus increased by 50% (to $3.75) for the remainder of PY3

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG = Gross customer annual natural gas savings for the measure, therms
NG_I = Gas furnace natural gas input, kbtu
T_S = Annual natural gas savings for the measure (2.918647059 therms for all gas furnaces)

Table 9.2.21-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.21-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Gas Furnace Replacement (92% AFUE)	NA	NA	0

Table 9.2.21-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Savings
All	NA	NA	2.918647059

Table 9.2.21-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Gas Furnace Replacement (92% AFUE)	$111 per 12,000 btuh of heating capacity	$2.50 kBtuh input

9.2.22 Gas Furnace Replacement (94% AFUE)

Measure Code: BPH7

Version Date & Revision History:

Draft date:	February 6, 2009
Effective date:	February 6, 2009
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- Must replace an existing natural gas fueled furnace

Eligibility Criteria for New Energy-Efficient Equipment:

- ENERGY STAR qualified furnace (94% AFUE)

Loadshape: NA

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: In PY4 removed criteria that customer must be GDS-2 account, as GDS-2, 3 and 4 customers are now eligible for gas incentives.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: 9-1-10 bonus increased by 50% (to $4.50) for the remainder of PY3

Supplemental Information Collected on the Application: None

Algorithms used to calculate savings

Measure Natural Gas Savings $\Delta NG = NG_I \times T_S$

ΔNG = Gross customer annual natural gas savings for the measure, therms
NG_I = Gas furnace natural gas input, kbtu
T_S = Annual natural gas savings for the measure (3.405088235 therms for all gas furnaces)

Table 9.2.22-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.22-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
Gas Furnace Replacement (94% AFUE)	NA	NA	0

Table 9.2.22-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)	Therm Savings
Office	NA	NA	3.405088235

Table 9.2.22-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Gas Furnace Replacement (94% AFUE)	$111 per 12,000 of heating capacity	$3.00/kBtuh input

9.2.23 Variable Frequency Drives on HVAC Motors

Measure Code: BPC20

Version Date & Revision History:

Draft date: December 17, 2008
Effective date: December 17, 2008
Revised NA
End date: TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installations only

Eligibility Criteria for New Energy-Efficient Equipment:

- Used in conjunction with pumping or air handling applications
- Minimum 2,000 hours annual operation
- May not control motor over 500 hp
- Must be installed on an AC motor (DC motors are not eligible)
- Redundant/Backup units do not qualify

Loadshape: Loadshape #2 (Table 6.0-1).

Persistence: The persistence factor is assumed to be one.

Lifetimes: 15 years

Revision Details: 9-15-2011 Removed criteria Any size unit. In PY4, added criteria Must be installed on an AC motor (DC motors are not eligible). In PY4, removed 3 criteria: (1) NOTE This increased incentive will be in effect for all applications received through December 31, 2010; (2) A new motor with VFD; (3) A variable frequency drive (VFD) is a system for controlling the rotational speed of an alternating current (AC) electric motor by controlling the frequency of the electrical power supplied to the motor. A variable frequency drive is a specific type of adjustable speed drive. 6-20-2011 incentive amount changed from $75 per horsepower controlled to $90 per horsepower controlled.

Referenced Documents: HVAC Standard Measures v3.xls

Bonus Incentives offered: 1-4-10 Incentive increased to $75/ hp controlled (previously $45). Originally set to return to $45 on 3-31-10, but was instead extended to 5-31-11. In addition, the cap that stated the incentive could be no more than 50% of the project cost was increased so that the incentive could be up to 75% of the project cost.

Supplemental Information Collected on the Application: Hp controlled, project cost (incentive is capped at 755 of project cost).

Algorithms used to calculate savings

Measure Demand Savings $\Delta kW = \Delta kW_S \times N_{HP} \times ISR$

Measure Energy Savings $\Delta kWh = \Delta kWh_S \times N_{HP} \times ISR$

ΔkW = Gross customer connected load kW savings for the measure
ΔkW_S = Gross customer connected load kW savings
N_{HP} = Total Horse Power being controlled
ISR = In service rate, or the percentage of units rebated that actually get used. For standard measures, this is assumed to be 100%
ΔkWh = Gross customer annual kWh savings for the measure
ΔkWh_S = Gross customer connected load kWh savings

Table 9.2.23-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
Office	1.0	1.0	1.0
School (K-12)	1.0	1.0	1.0
College/University	1.0	1.0	1.0
Retail/Service	1.0	1.0	1.0
Restaurant	1.0	1.0	1.0
Hotel/Motel	1.0	1.0	1.0
Medical	1.0	1.0	1.0
Grocery	1.0	1.0	1.0
Warehouse	1.0	1.0	1.0
Light Industry	1.0	1.0	1.0
Heavy Industry	1.0	1.0	1.0
Average = Miscellaneous	**1.0**	**1.0**	**1.0**

Table 9.2.23-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)*
VFDs on HVAC Motors	NA	NA	**0**

Table 9.2.23-3 Calculated Demand and Energy Savings by Type of Business

Building Types	kW Savings/hp	kWh Savings/hp	kWh Savings/hp
	Motors (All Sizes)	Chilled Water Pump Applications (All Sizes)	Fan Applications (All Sizes)
Office	0	850	701
Medical	0	850	701
Restaurant	0	850	701
Grocery	0	850	701
School/College	0	850	701
Warehouse	0	850	701
Retail/Service	0	850	701
Mfg/Industrial	0	850	701
Hotel/Motel	0	850	701
Other	0	850	701

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.21-2)	X	Demand Interactive Effects (average from Table 9.2.23-1)	X	Coincident Diversity Factor (average from Table 9.2.23-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.2.23-2)	X	Energy Interactive Effects (average from Table 9.2.23-1)	X	Hours of Operation (average from Table 9.2.23-1)

Table 9.2.23-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Incremental Cost	Incentive Payment
Variable Frequency Drives on HVAC Motors	$200 per hp	$90/hp controlled (many not exceed 75% of the project cost)

9.3 Lodging

The following measures are included in the PY3 Lodging program.

9.3 LODGING		
	Measure	Code
Lodging (HVAC)		
9.3.1	Guest Room Energy Management (GREM) Controls (PTAC)	BPLD1
9.3.2	Guest Room Energy Management (GREM) Controls (PTHP)	BPLD2

These supplemental calculations apply to both GREM measures

The kWh savings are equal to the sum of heating and cooling energy consumption multiplied by a savings factor. For PTAC systems:

$$kWh_{total} = \left(\frac{DL * OLF * HDD * 24 * HCF}{\Delta T_H * 3{,}413} + \left(\frac{DL * OLF * CDD * 24}{\Delta T_C * 12{,}000} * \frac{12}{EER} \right) \right) * GREM$$

where:

- DL = design load in btu/hr
- HDD = heating degree days, deemed 6,148
- CDD = cooling degree days, deemed 980
- ΔT_H = design temperature difference for heating, deemed 80ºF
- ΔT_C = design temperature difference for cooling, deemed 30ºF
- HCF = heating correction factor, deemed 0.75
- OLF = oversized factor for design load, deemed 0.85
- EER = energy efficiency ratio for air conditioner, deemed 9.6
- 12,000 = conversion factor, btu per ton
- 12 = conversion factor based on the definition of EER, converts EER to kW/ton
- GREM = percent reduction in energy consumption due to GREM, deemed 30%
- 24 = hours in a day
- 3,413 conversion factor, btu per kWh

$$kWh_{total} = \left(\frac{9750 * 0.85 * 6{,}148 * 24 * 0.75}{80 * 3{,}413} + \left(\frac{9750 * 0.85 * 980 * 24}{30 * 12{,}000} * \frac{12}{9.6} \right) \right) * 0.30$$

$$kWh_{total} = (3359 + 676.8) * 0.30$$

$$kWh_{total} = 1211$$

Assuming a utility rate of $.10/kWh, the incremental cost is ($396/$121.10) 21%. The return on investment is ($396/$121.10) 3.27 years without the incentive and (($396-$85)/$121.10) 2.57 years with the incentive.

For PTHP systems, heating savings result from replacing electric resistance heaters with the more efficient heat pump for part of the heating load. Electric resistance heaters still operate when conditions are such that the heat pump cannot meet the heating load. The heating consumption for PTHP systems:

$$kWh_{heat} = \left(\frac{DL * OLF * HDD * 24 * HCF}{\Delta T_H * 3{,}413} \right) * \left(BU\% + \frac{(1 - BU\%)}{COP} \right)$$

where:

- BU% = percent of heating load that is provided by backup resistance heaters, deemed 20%
- COP = Coefficient of Performance for heat pump, deemed 2.6

$$kWh_{heat} = \left(\frac{9750 * 0.85 * 6{,}148 * 24 * 0.75}{80 * 3{,}413} \right) * \left(0.20 + \frac{(1 - 0.20)}{2.6} \right)$$

$$kWh_{heat} = 1705.3$$

Assuming the same average EER;

$$kWh_{total} = (1705.3 + 676.8) * 0.30$$

$$kWh_{total} = 714.6$$

Assumptions

The following values were assumed for the above calculations:

Design Load: A weighted design load was established based on the three most common unit sizes and the market share of each

Capacity (btuh)	EER	Market Share
9,000	9.7	80%
12,000	9.35	15%
15,000	9	5%
Weighted Average Design Load (DL) = (9,000*.8)+(12,000*.15)+(15,000*.05) = 9750		
Weighted Average EER = (9.7*.8)+(9.35*.15)+(9*.05) = 9.6		

Heating Degree Days: National Weather Service reports that the normal value for HDD in Peoria, Illinois is 6148.

Cooling Degree Days: National Weather Service reports that the normal value for CDD in Peoria, Illinois is 980.

Cooling Design Temperature Difference: With a balance temperature of 70 ºF, the average outdoor highest recorded temperature during the months of April through September for Peoria Illinois is 99.5 ºF. The difference is 29.5 ºF.

Monthly normal and record temperatures (in °F)[8]

Measurement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Record High	70	72	86	92	93	105	104	103	100	90	81	71
Normal High	30.7	36.6	49.4	62.0	73.0	82.2	85.7	83.6	76.7	64.4	48.8	35.5
Normal Low	14.3	19.7	30.2	40.3	50.8	60.1	64.6	62.6	54.0	42.3	31.4	20.1
Record Low	-25	-19	-10	14	25	39	47	41	26	19	-2	-23

Heating Design Temperature Difference: The average outdoor lowest recorded temperature during the months of October through March is -10 ºF. The difference is then 80 ºF.

Heating Correction Factor: Assumed to be the ratio of heating capacity to cooling capacity and taken as 0.75 for these calculations. (Cooling Correction Factor taken as 1 and dropped out of equation).

Oversized Load Factor: OLF takes into account that HVAC units are oversized for their application.

Energy Efficiency Ratio: A weighted EER was established with the design load.

GREM: Previous studies report that the Guest Room Energy Management controls reduce HVAC energy consumption by 30%.

Backup Percent, BU%: A Focus On Energy analysis determined the amount of heat the average heat pump is able to provide is 9,178,442 BTU. From the above calculations, the heating design load is 11,464,099 BTU. So, backup heating must handle 20% of the heating load.

COP: The Coefficient of Performance is based on the Wisconsin Energy Code. For retrofits, COP=2.9-(0.026*Capacity/1000). With capacity deemed 9750, COP=2.6

Conclusion

Typical annual savings associated with the installation of Guest Room Energy Management controls in the Peoria area is **1211 kWh per room for PTAC systems and 714 kWh per room for PTHP systems**. If the incentive rate is $.07/kWh, the incentive should be $84.77 for PTAC retrofits and $49.98 for PTHP systems. Incentive levels of $80 and $50 are recommended.

Since GREM is occupancy based, kW savings for vacant rooms is deemed 0.1 kW. This is reported to be based on a Focus on Energy Measurement and Verification study done at a hotel in Fond du Lac, Wisconsin.

9.3.1 Guest Room Energy Management (PTAC)

Measure Code: BPLD1

Version Date & Revision History:

Draft date:	May 3, 2010
Effective date:	May 3, 2010
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installation

Eligibility Criteria for New Energy-Efficient Equipment:

- Electric heat Package Terminal Air Conditioners (PTAC) systems only
- Occupancy control must be key activated or sense body heat or motion and must control the HVAC system serving the room.

Loadshape: TBD

Persistence: The persistence factor is assumed to be one.

Lifetimes: 14 years

Revision Details: (None)

Referenced Documents: Business Programs: Deemed Savings Manual V1.0, Energy Reduction Associated with the Installation of the Entergize Energy Control System: Pilot Installation Evaluation

Bonus Incentives offered: None

Supplemental Information Collected on the Application: Number of Guest Rooms

Algorithms used to calculate savings

Measure Demand Savings ΔkW = 0.1 (Based on vacancy)

Measure Energy Savings ΔkWh = #Rooms x 714 kWh/year

ΔkW = Gross customer connected load kW savings for the measure
ΔkWh = Gross customer annual kWh savings for the measure

Table 9.3.1-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Annual Operating Hours	Peak kW Savings Per Watt Reduced	kWh Savings Per Watt Reduced
Hotel/Motel	1.0	1.0	1.0	8,760	0	0

Table 9.3.1-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
GREM (PTAC)	1540	1540?	1.0

Table 9.3.1-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Hotel/Motel	0.1 (based on vacancy)	1,211

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.3.1-2) X Demand Interactive Effects (average from Table 9.3.1-1) X Coincident Diversity Factor (average from Table 9.3.1-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.3.1-2) X Energy Interactive Effects (average from Table 9.3.1-1) X Hours of Operation (average from Table 9.3.1-1)

Table 9.3.1-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
GREM (PTAC)	$396	$0	$396	$80/room

9.3.2 Guest Room Energy Management (PTHP)

Measure Code: BPLD2

Version Date & Revision History:

Draft date:	May 3, 2010
Effective date:	May 3, 2010
Revised	NA
End date:	TBD

Eligibility Criteria

Eligibility Criteria for Baseline Equipment to be Replaced:

- New installation

Eligibility Criteria for New Energy-Efficient Equipment:

- Electric Package Terminal Heat Pumps (PTHP) systems only
- Occupancy control must be key activated or sense body heat or motion and must control the HVAC system serving the room.

Loadshape: TBD

Persistence: The persistence factor is assumed to be one.

Lifetimes: 14 years

Revision Details: (None)

Referenced Documents: Business Programs: Deemed Savings Manual V1.0, Energy Reduction Associated with the Installation of the Entergize Energy Control System: Pilot Installation Evaluation

Bonus Incentives offered: None

Supplemental Information Collected on the Application: Number of Guest Rooms

Algorithms used to calculate savings

Measure Demand Savings ΔkW = 0.1 (Based on vacancy)

Measure Energy Savings ΔkWh = #Rooms x 1211 kWh/year

ΔkW = Gross customer connected load kW savings for the measure
ΔkWh = Gross customer annual kWh savings for the measure

Table 9.3.2-1 Energy Factor Assumptions

Building Types	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Annual Operating Hours	Peak kW Savings Per Watt Reduced	kWh Savings Per Watt Reduced
Hotel/Motel	1.0	1.0	1.0	8,760	0	0

Table 9.3.2-2 Specifications and Calculated Non-coincident Demand Savings

Measure Description	Base Unit Wattage (watts)	Retrofit Fixture Wattage (watts)	Non-Coincident Demand Savings (kW)
GREM (PTHP)	910	910	1.0

Table 9.3.2-3 Calculated Demand and Energy Savings by Type of Business

Building Types	Demand Savings (kW)	Energy Savings (kWh)
Hotel/Motel	0.1 (base on vacancy)	714

Demand Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.3.2-2) X Demand Interactive Effects (average from Table 9.3.2-1) X Coincident Diversity Factor (average from Table 9.3.2-1)

Energy Savings Calculation (per unit) =

Non-coincident Demand Savings (weighted average from Table 9.3.2-2) X Energy Interactive Effects (average from Table 9.3.2-1) X Hours of Operation (average from Table 9.3.2-1)

Table 9.3.2-4 Measure Costs (Parts and Labor) and Incentive Levels

Measure Description	Installed Cost: High Performance	Installed Cost: Standard Practice	Incremental Cost	Incentive Payment
GREM (PTHP)	$396	$0	$396	$50/room