ICF ID	Efficient Technology	Sub Division	Measure name source	Measure lifetime source	Measure savings source	Measure cost source	RLW Measure ID	ICF Measure ID	DEER Measure ID	KEMA Measure ID
831	Pumps - O&M	All	KEMA	KEMA	KEMA	KEMA				
832	Pumps - Controls	All	KEMA	KEMA	KEMA	KEMA				
833	Pumps - System Optimization	All	KEMA	KEMA	KEMA	KEMA				
834	Pumps - Sizing	All	KEMA	KEMA	KEMA	KEMA				
835	Pumps - Replace 1-5 HP motor	All	KEMA	KEMA	KEMA	KEMA				
836	Pumps - ASD (1-5 hp)	All	KEMA	KEMA	KEMA	KEMA				
837	Pumps - Motor practices-1 (1-5 HP)	All	KEMA	KEMA	KEMA	KEMA				
838	Pumps - Replace 6-100 HP motor	All	KEMA	KEMA	KEMA	KEMA				
839	Pumps - ASD (6-100 hp)	All	KEMA	KEMA	KEMA	KEMA				
840	Pumps - Motor practices-1 (6-100 HP)	All	KEMA	KEMA	KEMA	KEMA				
841	Pumps - Replace 100+ HP motor	All	KEMA	KEMA	KEMA	KEMA				
842	Pumps - ASD (100+ hp)	All	KEMA	KEMA	KEMA	KEMA				
843	Pumps - Motor practices-1 (100+ HP)	All	KEMA	KEMA	KEMA	KEMA				
844	Efficient refrigeration - operations	SIC20	KEMA	KEMA	KEMA	KEMA				
845	Optimization refrigeration	SIC20	KEMA	KEMA	KEMA	KEMA				
846	Bakery - process	SIC20	KEMA	KEMA	KEMA	KEMA				
847	Bakery - process (mixing)	SIC20	KEMA	KEMA	KEMA	KEMA				
848	Clean room - controls	SIC28	KEMA	KEMA	KEMA	KEMA				
849	Clean room - new designs	SIC28	KEMA	KEMA	KEMA	KEMA				
850	Process controls (batch + site)	SIC28	KEMA	KEMA	KEMA	KEMA				
851	O&M - extruders / injection molding	SIC30	KEMA	KEMA	KEMA	KEMA				
852	Extruders / injection molding - multipump	SIC30	KEMA	KEMA	KEMA	KEMA				
853	Direct drive extruders	SIC30	KEMA	KEMA	KEMA	KEMA				
854	Injection molding - impulse cooling	SIC30	KEMA	KEMA	KEMA	KEMA				
855	Injection molding - direct drive	SIC30	KEMA	KEMA	KEMA	KEMA				
856	Efficient grinding	SIC32	KEMA	KEMA	KEMA	KEMA				
857	Process controls	SIC32	KEMA	KEMA	KEMA	KEMA				
858	Top-heating (glass)	SIC32	KEMA	KEMA	KEMA	KEMA				
859	Process controls	SIC33	KEMA	KEMA	KEMA	KEMA				
860	Efficient electric melting	SIC33	KEMA	KEMA	KEMA	KEMA				
861	Near net shape casting	SIC33	KEMA	KEMA	KEMA	KEMA				
862	Optimization process (M&T)	SIC34	KEMA	KEMA	KEMA	KEMA				
863	Scheduling	SIC34	KEMA	KEMA	KEMA	KEMA				
864	Efficient curing ovens	SIC34	KEMA	KEMA	KEMA	KEMA				
865	Machinery	SIC34	KEMA	KEMA	KEMA	KEMA				
866	Optimization process (M&T)	SIC35	KEMA	KEMA	KEMA	KEMA				
867	Scheduling	SIC35	KEMA	KEMA	KEMA	KEMA				
868	Efficient curing ovens	SIC35	KEMA	KEMA	KEMA	KEMA				
869	Machinery	SIC35	KEMA	KEMA	KEMA	KEMA				
870	Optimization process (M&T)	SIC37	KEMA	KEMA	KEMA	KEMA				
871	Scheduling	SIC37	KEMA	KEMA	KEMA	KEMA				
872	Efficient curing ovens	SIC37	KEMA	KEMA	KEMA	KEMA				
873	Machinery	SIC37	KEMA	KEMA	KEMA	KEMA				
874	Scheduling	SIC36	KEMA	KEMA	KEMA	KEMA				
875	Efficient curing ovens	SIC36	KEMA	KEMA	KEMA	KEMA				
876	Machinery	SIC36	KEMA	KEMA	KEMA	KEMA				
877	Efficient processes (welding, etc.)	SIC36	KEMA	KEMA	KEMA	KEMA				
878	Scheduling	SIC39/21/31	KEMA	KEMA	KEMA	KEMA				
879	Efficient machinery	SIC39/21/31	KEMA	KEMA	KEMA	KEMA				
880	Process controls	SIC39/21/31	KEMA	KEMA	KEMA	KEMA				
881	200W HPS	Street Lighting	DEER	DEER	DEER	DEER			D03-850	
882	180W LPS	Street Lighting	DEER	DEER	DEER	DEER			D03-851	
883	175W PS Metal Halide	Street Lighting	DEER	DEER	DEER	DEER			D03-847	
884	175W PS Metal Halide	Street Lighting	DEER	DEER	DEER	DEER			D03-848	
885	250W PS Metal Halide	Street Lighting	DEER	DEER	DEER	DEER			D03-849	
886	Demand Response	Detached	Ameren	Ameren	Ameren	Ameren				
887	Demand Response	Other	Ameren	Ameren	Ameren	Ameren				
888	New HomeRefrigerator - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
889	New Home 6 indoor + 2 outdoor CFLs	All Residential	DCEO	DCEO	DCEO	DCEO				
890	Air Conditioner - SEER 14 + Programmable Thermosta	All Residential	DCEO	DCEO	DCEO	DCEO				
891	New Home improved thermal envelope	All Residential	DCEO	DCEO	DCEO	DCEO				
892	Dishwasher - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
893	New Home ENERGY STAR Bathroom Exhaust Fan	All Residential	DCEO	DCEO	DCEO	DCEO				
894	90% AFUE furnace w/ efficient air handler	All Residential	DCEO	DCEO	DCEO	DCEO				

ICF ID	Efficient Technology	Sub Division	Measure name source	Measure lifetime source	Measure savings source	Measure cost source	RLW Measure ID	ICF Measure ID	DEER Measure ID	KEMA Measure ID
895	Retrofit Refrigerator - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
896	Advanced Lighting Package (10 CFL Fixtures at 3 hrs/t	All Residential	DCEO	DCEO	DCEO	DCEO				
897	ENERGY STAR Bathroom Exhaust Fan	All Residential	DCEO	DCEO	DCEO	DCEO				
898	Dishwasher - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
899	Air Conditioner - SEER 16 + Programmable Thermosta	All Residential	DCEO	DCEO	DCEO	DCEO				
900	WindowAir Conditioner - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
901	Improved thermal envelope	All Residential	DCEO	DCEO	DCEO	DCEO				
902	New HomeRefrigerator - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
903	New Home 6 indoor + 2 outdoor CFLs	All Residential	DCEO	DCEO	DCEO	DCEO				
904	New Home ENERGY STAR Bathroom Exhaust Fan	All Residential	DCEO	DCEO	DCEO	DCEO				
905	Dishwasher - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
906	Air Conditioner - SEER 16 + Programmable Thermosta	All Residential	DCEO	DCEO	DCEO	DCEO				
907	WindowAir Conditioner - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
908	Improved thermal envelope	All Residential	DCEO	DCEO	DCEO	DCEO				
909	90% AFUE furnace w/ efficient air handler	All Residential	DCEO	DCEO	DCEO	DCEO				
910	15W CFL	All Residential	DCEO	DCEO	DCEO	DCEO				
911	20W CFL	All Residential	DCEO	DCEO	DCEO	DCEO				
912	25W CFL	All Residential	DCEO	DCEO	DCEO	DCEO				
913	15W CFL daylight	All Residential	DCEO	DCEO	DCEO	DCEO				
914	20W CFL daylight	All Residential	DCEO	DCEO	DCEO	DCEO				
915	13W capsule	All Residential	DCEO	DCEO	DCEO	DCEO				
916	16W CFL reflector	All Residential	DCEO	DCEO	DCEO	DCEO				
917	Refrigerator - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
918	12 CFLs at 3 hours per day	All Residential	DCEO	DCEO	DCEO	DCEO				
919	Air Conditioner - SEER 16 + Programmable Thermosta	All Residential	DCEO	DCEO	DCEO	DCEO				
920	WindowAir Conditioner - ENERGY STAR	All Residential	DCEO	DCEO	DCEO	DCEO				
921	2 4' T8 32 watt lamps with EB	Education	EEPM	DEER	EEPM/DEER	EEPM			D03-853	
922	2 4' Super T8 28 watt lamps with EB	Education	EEPM	DEER	EEPM/DEER	EEPM			D03-852	
923	1 4' T8 32 watt lamps with EB and reflector	Education	EEPM	DEER	EEPM/DEER	EEPM			D03-853	
924	2 4' T8 32 watt lamps with EB with dimming system	Education	EEPM	DEER	EEPM/DEER	EEPM			D03-853	
925	2 4' T8 32 watt lamps with EB with occupancy sensors	Education	EEPM	DEER	EEPM/DEER	EEPM			D03-853	
926	2 4' Super T8 28 watt lamps with EB	Education	EEPM	DEER	EEPM/DEER	EEPM			D03-852	
927	2 8' T8 59 watt lamps with EB	Education	EEPM	DEER	EEPM/DEER	EEPM				
928	2 8' Super T8 59 watt lamps with EB	Education	EEPM	DEER	EEPM/DEER	EEPM				
929	1 8' T8 59 watt lamps with EB and reflector	Education	EEPM	DEER	EEPM/DEER	EEPM				
930	2 8' T8 59 watt lamps with EB with dimming system	Education	EEPM	DEER	EEPM/DEER	EEPM				
931	2 8' T8 59 watt lamps with EB with occupancy sensors	Education	EEPM	DEER	EEPM/DEER	EEPM				
932	2 8' Super T8 59 watt lamps with EB	Education	EEPM	DEER	EEPM/DEER	EEPM				
933	50W Metal Halide	Education	DEER	DEER	DEER	DEER			D03-844	
934	75W Metal Halide	Education	DEER	DEER	DEER	DEER			D03-845	
935	100W Metal Halide	Education	DEER	DEER	DEER	DEER			D03-846	
936	DHW wrap R-4	Multifamily	RLW	DEER	DEER	ICF	31			
937	Faucet aerators	Multifamily	DEER	DEER	DEER	DEER			D03-934	
938	Hot Water Pipe Insulation	Multifamily	DEER	DEER	DEER	DEER			D03-936	
939	Low Flow Shower Heads	Multifamily	DEER	DEER	DEER	DEER			D03-937	
940	LEED Silver + 21% above code	Education	DCEO	DCEO	DCEO	DEER				
941	LEED Silver + 25% above code	Education	DCEO	DCEO	DCEO	DEER				
942	LEED Silver + 32% above code	Education	DCEO	DCEO	DCEO	DEER				
943	Public Sector Custom - Efficient Technologies	Assembly	DCEO	DCEO	DCEO	SCE				

Standard Inputs for ICF's DOE-2 Residential Model

Standard Inputs for ICF's DOE-2 Commercial Model

Architectural Information	**Options**
Square Feet per Floor	Any Value
Number of Stories	Any Value
Window Distribution	Any Distribution
Window Area to Wall Area Ratio	Any Value
Occupancy in Sq Ft Per Person	Any Value
Locations	Any TMY2 Weather Location
Shell Information	**Options**
Wall Type	1 - Mass Bldg 2 - Metal Bldg 3 - Steel Frame 4 - Wood Frame & Other
Wall Insulation R-value	Any Value
Wall Sheathing R-value	Any Value
Door R-Value	Any Value
Ceiling Type	1 - Insulation Entirely Above Deck 2 - Metal Building 3 - Attic and Other
Roof Solar Absorptivity	Any Value
Attic Insulation R-Value	Any Value
Slab Insulation R-Value	Any Value
Window U-Value	Any Value
Window SHGC	Any Value
Infiltration Air Change Rate per Hour	Any Value
Systems Information	**Options**
System Type	1 - Commercial Chiller and Boiler 2 - Packaged AC with Gas Furnace 3 - Packaged AC with Boiler 4 - Packaged Heatpump 5 - Split AC with Furnace 6 - Split Heatpump 7 - PTAC with Boiler 8 - PTAC with Gas Furnace 9 - PTAC with Electric
Cooling Capacity in Tons	Any Value
Cooling Efficiency (EER)	Any Value
Fuel Heating Efficiency (% AFUE)	Any Value
Elec Heating Efficiency (COP)	Any Value
Fan Type	1 - Constant Volume 2 - Variable Volume
Ventilation Rate	1 - CFM Per Person 2 - CFM Per Sq Ft of Floor Space
Duct Loss	Any Value
Thermostat	1 - Manual 2 - Programmable
Lighting Density, W Per Sq Ft	Any Value
Misc. Equipment Loads, W Per Sq Ft	Any Value
Sensible Occupant Loads, Btu Per Hr	Any Value
Latent Occupant Loads, Btu Per Hr	Any Value
Domestic Hot Water	**Options**
DHW Fuel Type	1 - Oil 2 - Gas 3 - Electric
DHW Capacity in Gallons	Any Value
Energy Factor	Any Value

Warehouse		
Architectural Information		
Square Feet per Floor		7530.5
Number of Stories		2
Window Distribution		2
Window Area to Wall Area Ratio		10%
Occupancy in Sq Ft Per Person		1000.0
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN	
Shell Information		
Wall Type		1
Wall Insulation R-value		13
Wall Sheathing R-value		0
Door R-Value		2
Ceiling Type		1
Roof Solar Absorptivity		0.8
Attic Insulation R-Value		15
Slab Insulation R-Value		19
Window U-Value		0.66
Window SHGC		0.5
Infiltration Air Change Rate per Hour		0.05
Systems Information		
System Type		2
Cooling Capacity in Tons		0
Cooling Efficiency (EER)		9
Fuel Heating Efficiency (% AFUE)		85
Elec Heating Efficiency (COP)		3.2
Fan Type		1
Ventilation Rate		0
Duct Loss		0.05
Thermostat		1
Lighting Density, W Per Sq Ft		1
Misc. Equipment Loads, W Per Sq Ft		0.50
Sensible Occupant Loads, Btu Per Hr		
Latent Occupant Loads, Btu Per Hr		
Domestic Hot Water		
DHW Fuel Type	G	
DHW Capacity in Gallons		237
Energy Factor		0.55

Small - Office		
Architectural Information		
Square Feet per Floor		4118.5
Number of Stories		2
Window Distribution		2
Window Area to Wall Area Ratio		25%
Occupancy in Sq Ft Per Person		125.0
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN	
Shell Information		
Wall Type		2
Wall Insulation R-value		13
Wall Sheathing R-value		1
Door R-Value		2
Ceiling Type		1
Roof Solar Absorptivity		0.8
Attic Insulation R-Value		15
Slab Insulation R-Value		19
Window U-Value		0.65
Window SHGC		0.5
Infiltration Air Change Rate per Hour		0.05
Systems Information		
System Type		2
Cooling Capacity in Tons		0
Cooling Efficiency (EER)		9
Fuel Heating Efficiency (% AFUE)		85
Elec Heating Efficiency (COP)		3.2
Fan Type		1
Ventilation Rate		7.5
Duct Loss		0.05
Thermostat		1
Lighting Density, W Per Sq Ft		1.25
Misc. Equipment Loads, W Per Sq Ft		1.00
Sensible Occupant Loads, Btu Per Hr		
Latent Occupant Loads, Btu Per Hr		
Domestic Hot Water		
DHW Fuel Type	G	
DHW Capacity in Gallons		151
Energy Factor		0.55

Assembly		
Architectural Information		
Square Feet per Floor		6080.5
Number of Stories		2
Window Distribution		2
Window Area to Wall Area Ratio		10%
Occupancy in Sq Ft Per Person		35.0
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN	
Shell Information		
Wall Type		1
Wall Insulation R-value		13
Wall Sheathing R-value		0
Door R-Value		2
Ceiling Type		1
Roof Solar Absorptivity		0.8
Attic Insulation R-Value		15
Slab Insulation R-Value		19
Window U-Value		0.66
Window SHGC		0.5
Infiltration Air Change Rate per Hour		0.05
Systems Information		
System Type		2
Cooling Capacity in Tons		0
Cooling Efficiency (EER)		9
Fuel Heating Efficiency (% AFUE)		85
Elec Heating Efficiency (COP)		3.2
Fan Type		1
Ventilation Rate		5
Duct Loss		0.05
Thermostat		1
Lighting Density, W Per Sq Ft		1.5
Misc. Equipment Loads, W Per Sq Ft		0.50
Sensible Occupant Loads, Btu Per Hr		
Latent Occupant Loads, Btu Per Hr		
Domestic Hot Water		
DHW Fuel Type	G	
DHW Capacity in Gallons		237
Energy Factor		0.55

Food Sales		
Architectural Information		
Square Feet per Floor		1900
Number of Stories		2
Window Distribution		2
Window Area to Wall Area Ratio		20%
Occupancy in Sq Ft Per Person		125.0
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN	
Shell Information		
Wall Type		1
Wall Insulation R-value		13
Wall Sheathing R-value		0
Door R-Value		2
Ceiling Type		3
Roof Solar Absorptivity		0.8
Attic Insulation R-Value		15
Slab Insulation R-Value		19
Window U-Value		0.66
Window SHGC		0.5
Infiltration Air Change Rate per Hour		0.05
Systems Information		
System Type		2
Cooling Capacity in Tons		0
Cooling Efficiency (EER)		9
Fuel Heating Efficiency (% AFUE)		85
Elec Heating Efficiency (COP)		0
Fan Type		1
Ventilation Rate		5
Duct Loss		0.05
Thermostat		1
Lighting Density, W Per Sq Ft		1.75
Misc. Equipment Loads, W Per Sq Ft		2.00
Sensible Occupant Loads, Btu Per Hr		
Latent Occupant Loads, Btu Per Hr		
Domestic Hot Water		
DHW Fuel Type	G	
DHW Capacity in Gallons		56
Energy Factor		0.49

Food Service		
Architectural Information		
Square Feet per Floor		3029.5
Number of Stories		2
Window Distribution		2
Window Area to Wall Area Ratio		20%
Occupancy in Sq Ft Per Person		40.0
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN	
Shell Information		
Wall Type		1
Wall Insulation R-value		13
Wall Sheathing R-value		0
Door R-Value		2
Ceiling Type		1
Roof Solar Absorptivity		0.8
Attic Insulation R-Value		15
Slab Insulation R-Value		19
Window U-Value		0.66
Window SHGC		0.5
Infiltration Air Change Rate per Hour		0.05
Systems Information		
System Type		2
Cooling Capacity in Tons		0
Cooling Efficiency (EER)		9
Fuel Heating Efficiency (% AFUE)		85
Elec Heating Efficiency (COP)		2.8
Fan Type		1
Ventilation Rate		10
Duct Loss		0.05
Thermostat		1
Lighting Density, W Per Sq Ft		1.75
Misc. Equipment Loads, W Per Sq Ft		1.50
Sensible Occupant Loads, Btu Per Hr		
Latent Occupant Loads, Btu Per Hr		
Domestic Hot Water		
DHW Fuel Type	G	
DHW Capacity in Gallons		65
Energy Factor		0.55

Lodging			
Architectural Information			
Square Feet per Floor		15658	
Number of Stories		2	
Window Distribution		2	
Window Area to Wall Area Ratio		25%	
Occupancy in Sq Ft Per Person		125.0	
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN		
Shell Information			
Wall Type		1	
Wall Insulation R-value		13	
Wall Sheathing R-value		0	
Door R-Value		2	
Ceiling Type		1	
Roof Solar Absorptivity		0.8	
Attic Insulation R-Value		15	
Slab Insulation R-Value		19	
Window U-Value		0.66	
Window SHGC		0.5	
Infiltration Air Change Rate per Hour		0.05	
Systems Information			
System Type		9	1
Cooling Capacity in Tons		0	0
Cooling Efficiency (EER)		7	16
Fuel Heating Efficiency (% AFUE)		0	85
Elec Heating Efficiency (COP)		1	3.2
Fan Type		1	1
Ventilation Rate		7.5	7.5
Duct Loss		0	0
Thermostat		1	1
Lighting Density, W Per Sq Ft		1.75	1.75
Misc. Equipment Loads, W Per Sq Ft		0.50	0.50
Sensible Occupant Loads, Btu Per Hr			
Latent Occupant Loads, Btu Per Hr			
Domestic Hot Water			
DHW Fuel Type	G		
DHW Capacity in Gallons		40	
Energy Factor		0.55	

Health Care (Inpatient)			
Architectural Information			
Square Feet per Floor		37050	
Number of Stories		4	
Window Distribution		2	
Window Area to Wall Area Ratio		25%	
Occupancy in Sq Ft Per Person		67.0	
Locations	St Louis, MO Kansas, MO Clmbmo, MO Memphis, TN		
Shell Information			
Wall Type		1	
Wall Insulation R-value		13	
Wall Sheathing R-value		0	
Door R-Value		2	
Ceiling Type		1	
Roof Solar Absorptivity		0.8	
Attic Insulation R-Value		15	
Slab Insulation R-Value		19	
Window U-Value		0.66	
Window SHGC		0.5	
Infiltration Air Change Rate per Hour		0.05	
Systems Information			
System Type		1	2
Cooling Capacity in Tons		0	0
Cooling Efficiency (EER)		16	9
Fuel Heating Efficiency (% AFUE)		85	85
Elec Heating Efficiency (COP)		3.2	2.8
Fan Type		1	1
Ventilation Rate		7.5	7.5
Duct Loss		0.05	0.05
Thermostat		1	1
Lighting Density, W Per Sq Ft		1.5	1.5
Misc. Equipment Loads, W Per Sq Ft		2.00	2.00
Sensible Occupant Loads, Btu Per Hr			
Latent Occupant Loads, Btu Per Hr			
Domestic Hot Water			
DHW Fuel Type	G		
DHW Capacity in Gallons		237	
Energy Factor		0.55	

Appendix C: Measure Bundling

Appendix C shows how measures were bundled into programs. Below is a table showing two columns, the first is the program name, and the second shows which measures are included in that program. The table shows only the measures that passed the total resource cost test with a cost benefit ratio greater than one.

Program	Efficient Technology
C&I Custom	Bakery - process
	Bakery - process (mixing)
	Clean room - controls
	Clean room - new designs
	Comp Air - ASD (100+ hp)
	Comp Air - ASD (6-100 hp)
	Comp Air - Motor practices-1 (100+ HP)
	Comp Air - Motor practices-1 (1-5 HP)
	Comp Air - Motor practices-1 (6-100 HP)
	Comp Air - Replace 100+ HP motor
	Compressed Air - Controls
	Compressed Air - System Optimization
	Compressed Air- Sizing
	Compressed Air-O&M
	Efficient curing ovens
	Efficient electric melting
	Efficient machinery
	Efficient processes (welding, etc.)
	Efficient refrigeration - operations
	Extruders / injection molding - multipump
	Fans - ASD (100+ hp)
	Fans - ASD (6-100 hp)
	Fans - Controls
	Fans - Motor practices-1 (100+ HP)
	Fans - Motor practices-1 (1-5 HP)
	Fans - Motor practices-1 (6-100 HP)
	Fans - O&M
	Fans - Replace 100+ HP motor
	Fans - System Optimization
	Fans- Improve components
	Injection molding - direct drive
	Injection molding - impulse cooling
	Machinery
	Near net shape casting
	O&M - extruders / injection molding
	Optimization process (M&T)
	Optimization refrigeration
	Optimize drying process
	Power recovery

Program	Efficient Technology
C&I Custom	Process controls
	Process controls (batch + site)
	Pumps - ASD (100+ hp)
	Pumps - ASD (6-100 hp)
	Pumps - Controls
	Pumps - Motor practices-1 (100+ HP)
	Pumps - Motor practices-1 (1-5 HP)
	Pumps - Motor practices-1 (6-100 HP)
	Pumps - O&M
	Pumps - Replace 100+ HP motor
	Pumps - Sizing
	Pumps - System Optimization
	Refinery Controls
	Scheduling
	Top-heating (glass)
C&I Prescriptive	250W PS Metal Halide
	50W Metal Halide
	100W Metal Halide
	175W PS Metal Halide
	180W LPS
	2 1-lamp indirect fixture with T5
	200W HPS
	26 W White LED Lamp
	80 Plus desktop power supply
	80 Plus server power supply
	Addition of a LT subcooler to an air-cooled multiplex
	Chiller Efficiency
	Computer Power Management
	Connectionless Steamer, Efficient use = 0.5 kW/hour
	Efficient Air-Cooled 1001-1500 lbs/day
	Efficient Air-Cooled 201-300 lbs/day
	Efficient Air-Cooled 301-400 lbs/day
	Efficient ir-Cooled 501-1000 lbs/day
	Electroluminescent Exit Sign (New)
	Electroluminescent Exit Sign Retrofit Kit
	Eliminate anti-sweat heaters from doors
	Energy Efficient pre-rinse spray valve
	High Bay T5 (4L4' F28T5/HO)
	Hot Food Holding Cabinet, Efficient use = 0.43 kW/hour
	Install automatic door closer on walk-in cooler doors
	Install automatic door closer on walk-in freezer doors
	Integral CFL, screw-in
	LED Exit Sign (new)
	LED Exit Sign (retrofit kit)
	LED Pedestrian Signal
	LED Traffic Signal
	Modular CFL, pin based

Program	Efficient Technology
C&I Prescriptive	Occupancy sensor - Assume control 3 2-lamp fixtures w/T8 3
	Packaged Unit Efficiency
	Premium Efficiency Motor
	Replace multiplex air-cooled condenser with evaporative con
	Substitute high efficiency motors for standard efficiency
	Upgrade from 53 Btu/Watt @ 10°F TD to 85 Btu/Watt
	Variable CW Pump
	Variable HW Pump
	VAV
	Vending Machine Controller
	2 4' T8 32 watt lamps with EB
	2 4' Super T8 28 watt lamps with EB
	1 4' T8 32 watt lamps with EB and reflector
	2 4' T8 32 watt lamps with EB with dimming system
	2 4' T8 32 watt lamps with EB with occupancy sensors
	2 8' T8 59 watt lamps with EB
	2 8' Super T8 59 watt lamps with EB
	1 8' T8 59 watt lamps with EB and reflector
	2 8' T8 59 watt lamps with EB with dimming system
	2 8' T8 59 watt lamps with EB with occupancy sensors
	2 1-lamp F32T8 with EB and CFL Task Light
	2 1-lamp Super T8s with high-power EB
C&I Retro-Commissioning	Air-cooled multiplex system w/extensive refrigeration equipm
	Ambient following SCT setpoint, 70°F minimum
	Ambient following SCT setpoint, 70°F minimum, variable-spd
	Chiller-Reset
	Cleaned Coil
	Cycle fan off with thermostat; duty cycle occasionally when o
	Extensive refrigeration equipment maintenance
	Floating SCT controlled to 70°F
	Floating SST control on LT and MT suction groups
	Optimized OA
	Reduce design SCT by ~5°F and improve efficiency
	Scheduled AHU
	Turn off fixture lights when store closed, between 12am and 6
	Wetbulb following SCT setpoint, 70°F minimum
	Wetbulb following SCT setpoint, 70°F minimum, variable-spd
Commercial Demand Credit	Demand Response
Commercial New Construction	New Construction Building - with upgrades
DCEO Lights for Learning	13W capsule
	15W CFL
	15W CFL daylight
	16W CFL reflector
	20W CFL
	20W CFL daylight
	25W CFL
	Lights for learning program

Program	Efficient Technology
DCEO Low Income Direct Install	12 CFLs at 3 hours per day
	WindowAir Conditioner - ENERGY STAR
DCEO Low Income EE Moderate Rehab (MF)	90% AFUE furnace w/ efficient air handler
	Air Conditioner - SEER 16 + Programmable Thermostat
	New Home 6 indoor + 2 outdoor CFLs
	WindowAir Conditioner - ENERGY STAR
DCEO Low Income New Const. Gut Rehab	Air Conditioner - SEER 14 + Programmable Thermostat
	New Home 6 indoor + 2 outdoor CFLs
DCEO Public Retrocommissioning	Cleaned Coil
	Economizer Lim
	Optimized OA
	Scheduled AHU
DCEO Public Sector Customized Program	Public Sector Custom - Efficient Technologies
DCEO Public Sector New Construction	0 LEED Points (10% above code)
	1 LEED Point (11% above code)
	1 LEED Point (15% above code)
	2 LEED Points (14% above code)
	2 LEED Points (20% above code)
	3 LEED Points (25% above code)
	4 LEED Point (30% above code)
	4 LEED Points (21% above code)
	5 LEED Points (25% above code)
	7 LEED Points (32% above code)
	LEED Silver + 21% above code
	LEED Silver + 25% above code
	LEED Silver + 32% above code
DCEO Public Sector Prescriptive	50W Metal Halide
	Chiller Efficiency
	Integral CFL, screw-in
	Modular CFL, pin based
	Packaged Unit Efficiency
	VAV
	2 4' Super T8 28 watt lamps with EB
	1 4' T8 32 watt lamps with EB and reflector
	2 8' Super T8 59 watt lamps with EB
	1 8' T8 59 watt lamps with EB and reflector
DCEO Single Family Rehab	90% AFUE furnace w/ efficient air handler
	Air Conditioner - SEER 16 + Programmable Thermostat
	WindowAir Conditioner - ENERGY STAR
Home Energy Performance	Ceiling Insulation (R-30)
	Ceiling Insulation (R-38)
	Faucet Aerators (Existing)
	Hot Water Insulation (Existing)
	Hot Water Pipe Insulation (Existing)
	Infiltration = 0.35 ACH
	Low Flow Shower Heads (Existing)
	R-11 Wall Insulation
Residential Appliance Recycling	Refrigerator recycling
Residential DR - Direct Load Control	Demand Response

Program	Efficient Technology
Residential HVAC Diagnostics & Tune-Up	Central AC (Correct charge, Existing)
	Duct Leakage 5%
	Increase duct sizes or add new ducts
Residential Lighting & Appliances	13 Watt Integral CFL
	18 Watt Integral CFL
	25 Watt Integral CFL
	ENERGY STAR Ceiling Fan
	ENERGY STAR De-humidifier (Existing)
	ENERGY STAR Dishwasher (Existing)
	ENERGY STAR Freezer (Existing)
	ENERGY STAR Window AC (10.8 EER, Existing)
	High Efficiency Water Heater - Gas, EF = 0.63
Residential Low Income	Programmable Thermostat (Existing)
	Standard Refrigerator (Existing) - NAECA
	Doors R-4 (Existing) to R-8
Residential Multifamily	Central AC (Correct charge, Existing)
	DHW wrap R-4
	Electroluminescent Exit Sign (New)
	Electroluminescent Exit Sign Retrofit Kit
	Faucet aerators
	Hot Water Pipe Insulation
	Integral CFL, screw-in
	LED Exit Sign (new)
	LED Exit Sign (retrofit kit)
	Low Flow Shower Heads
	Modular CFL, pin based
	Occupancy sensor - Assume control 3 2-lamp fixtures w/T8 3
	2 4' T8 32 watt lamps with EB
	2 4' Super T8 28 watt lamps with EB
	1 4' T8 32 watt lamps with EB and reflector
	2 4' T8 32 watt lamps with EB with occupancy sensors
	2 8' Super T8 59 watt lamps with EB
	1 8' T8 59 watt lamps with EB and reflector
Residential New HVAC	Ground Source Heat Pump
	Size AC units to 100% of Manual J
	ENERGY STAR Central AC (14 SEER)
Street Lighting2	175W PS Metal Halide
	180W LPS
	200W HPS
	250W PS Metal Halide

Appendix D: Program Documentation

Appendix D contains a listing of each program, including the participation, the costs broken down by incentive, administration, marketing, and implementation, and two verification variables, the realization rate and net-to-gross ratio. The program's total resource cost result is also shown. Sources and a brief explanation of program design and assumptions is included as well

Home Energy Performance						
	2005	2006	2007	Total		Source
Participation (Homes)	270	690	920	1,900		
Participation % of Baseline	1.9%	4.8%	6.4%	8.0%		Baseline data: Ameren
Incentive Costs	$110,000	$270,000	$370,000	$750,000		
Admin Costs	$140,000	$360,000	$480,000	$970,000	130%	LIPA Program Data
Marketing Costs	$0	$0	$0	$0	0%	
Implementation Costs	$0	$0	$0	$0	0%	
Total Non-Incentive Costs	$140,000	$360,000	$480,000	$970,000		
Total Program Costs	$250,000	$630,000	$840,000	$1,720,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.76					

Notes: The baseline data for this program is the number of single family attached and detached homes in the Ameren territory, as provided by Ameren. Participation is based on best practice program data and Ameren program goals (number of homes upgraded). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on program data from Long Island Power Authority, as well as ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce expected energy savings, such as improperly applied hot water tank wraps or pipe wraps. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual version 2 (2003).

Residential HVAC Diagnostics & Tune-Up						
	2005	2006	2007	Total		Source
Participation (Homes)	0	790	1,060	2,300		
Participation % of Baseline	0.0%	2.4%	4.8%	6.9%		Baseline data: Ameren
Incentive Costs	$0	$460,000	$570,000	$1,450,000		
Admin Costs	$0	$290,000	$580,000	$870,000	60%	Arizona Public Service, E.ON Energy, ICF
Marketing Costs	$0	$0	$0	$0	0%	
Implementation Costs	$0	$0	$0	$0	0%	
Total Non-Incentive Costs	$0	$290,000	$580,000	$870,000		
Total Program Costs	$0	$770,000	$1,150,000	$2,320,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.97					

Notes: The baseline data for this program is the number of homes in the Ameren territory, as provided by Ameren. Participation is based on best practice program data and Ameren program goals (number of improved ACs). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on program data from Arizona Public Service, E.ON Energy, as well as ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce expected energy savings, such as units that are not correctly tuned up. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

Residential Appliance Recycling						
	2008	2009	2010	Total		Source
Participation (Units)	0	14,000	23,000	36,000		
Participation % of Baseline	1.5%	5.5%	9.0%	0.0%		Baseline data: Ameren
Incentive Costs	$190,000	$690,000	$1,130,000	$2,000,000		
Admin Costs	$150,000	$550,000	$900,000	$1,600,000	80%	E-Source report (2007) and JACO Industry Data
Marketing Costs	$150,000	$550,000	$900,000	$1,600,000	80%	
Implementation Costs	$300,000	$1,100,000	$1,800,000	$3,200,000	160%	
Total Non-Incentive Costs	$600,000	$2,200,000	$3,600,000	$6,400,000		
Total Program Costs	$790,000	$2,890,000	$4,730,000	$8,400,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.35 fridges; 0.54 freezers and window A/C units					CA Energy Efficiency Policy Manual & ICF Assumption
Program TRC Result	1.15					

Notes: The baseline data for this program is the number of homes in the Ameren territory that are estimated to have secondary refrigerators, freezers, or air conditioning units. Baseline data, the number of single family detached homes, was provided by Ameren, and Midwest Energy Efficiency Alliance provided number of homes with secondary units in Illinois. Participation was based on best practice program data and Ameren program goals (number of units). Costs for administration, marketing, and implementation were based on a percentage of the incentive costs, and were determined an E-Source report (Kolwey, Neil; EDRP-F5, April 2006) conversations with JACO, as well as ICF and Ameren discussion. Realization rate of 95% accounts for removals that do not produce expected energy savings. The net to gross ratios of 35% for second fridges and 54% for second freezers was drawn from the California Energy Efficiency Policy Manual, version 2 (2003). The 54% ratio was also applied to window A/C units, by ICF Assumption.

Residential Lighting & Appliances						
	2008	2009	2010	Total		Source
Participation (CFLs)	360,000	820,000	1,610,000	2,790,000		
Participation % of Baseline	2.2%	5.0%	10.0%	0.0%		Baseline data: Ameren
Incentive Costs	$790,000	$1,790,000	$3,580,000	$6,150,000		
Admin Costs	$39,000	$89,000	$180,000	$310,000	5%	Connecticut Power & Light Program Data
Marketing Costs	$180,000	$410,000	$820,000	$1,410,000	23%	
Implementation Costs	$160,000	$360,000	$720,000	$1,230,000	20%	
Total Non-Incentive Costs	$380,000	$860,000	$1,720,000	$2,950,000		
Total Program Costs	$1,160,000	$2,650,000	$5,290,000	$9,100,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.68					

Notes: The baseline data for this program is the number of homes in the Ameren territory, as provided by Ameren. Participation is based on best practice program data and Ameren program goals (number of CFLs distributed). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on program data from Connecticut Power & Light. Realization rate of 95% accounts for installations that do not produce expected energy savings, such as using CFLs to replace burned out CFLs. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

Residential Multifamily						
	2008	2009	2010	Total		Source
Participation (Various, see template for this program)						
Participation % of Baseline	4.0%	8.0%	6.0%	0.0%		Baseline data: Ameren
Incentive Costs	$120,000	$180,000	$180,000	$480,000		
Admin Costs	$48,000	$72,000	$72,000	$190,000	40%	ICF Assumption
Marketing Costs	$48,000	$72,000	$72,000	$190,000	40%	
Implementation Costs	$48,000	$72,000	$72,000	$190,000	40%	
Total Non-Incentive Costs	$140,000	$216,000	$216,000	$570,000		
Total Program Costs	$260,000	$390,000	$390,000	$1,050,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.48					

Notes: The baseline data for this program is the number of all electric multifamily units in the Ameren territory, as provided by Ameren. Participation is based on best practice program data and Ameren program goals (number of homes). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs are based on ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce expected energy savings, such as improperly applied hot water tank wraps or pipe wraps. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

Commercial Demand Credit						
	[illegible]	[illegible]	[illegible]	Total		Source
Participation (kW)	2,390	4,600	6,900	14,000		
Participation % of Baseline	0.1%	0.2%	0.3%	0.0%		Baseline data: Ameren
Incentive Costs	$49,000	$96,000	$145,000	$290,000		
Admin Costs	$2,500	$4,900	$7,200	$15,000	5%	
Marketing Costs	$0	$0	$0	$0	0%	Ameren
Implementation Costs	$0	$0	$0	$0	0%	
Total Non-Incentive Costs	$2,500	$4,900	$7,200	$15,000		
Total Program Costs	$51,000	$100,000	$150,000	$310,000		
Realization Rate	1					ICF Assumption
Net-to-Gross Ratio	0.95					CA Energy Efficiency Policy Manual
Program TRC Result	2.50					

Notes: All program info is provided directly by Ameren.

Residential DR - Direct Load Control						
	[illegible]	[illegible]	[illegible]	Total		Source
Participation (kW)	2,900	5,900	8,900	18,000		
Participation % of Baseline	0.3%	0.6%	0.9%	0.0%		Baseline data: Ameren
Incentive Costs	$510,000	$[illegible],000	$700,000	$1,810,000		
Admin Costs	$130,000	$260,000	$390,000	$770,000	25%	
Marketing Costs	$0	$0	$0	$0	0%	Ameren
Implementation Costs	$0	$0	$0	$0	0%	
Total Non-Incentive Costs	$130,000	$260,000	$390,000	$770,000		
Total Program Costs	$640,000	$850,000	$1,090,000	$2,580,000		
Realization Rate	1					ICF Assumption
Net-to-Gross Ratio	0.95					CA Energy Efficiency Policy Manual
Program TRC Result	1.73					

Notes: All program info is provided directly by Ameren.

Residential New HVAC						
	[illegible]	[illegible]	[illegible]	Total		Source
Participation (Homes)	350	1,800	3,600	5,700		
Participation % of Baseline	1.0%	4.9%	9.0%	0.0%		Baseline data: Ameren
Incentive Costs	$63,000	$280,000	$570,000	$910,000		
Admin Costs	$6,300	$28,000	$57,000	$91,000	10%	
Marketing Costs	$19,000	$85,000	$170,000	$270,000	30%	LIPA Program Data
Implementation Costs	$38,000	$170,000	$340,000	$550,000	60%	
Total Non-Incentive Costs	$63,000	$280,000	$570,000	$910,000		
Total Program Costs	$126,000	$570,000	$1,130,000	$1,820,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.14					

Notes: The baseline data for this program is the number of new air conditioners purchased annually in the Ameren territory, estimated from data provided by Ameren and the American Housing Survey. Participation is based on best practice program data and Ameren program goals (number of units installed). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on program data from Long Island Power Authority , as well as ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce expected energy savings, such as units that are not correctly charged or installed. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

C&I Prescriptive						
	2008	2009	2010	Total		Source
Participation (Units)	80,000	150,000	210,000	440,000		
Participation % of Baseline	2.7%	4.8%	6.4%	0.0%		Baseline data: Ameren
Incentive Costs	$2,070,000	$3,710,000	$4,950,000	$10,730,000		
Admin Costs	$200,000	$370,000	$490,000	$1,060,000	10%	PG&E, Nevada Power, and WE Energies Program Data
Marketing Costs	$200,000	$370,000	$490,000	$1,060,000	10%	
Implementation Costs	$1,020,000	$1,830,000	$2,440,000	$5,280,000	50%	
Total Non-Incentive Costs	$1,430,000	$2,560,000	$3,410,000	$7,300,000		
Total Program Costs	$3,500,000	$6,270,000	$8,360,000	$18,120,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.37					

Notes: The baseline data for this program is the number base technology installations (such as number of T-12 fixtures, number of inefficient motors, etc.) in the Ameren territory, as estimated from a study by KEMA Colorado, with data weighted by EIA building data for the east north-central region. Participation is based on best practice program data and Ameren program goals (number of units). Incentive costs are set in two ways. For linear flourescent lighting, CFLs, and motors, incentive level was set to specific values based on program data (Pacific Gas & Electric, Nevada Power, and We Energies) and Ameren program design goals. For all other measures, incentive level was calculated to reduce measure payback to 2 years. Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on program data from a California Statewide report, Nevada Power, and WE Energies, as well as ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce expected energy savings. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

C&I Retro-commissioning						
	2008	2009	2010	Total		Source
Participation (Projects)	96	230	360	686		
Participation % of Baseline	3.6%	7.2%	11.2%	0.0%		Baseline data: Ameren
Incentive Costs	$100,000	$240,000	$380,000	$720,000		
Admin Costs	$30,000	$73,000	$110,000	$220,000	30%	Connecticut Light & Power, ICF
Marketing Costs	$30,000	$73,000	$110,000	$220,000	30%	
Implementation Costs	$30,000	$73,000	$110,000	$220,000	30%	
Total Non-Incentive Costs	$91,000	$220,000	$340,000	$656,000		
Total Program Costs	$190,000	$460,000	$720,000	$1,370,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.46					

Notes: The baseline data for this program is the number base technology installations (such as number of air handlers) in the Ameren territory, as estimated from a study by KEMA Colorado, with data weighted by EIA building data for the east north-central region. Participation is based on best practice program data and Ameren program goals (number of units). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on Connecticut Light & Power program data, as well as ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce the expected energy savings. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

Commercial New Construction						
	2008	2009	2010	Total		Source
Participation (Buildings)	0	2	7	9		
Participation % of Baseline	0.0%	3.2%	14.4%	0.0%		Baseline data: Ameren
Incentive Costs	$0	$48,000	$220,000	$268,000		
Admin Costs	$0	$2,400	$11,000	$13,000	5%	ICF Assumption
Marketing Costs	$0	$2,400	$11,000	$13,000	5%	
Implementation Costs	$0	$19,000	$86,000	$110,000	40%	
Total Non-Incentive Costs	$0	$24,000	$110,000	$130,000		
Total Program Costs	$0	$72,000	$320,000	$400,000		
Realization Rate	1					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.12					

Notes: The baseline data for this program is the number of new large commercial buildings in the Ameren territory. Participation is based on best practice program data and Ameren program goals (number of buildings). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on ICF and Ameren discussion. Realization rate is 100% because the program is designed to work with buildings through an application and inspection process. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

Street Lighting						
	[illegible]	[illegible]	[illegible]	Total		Source
Participation (Lights)	8,000	8,000	8,000	24,000		
Participation % of Baseline	5.3%	5.3%	5.3%	0.0%		Baseline data: Ameren
Incentive Costs	$400,000	$400,000	$400,000	$1,200,000		
Admin Costs	$60,000	$60,000	$60,000	$180,000	15%	
Marketing Costs	$60,000	$60,000	$60,000	$180,000	15%	ICF, Ameren
Implementation Costs	$0	$0	$0	$0	0%	
Total Non-Incentive Costs	$120,000	$120,000	$120,000	$360,000		
Total Program Costs	$520,000	$520,000	$520,000	$1,560,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.93					

Notes: The baseline data for this program is the number of single family attached and detached homes in the Ameren territory, as provided by Ameren. Participation is based on best practice program data and Ameren program goals (number of street lights installed). Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are based on ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce expected energy savings, such as improperly applied hot water tank wraps or pipe wraps. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual version 2 (2003).

Oil Custom						
	[illegible]	[illegible]	[illegible]	Total		Source
Participation (Projects)	32	83	140	250		
Participation % of Baseline	3.1%	8.0%	13.6%	0.0%		Baseline data: Ameren
Incentive Costs	$310,000	$810,000	$1,310,000	$2,430,000		
Admin Costs	$31,000	$81,000	$130,000	$240,000	10%	
Marketing Costs	$16,000	$40,000	$65,000	$120,000	5%	WE Energies Program Data
Implementation Costs	$200,000	$520,000	$850,000	$1,560,000	65%	
Total Non-Incentive Costs	$250,000	$640,000	$1,050,000	$1,940,000		
Total Program Costs	$560,000	$1,450,000	$2,360,000	$4,370,000		
Realization Rate	0.95					ICF Assumption
Net-to-Gross Ratio	0.8					CA Energy Efficiency Policy Manual
Program TRC Result	1.90					

Notes: The baseline data for this program is the energy (kWh) consumed in Ameren's territory in 2006, provided by Ameren, and weighted among industrial users using EIA data. Participation is based on best practice program data and Ameren program goals (number of kWh saved). Incentive costs are set to $0.08/kWh, based on program data from Southern California Edison. Costs for administration, marketing, and implementation are based on a percentage of the incentive costs, and are estimated using WE Energies program data, as well as ICF and Ameren discussion. Realization rate of 95% accounts for installations that do not produce the expected energy savings. The net to gross ratio of 80% is drawn from the California Energy Efficiency Policy Manual, version 2 (2003).

Appendix E: Setting Uncertainties

This Appendix documents ICF's methodology for setting the uncertainty distributions used in the risk analysis. The overall approach to the risk analysis is a subject covered in Appendix A. The uncertainties documented in this Appendix are the ones that were used to run the third and final Monte Carlo simulation, the results of which were used in the final analysis of portfolio risk in Appendix A. Ideally, these uncertainty distributions would be based on observations of many actual values. Unfortunately, consistent data sets do not exist that would enable us to base the distributions on observed variation of values for identical programs. Therefore, these distributions were based on subjective evaluation of the relative uncertainty associated with the source of the initial values.

E.1 Overview

As discussed in Appendix A, there were four uncertainties used in the risk analysis of the portfolio: unit energy savings estimates (annual energy use of the efficient technology minus the annual energy use of the baseline technology), projected measure installation counts, program net-to-gross ratios and program engineering verification factors. Uncertainty distributions were estimated using a process that analyzed the key factors contributing to each uncertainty at the program or measure level. Then based on the analysis of these factors, ICF set probability distributions around each uncertainty for every measure in the portfolio. To review, the table below outlines what factors ICF used to analyze each key uncertainty.

Table 1: Factors used to analyze key portfolio uncertainties

Uncertainty	Factors used to analyze uncertainty
Unit savings	Source of the unit savings estimate (i.e. DEER) and the measure's weather sensitivity.
Projected installations	Program's ability to get measures directly installed (an education program would have a much lower ability to do this than a C&I Custom program, for example), the program participation rate, the source of the baseline measure usage rate (i.e. MEEA, KEMA), and the applicability of the baseline usage rate to the Company's portfolio.
Net-to-gross ratios	Source of the NTGR estimate, the applicability of the NTGR to the Company's program, and the uncertainty around an evaluator's ability to conduct robust impact studies on the program given the evaluation budget.

The engineering verification factor was not considered a key uncertainty because most of the evaluation risk was captured in NTGR uncertainty. ICF used its knowledge of program installation rates to estimate uncertainty around the verification factors used in the Energy Efficiency Potential Model (EEPM).

Whether the uncertainties were set at the program level, then applied to each measure in each program, as was the case with installations, NTGR and engineering verification factor uncertainties, or applied directly at the measure level, as was the case with unit energy savings uncertainty, ICF assigned every measure in the portfolio four uncertainties that impacted portfolio kWh savings. The total number of uncertainties used in the risk analysis was 3,700.

E.2 Quantifying portfolio uncertainties

The first step the ICF team took in setting uncertainties was quantifying their confidence in each of the factors inherent to the EEPM that contributed to key uncertainties at the measure or program level. For example, for each program net-to-gross ratio (NTGR) used in the EEPM, ICF asked the following questions:

- How confident are we that the source we used for the NTGR is reliable and accurate?
- How confident are we about the applicability of this NTGR to Ameren IL's program?
- Given the evaluation budget and the program's structure, how confident are we that an evaluator will be able to conduct robust impact studies?

Confidence in each factor was quantified using a discrete scale, shown in the table below, where 0.1 indicated ICF had no confidence in a factor and a 1 indicated that they had no reason to be uncertain about the factor. Confidence levels were set for lower and upper bounds around each factor.

Table 2: Uncertainty factor confidence scale

Confidence Value	Description
0.1	not confident
0.5	neither confident, nor "not confident" (best guess)
0.75	confident
0.9	very confident
1	no reason to be uncertain

Once confidence was quantified for each factor contributing to an uncertainty, ICF weighed each factor based on their assessment of each factor's importance in its contribution to the uncertainty. Finally, ICF calculated the uncertainty as one minus the weighted average of their confidence in each factor contributing to the uncertainty. For example, ICF quantified their uncertainty in projected measure installations for the Residential New HVAC Program as shown in the table below.

Table 3: Example calculation of weighted installation uncertainty

Uncertainty Factor	Lower Bound Confidence	Upper Bound Confidence	Factor Weight
Baseline participation source confidence	0.9	0.9	4
Applicability of baseline source to Ameren IL's portfolio confidence	0.9	0.9	3
Program ability to install confidence	0.75	0.75	1
Hardwired participation rate confidence	0.9	1	5
Weighted Confidence	**0.89**	**0.93**	
Weighted Uncertainty	**0.11**	**0.07**	

ICF and Ameren IL estimated, using the EEPM, that the Residential New HVAC program will install 6,555 14 SEER ACs over three years. According to ICF's uncertainty analysis, the program may actually install somewhere between 5,823 and 7,285 units, inclusive.

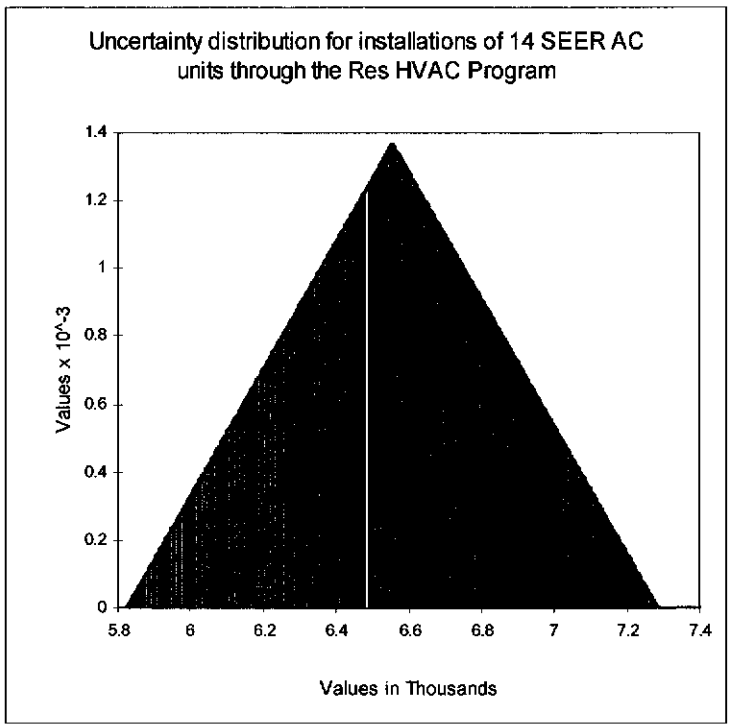
The factor weights for baseline participation source, applicability of the baseline source and the hardwired participation rate were established based on ICF's professional judgment. These weights did not vary across measures in the portfolio. The weight on the program's ability to install measures is based on the program's projected contribution to overall portfolio energy savings over three years (these weights, by program, are the same weights shown below in Table 9--"Evaluation Confidence Weight"). In the case of the Residential HVAC Program, this weight is low because the program is projected to contribute a small percentage to overall portfolio savings.

Factor weights varied between 0 and 5 in the analysis.

Distribution shapes

ICF used triangular probability distributions for the uncertainties in the risk analysis. The main reason ICF used this distribution shape is that data was not available to support the used of fitted uncertainty distributions, nor did ICF have any evidence that the uncertainties were normally distributed. Triangular distributions are set in @RISK using minimum (lower bound), most likely and maximum (upper bound) values. The probability distribution for 14 SEER ACs installed through the New Residential HVAC program in detached single family homes is illustrated in the picture below. The x-axis shows the range of total number of possible installations, where 6,555 is the most likely number of installations, 5,056 is the lower bound and 7,285 is the upper bound. The y-axis is the relative probability that each value on the x-axis will occur.

Figure 1: Example uncertainty distribution



E.3 Uncertainty documentation

Below, ICF documents the uncertainty factor confidence levels and weights used in calculating weighted uncertainties prior to the final Monte Carlo simulation. As stated in Appendix A, the ICF team went through three rounds of quantifying confidence levels and setting uncertainty distributions.

Unit energy savings

The factors considered in calculating unit energy savings uncertainty were the source of the savings estimate and measure weather sensitivity.

ICF's confidence in the sources of unit energy savings used in the EEPM are shown in the table below.

Table 4: Unit energy savings source confidence levels

Unit Energy Savings Source	Upper Bound Confidence	Lower Bound Confidence
Database of Energy Efficiency Resources (DEER)	0.9	0.9
Information provided by Ameren IL team	0.75	0.75
Data and assumptions from ICF	0.75	0.75
ICF's Energy Efficiency Potential Model	0.75	0.75
Environmental Protection Agency and ICF work together on ESTAR Advanced Lighting Package program	0.75	0.75
Fisher Nickel and Food Technology Service Center	0.9	0.9

Department of Commerce and Economic Opportunity of the State of Illinois	0.75	0.75
American Consortium for an Energy Efficiency Economy; white papers	0.75	0.75
Arkansas Dept. of Economic Development, Little Rock, AR LED traffic light case study	0.75	0.75
DEER & Pacific Gas & Electric data on energy efficiency motor operation	.9	.9
MEEA Illinois Residential Market Analysis, Final Report. May 12, 2003	0.75	0.75

If a measure was not weather sensitive, ICF was confident it would not contribute to energy savings uncertainty, and gave a confidence level of one to this savings uncertainty factor. Weather sensitive measures were given confidence levels of 0.75 to their energy savings estimates.

The table below shows how ICF calculated weighted energy savings uncertainty for 14 SEER ACs (continuing with the above example).

Table 5: Example calculation of weighted unit energy savings uncertainty

Uncertainty Factor	Lower Bound Confidence	Upper Bound Confidence	Factor Weight
Energy savings source (Data and assumptions from ICF)	0.75	0.75	5
Weather sensitivity (weather sensitive)	0.75	0.75	3
Weighted Confidence	**0.75**	**0.75**	
Weighted Uncertainty	**0.25**	**0.25**	

ICF's DOE-2 modelers estimated that the annual energy savings for this measure is 300 kWh. According to ICF's uncertainty analysis, the actual annual kWh savings may be between 225 and 375 kWh, inclusive. The factor weights shown in the table above do not vary for weather sensitive measures across the portfolio. Non-weather sensitive measures were given a weather sensitivity factor weight of one.

Projected measure Installations

The factors used in analyzing projected measure installation counts included the program's ability to get measures directly installed, the program's participation rate, the source of the baseline measure usage rate and the applicability of the baseline usage rate to the Company's portfolio.

The table below documents ICF's confidence in each program's ability to get measures directly installed, and in the hard-wired participation rates used in the EEPM.

Table 6: Projected installations uncertainty factor confidence levels, part 1

PROGRAM TYPE	Program ability to install confidence (Lower Bound)	Program ability to install confidence (Upper Bound)	Hardwired participation rate confidence (Lower Bound)	Hardwired participation rate confidence (Upper Bound)
C&I Custom	0.9	0.9	0.75	0.9
C&I Prescriptive	0.75	0.75	0.75	0.9
C&I Retro-commissioning	0.75	0.75	0.75	0.9
Commercial Demand Credit	0.75	0.75	0.75	0.9
Commercial New Construction	0.75	0.75	0.9	0.9
DCEO Building Industry Training & Education	0.75	0.75	0.75	0.9
DCEO Lights for Learning	0.5	0.5	0.75	0.9
DCEO Low Income Direct Install	0.75	0.75	0.75	0.9
DCEO Low Income EE Moderate Rehab (MF)	0.75	0.75	0.75	0.9
DCEO Low Income New Const. Gut Rehab	0.75	0.75	0.75	0.9
DCEO Manufacturing Energy Efficiency Program	0.75	0.75	0.75	0.9
DCEO Public Retrocommissioning	0.75	0.75	0.75	0.9
DCEO Public Sector Customized Program	0.75	0.75	0.75	0.9
DCEO Public Sector New Construction	0.75	0.75	0.75	0.9
DCEO Public Sector Prescriptive	0.9	0.9	0.75	0.9
DCEO Single Family Rehab	0.9	0.9	0.75	0.9
DCEO Smart Energy Design Assistance Program	0.75	0.75	0.75	0.9
ENERGY STAR Homes Program	0.75	0.75	0.75	0.9
Home Energy Performance	0.75	0.75	0.75	0.9
Residential Appliance Recycling	0.75	0.75	0.9	0.9
Residential DR - Direct Load Control	0.75	0.75	0.9	0.9
Residential HVAC Diagnostics & Tune-Up	0.9	0.9	0.9	0.9
Residential Lighting & Appliances	0.75	0.75	0.9	0.9
Residential Low Income	0.5	0.5	0.75	0.9
Residential Multifamily	0.75	0.75	0.75	0.9
Residential New HVAC	0.75	0.75	0.9	0.9
Street Lighting	0.75	0.75	0.75	0.9

The table below document's ICF's confidence in the sources it used for baseline measure usage rates, and the applicability of those sources to Ameren IL's portfolio.

Table 7: Program installations uncertainty factor confidence levels, part 2

Sector	Baseline Measure Usage Source	Baseline Source Confidence (Lower Bound)	Baseline Source Confidence (Lower Bound)	Baseline Source Applicability (Lower Bound)	Baseline Source Applicability (Upper Bound)
DCEO	DCEO	0.75	0.75	0.9	0.75
Non-Residential	KEMA, Inc., "Colorado DSM Market Potential Assessment," 2006	0.75	0.75	0.75	0.75
Residential	MEEA, "Ilinois Residential Market Analysis," 2003	0.9	0.9	0.9	0.9

An example of how weighted installation uncertainties were calculated is shown above in Table 3.

Net-to-gross ratios

Three factors were considered in the analysis of net-to-gross ratio (NTGR) uncertainty: the source of the NTGR estimate, the applicability of the NTGR to the Company's program and the uncertainty around an evaluator's ability to conduct robust impact studies.

Continuing with the Residential New HVAC Program example above, the table below demonstrates how ICF calculated NTGR uncertainty for measures in this program.

Table 8: Example of weighted NTGR uncertainty calculation

Uncertainty Factor	Lower Bound Confidence	Upper Bound Confidence	Factor Weight
NTGR source confidence	0.75	0.9	5
Applicability of source to Ameren IL program confidence	0.75	0.75	3
Evaluator's ability to conduct robust impact studies	0.75	0.75	1
Weighted Confidence	**0.73**	**0.88**	
Weighted Uncertainty	**0.27**	**0.12**	

The source of the NTGR used in the EEPM for the Residential New HVAC program was the California Energy Efficiency Policy Manual, which recommends a NTGR of 0.8 for all proposed programs. According to ICF's uncertainty analysis, the actual NTG for the program could range between 0.58 and 0.9, inclusive, though 0.8 was set as the most likely value in the uncertainty distribution.

Factor weights for NTGR source confidence and applicability of source to Ameren IL's program confidence were set based on ICF's professional judgment. The evaluator's ability to conduct robust impact studies on a program was weighted proportional to each program's contribution to portfolio energy savings. The Residential HVAC Program is small, therefore it was ascribed a small weight for this factor (there is further discussion of this issue in Appendix A).

The table below[1] documents ICF's confidence in NTGR sources, the applicability of the NTGR sources used in Ameren IL's portfolio, and ability of an evaluator to conduct robust impact estimates on the program. It also shows the weights used for the evaluation confidence in the calculation of the final weighted uncertainty for program NTGRs.

Table 9: NTGR uncertainty factor confidence levels

[1] Note, for the final portfolio the NTGRs for the Commercial Demand Credit, Home Energy Performance, Residential DR and Residential Multifamily program elements were changed to 0.8 based on the California Energy Efficiency Policy Manual.

Program	NTGR Source	Source Confidence (Lower Bound)	Source Confidence (Upper Bound)	Applicability of Source Confidence (Lower Bound)	Applicability of Source Confidence (Upper Bound)	Evaluation Confidence (Lower Bound)	Evaluation Confidence (Upper Bound)	Evaluation Confidence Weight
C&I Custom	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	2
C&I Prescriptive	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	5
C&I Retro-commissioning	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
Commercial Demand Credit	ICF	0.9	1	0.9	0.9	0.75	0.75	1
Commercial New Construction	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Building Industry Training & Education	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	0
DCEO Lights for Learning	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Low Income Direct Install	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Low Income EE Moderate Rehab (MF)	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Low Income New Const. Gut Rehab	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Manufacturing Energy Efficiency Program	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	0
DCEO Public Retrocommissioning	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Public Sector Customized Program	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Public Sector New Construction	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Public Sector Prescriptive	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	3
DCEO Single Family Rehab	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1
DCEO Smart Energy Design Assistance Program	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	0
ENERGY STAR Homes Program	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.9	1	0.9	0.9	0.75	0.75	0
Home Energy Performance	ICF	0.75	0.9	0.75	0.75	0.75	0.75	1
Residential Appliance Recycling	"2004-05 Database for Energy Efficient Resources (DEER)". Version 2.01 October 26, 2005	0.75	0.9	0.75	0.75	0.75	0.75	2
Residential DR - Direct Load Control	ICF	0.9	1	0.9	0.9	0.75	0.75	1
Residential HVAC Diagnostics & Tune-Up	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.9	1	0.9	0.9	0.75	0.75	1
Residential Lighting & Appliances	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	3
Residential Low Income	ICF	0.75	0.9	0.75	0.75	0.75	0.75	0
Residential Multifamily	ICF	0.9	1	0.9	0.9	0.75	0.75	1
Residential New HVAC	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.9	1	0.9	0.9	0.75	0.75	1
Street Lighting	"Energy Efficiency Policy Manual v2", Prepared by the California Public Utilities Commission, Energy Division, August, 2003	0.75	0.9	0.75	0.75	0.75	0.75	1

Residential CFL NTGRs

Recent evaluation results were used in place of ICF's uncertainty estimates of NTGRs for residential CFLs. This is because sensitivity analyses performed on the results the first Monte Carlo simulations revealed that portfolio energy savings is highly sensitive to CFL NTGRs. As documented in the table below, the evaluated NTGRs were used as the lower bound estimates; upper bound estimates were set based on ICF's professional judgment. 0.8 was used as the most likely NTGR value in the uncertainty distributions for these measures.

Table 10: Residential CFL NTGRs used in the uncertainty analysis

Sector	Measures	NTG Lower Bound	NTG Upper Bound	Source (Lower Bound)
Residential	Low wattage CFLs (<30 watts)	0.62	0.85	"2004/2005 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation Final Report," Itron, 2007.
Residential	Specialty CFLs (>=30 watts), torchieres, etc.	0.72	0.85	"2004/2005 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation Final Report," Itron, 2007.
Residential	CF fixtures	0.36	0.8	"2004/2005 Statewide Residential Retrofit Single-Family Energy Efficiency Rebate Evaluation Final Report," Itron, 2007.
Residential	Multifamily CFLs	0.78	0.85	"Evaluation of the 2004-2005 Statewide Multifamily Rebate Program," KEMA, 2007.

Engineering Verification Factors

As stated above, the engineering verification factor was not a key uncertainty in the risk analysis. Therefore, ICF did not use the same weighting process to create uncertainty distributions around engineering verification factors for programs. Instead, ICF exercised professional judgment based on its experience with energy efficiency programs to estimate uncertainty distributions for program engineering verification factors. Triangular probability distributions were used for setting these uncertainties. For each program, the lower bound of the distribution was set at 0.95 and the most likely and upper bound values were both set at 1.

Table 11: Program Engineering Verification Factor confidence levels

Program	Engineering Verification Factor	
	Lower Bound	Upper Bound
C&I Custom	0.95	1
C&I Prescriptive	0.95	1
C&I Retro-commissioning	0.95	1
Commercial Demand Credit	0.95	1
Commercial New Construction	0.95	1
DCEO Building Industry Training & Education	0.95	1
DCEO Lights for Learning	0.95	1
DCEO Low Income Direct Install	0.95	1
DCEO Low Income EE Moderate Rehab (MF)	0.95	1
DCEO Low Income New Const. Gut Rehab	0.95	1
DCEO Manufacturing Energy Efficiency Program	0.95	1
DCEO Public Retrocommissioning	0.95	1
DCEO Public Sector Customized Program	0.95	1
DCEO Public Sector New Construction	0.95	1
DCEO Public Sector Prescriptive	0.95	1
DCEO Single Family Rehab	0.95	1
DCEO Smart Energy Design Assistance Program	0.95	1
ENERGY STAR Homes Program	0.95	1
Home Energy Performance	0.95	1
Residential Appliance Recycling	0.95	1
Residential DR - Direct Load Control	0.95	1
Residential HVAC Diagnostics & Tune-Up	0.95	1
Residential Lighting & Appliances	0.95	1
Residential Low Income	0.95	1
Residential Multifamily	0.95	1
Residential New HVAC	0.95	1
Street Lighting	0.95	1