Inputs and Assumptions for Calculating Total Resource Cost

March 28, 2008

As set out in the Board's Guidelines for Electricity Distributor Conservation and Demand Management (the "Guidelines"), conservation and demand management ("CDM") initiatives should be evaluated on the basis of a cost effectiveness test known as the Total Resource Cost (TRC) test. The TRC test assesses CDM costs and benefits from a societal perspective. The benefits in the TRC test are driven by the annual energy (kWh/yr) and demand (kW) savings. Energy and demand savings are often calculated at the technology level and are commonly referred to as "prescriptive" savings estimates. For programs that rely on prescriptive savings estimates, savings are calculated by multiplying the per unit (i.e. single technology) savings with the number of units installed.

Attachment 1 provides a number of energy efficient equipment types and their estimated equipment lives, along with the energy, load savings and cost estimates for use by distributors when undertaking benefit-cost analyses of CDM measures and programs. All data is provided on a per unit basis and includes electricity savings, cost, equipment life and free rider estimates. In addition, all of the information is provided in comparison to a reference case and classified by the decision or installation type – new, retrofit, or replacement.

The inputs and assumptions data were developed using secondary research, augmented by expert input as required. All data points were cross-referenced with a minimum of two sources. Where possible, recent Canadian experience and data was used. All savings data were based on an understanding of average electricity loads in typical applications in each sector. Cost data were collected from a variety of sources including retailers and distributors. Free rider values are also provided for all measures.

Free Rider Rates

The free rider rate for custom projects, as defined in section 7.2.3 of the Board's Guidelines for Electricity Conservation and Demand Management, is 30%.

Persistence

As set out in section 3.4.3 of the Guidelines, persistence is a measure of how long a CDM measure is kept in place by the customer. There is a compelling argument for accounting for persistence in the assessment of CDM cost effectiveness, especially for measures which are easily replaced such as compact fluorescent light bulbs. However, at this time, distributors should assume 100% persistence in assessing CDM cost effectiveness unless otherwise updated by the Board. While persistence is not likely 100%, for practicality, it is necessary to make some simplifying assumptions.

Attachment 1:

Table of Inputs and Assumptions for Calculating Total Resource Cost

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Table of Inputs and Assumptions for Calculating Total Resource Cost

Number	Efficient Equipment & Technologies	Base Equipment & Technologies	Load Type (Base, Weather Winter, Weather Summer, Load shifting)	Decision Type	Annual Operating Time, hrs/yr	Base Annual Energy Usage (kWh/yr)	Energy Efficient Technology Annual Energy Usage (kWh/yr)	Annual Energy Savings with Upgrade (kWh/yr)	Demand Reduction: Winter On Peak (kW)	Demand Reduction: Summer On Peak (kW)	Annual Water Savings Litres/yr	Alternative Fuel Increase m3/yr	EE Technology Life	Incremental Equipment Cost, $	Lifespan Hours	Free Ridership	Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
	Refrigerators																							
1	Recycling Program	Average existing stock	Base	Removal	-	1,200	0	1,200	0.288	0.272	-	-	6	$100.00	-	10%	82	94	221	72	107	222	179	222
2	Energy Star Refrigerators	Current standard for refridgerator	Base	New/Repl	-	514	440	74	0.018	0.017	-	-	19	$70.00	-	10%	5	6	14	4	7	14	11	14
	Freezers																							
3	Recycling Program	Average existing stock	Base	Removal	-	900	0	900	0.216	0.204	-	-	6	$100.00	-	10%	62	71	166	54	80	167	134	167
4	Energy Star Freezer	Current standard for freezer	Base	New/Repl	-	368	331	37	0.009	0.008	-	-	21	$200.00	-	10%	3	3	7	2	3	7	5	7
	Clothes Dryers																							
5	High Efficiency Clothes Dryer	Current standard for clothes dryer	Base	New/Repl	-	916	824	92	0.005	0.004	-	-	18	$100.00	-	10%	6	7	17	5	8	17	14	17
6	Fuel Switching - Gas Clothes Dryer	Average existing stock	Base	New/Repl	-	916	0	916	0.047	0.040	-	112.00	18	$0.00	-	10%	63	72	169	55	82	170	136	170
	Range/Ovens and EE Cooking and Food Preparation																							
7	High Efficiency Range/Oven	Current standard range/oven	Base	New/Repl	-	550	495	55	0.001	0.000	-	-	18	$60.00	-	10%	4	4	10	3	5	10	8	10
8	Fuel Switching - Gas Range	Average existing stock	Base	New/Repl	-	735	0	735	0.017	0.000	-	81.00	18	$400.00	-	10%	51	58	135	44	66	136	109	136
9	Microwave Oven as Alternative Food Preparation	Average existing stock	Base	New/Repl	-	735	625	110	0.003	0.000	-	-	5	$120.00	-	10%	8	9	20	7	10	20	16	20
10	Toaster Oven as Alternative Food Preparation	Average existing stock	Base	New/Repl	-	735	625	110	0.003	0.000	-	-	5	$140.00	-	10%	8	9	20	7	10	20	16	20
	Dishwashers																							
11	Energy Star Dishwasher	Current standard dishwasher	Base	New/Repl	-	592	492	100	0.002	0.000	-	-	13	$100.00	-	10%	7	8	18	6	9	19	15	19
	Clothes Washers																							
12	Energy Star Front Loading Clothes Washer	Current standard for clothes washer	Base	New/Repl	-	779	299	480	0.019	0.016	20000	-	14	$200.00	-	10%	33	38	88	29	43	89	72	89
13	Energy Star Top Loading Clothes Washers	Current standard for clothes washer	Base	New/Repl	-	779	701	78	0.003	0.003	-	-	14	$100.00	-	10%	5	6	14	5	7	14	12	14
14	Cold Water Washing (Detergent)	Average existing stock	Base	New/Repl	-	779	156	623	0.024	0.021	-	-	1	$10.00	-	25%	43	49	115	37	56	115	93	115
	Indoor Lighting																							
15	CFL Screw-In 11W	40W Incandescent	Lightng	Ret./Repl.	2,320	93	26	67	0.015	0.000	-	-	3	$2.25	8,000	10%	10	5	13	0	8	9	11	11
16	CFL Screw-In 15W	60W Incandescent	Lightng	Ret./Repl.	2,320	139	35	104	0.023	0.000	-	-	4	$2.00	10,000	10%	15	8	20	0	12	14	17	18
17	CFL Screw-In 20W	75W Incandescent	Lightng	Ret./Repl.	2,320	174	46	128	0.028	0.000	-	-	4	$3.50	10,000	10%	19	9	25	0	14	17	21	22
18	CFL Screw-In 25W	100W Incandescent	Lightng	Ret./Repl.	2,320	232	58	174	0.038	0.000	-	-	4	$4.00	10,000	10%	26	13	34	0	20	23	29	29
19	CFL Screw-In 27W	100W Incandescent	Lightng	Ret./Repl.	2,320	232	63	169	0.037	0.000	-	-	3	$5.00	8,000	10%	25	13	33	0	19	23	28	29
	Outdoor Lighting																							
20	Flood Light, 26W Fluorescent	Flood Light, 100W Incandescent PAR	Base	Ret./Repl.	1,825	183	58	124	0.013	0.000	-	-	5	$6.00	10,000	5%	3	16	23	0	11	30	18	23
21	Metal Halide Fixture 39W CMH PAR	Flood Light, 150W Incandescent PAR	Base	Ret./Repl.	1,825	274	100	173	0.017	0.000	-	-	5	$100.00	10,000	5%	4	22	32	0	15	42	26	32
22	LED Christmas Lights (indoor or outdoor)	5 WATT Christmas lights C-7(25 lights)	Base Winter	Ret./Repl.	155	19	1	19	0.008	0.000	-	-	30	$2.00	200,000	5%	6	4	9	0	0	0	0	0
23	LED Christmas Lights (indoor or outdoor)	Incandescent Mini Lights	Base Winter	Ret./Repl.	155	8	1	7	0.003	0.000	-	-	30	$2.00	200,000	5%	2	1	4	0	0	0	0	0
	Lighting Controls																							
22	Timer - Outdoor Light	2 Flood Lights, 75W Incandescent, on 50% time	Base	New	4,380	876	584	292	0.189	0.000	-	-	20	$20.00	-	10%	43	22	57	0	33	39	49	49
23	Dimmer Switch	2 100 Watt incandescent bulbs	Base	New	-	464	325	139	0.090	0.000	-	-	10	$5.00	-	10%	21	10	27	0	16	19	23	24
24	Motion Detector	3 100 Watt incandescent bulbs	Base	New	-	696	487	209	0.135	0.000	-	-	10	$25.00	-	10%	31	15	41	0	23	28	35	35
	Water Heating - Average Residential Home																							
25	Efficient Showerhead	Average existing stock	Base	Ret./Repl.	-	5,000	4,455	545	0.096	0.039	26,800	-	12	$7.00	-	10%	37	43	100	33	49	101	81	101
26	Faucet Aerator	Average existing stock	Base	Ret./Repl.	-	5,000	4,966	34	0.006	0.002	3,269	-	12	$5.00	-	10%	2	3	6	2	3	6	5	6
27	Faucet Washers	Average existing stock	Base	Ret./Repl.	-	5,000	4,980	20	0.004	0.001	-	-	6	$0.28	-	10%	1	2	4	1	2	4	3	4
28	Tank Wrap	Average existing stock	Base	Ret./Repl.	-	5,000	4,730	270	0.047	0.019	-	-	6	$25.00	-	5%	19	21	50	16	24	50	40	50
30	Pipe Insulation (6-10')	Average existing stock	Base	Ret./Repl.	-	5,000	4,924	76	0.013	0.005	-	-	6	$0.50	-	10%	5	6	14	5	7	14	11	14

Assumption and Measures List: Residential

Number	Efficient Equipment & Technologies	Base Equipment & Technologies	Load Type (Base, Weather Winter, Weather Summer, Load shifting)	Decision Type	Annual Operating Time, hrs/yr	Base Annual Energy Usage (kWh/yr)	Energy Efficient Technology Annual Energy Usage (kWh/yr)	Annual Energy Savings with Upgrade (kWh/yr)	Demand Reduction		Annual Water Savings Litres/yr	Alternative Fuel Increase m3/yr	EE Technology Life	Incremental Equipment Cost, $	Lifespan Hours	Free Ridership	Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
									Winter On Peak (kW)	Summer On Peak (kW)														
	Water Heater Load Shifting																							
31	Utility Controlled Relay	Average existing stock	Load Shifting	Retrofit	-	5,000	5,000	0	2.892	0.777	-	-	12	$50.00	-	0%	1134	-1134	0	648	-427	-220	0	0
32	Water Heater Clock Thermostat	Average existing stock	Load Shifting	Retrofit	-	5,000	5,000	0	2.892	0.777	-	-	12	$150.00	-	0%	1134	-1134	0	648	-427	-220	0	0
	Alternative Water Heating																							
33	Tankless Instantaneous Electric Water Heater	Current standard electrical water heater	Base	New/Retro	-	5,000	4,250	750	0.131	0.054	-	-	18	$600.00	-	0%	52	59	138	45	67	139	112	139
34	Solar Assisted Water Heater	Current standard electrical water heater	Base	New	-	5,000	3,020	1,980	0.347	0.142	-	-	18	$2,000.00	-	0%	136	156	365	118	177	367	295	367
35	Fuel Switching - Gas Water Heater	Current standard electrical water heater	Base	New	-	5,000	0	5,000	0.876	0.357	-	680.00	18	$600.00	-	0%	344	393	921	298	447	926	745	926
	Thermal Envelope Improvements - Existing Homes, Single Family Detached																							
36	Caulking Products	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,741	362	0.290	0.000	-	-	25	$100.00	-	10%	50	57	134	0	0	0	54	67
37	Weatherstripping	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,560	543	0.435	0.000	-	-	25	$30.00	-	10%	75	86	201	0	0	0	81	101
38	Air Vapour Barrier Upgrade	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	16,836	1,267	1.015	0.000	-	-	25	$405	-	10%	175	200	468	0	0	0	189	235
39	Attic Insulation (R-11 to R-38)	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	15,388	2,715	2.176	0.000	-	-	25	$2,253	-	10%	374	428	1003	0	0	0	406	504
40	Duct Insulation and Sealing	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	15,388	2,715	2.176	0.000	-	-	25	$540	-	10%	374	428	1003	0	0	0	406	504
41	Wall Insulation	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,560	543	0.435	0.000	-	-	25	$2,004	-	10%	75	86	201	0	0	0	81	101
42	Ceiling/Floor Insulation	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,560	543	0.435	0.000	-	-	25	$2,253	-	10%	75	86	201	0	0	0	81	101
43	Basement Insulation	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,560	543	0.435	0.000	-	-	25	$1,379	-	10%	75	86	201	0	0	0	81	101
44	Door Upgrade	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,560	543	0.435	0.000	-	-	25	$335	-	10%	75	86	201	0	0	0	81	101
45	Window Upgrade	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	17,560	543	0.435	0.000	-	-	25	$3,520	-	10%	75	86	201	0	0	0	81	101
	Thermal Envelope Improvements - New Homes, Single Family Detached																							
46	R-2000+ Lrg 2 story new house	Current Ontario Building Code	Weather/Winter	New	-	23,647	9,223	14,424	11.558	0.000	-	-	25	$12,800	-	5%	1988	2272	5330	0	0	0	2155	2680
47	R-2000+ Sm 2 story new house	Current Ontario Building Code	Weather/Winter	New	-	19,229	7,076	12,153	9.738	0.000	-	-	25	$9,701	-	5%	1675	1914	4491	0	0	0	1815	2258
48	R-2000+ Interior Row new house	Current Ontario Building Code	Weather/Winter	New	-	9,462	3,482	5,980	4.792	0.000	-	-	25	$5,802	-	5%	824	942	2210	0	0	0	893	1111
49	R-2000+ Exterior Row new house	Current Ontario Building Code	Weather/Winter	New	-	12,630	4,648	7,982	6.396	0.000	-	-	25	$7,057	-	5%	1100	1257	2949	0	0	0	1192	1483
	Space Cooling																							
50	Energy Star Room Air Conditioner	Current standard for room air conditioner	Weater/Summer	Ret./Repl.	-	880	792	88	0.000	0.090	-	-	12	$36.00	-	10%	0	0	0	16	24	49	0	0
51	Utility Controlled Relay	Average existing stock	Weater/Summer	Ret./Repl.	-	1,964		0	0.000	0.500	-	-	18	$150.00	-	0%	0	0	0	255	-170	-85	0	0
52	Contractor service (charge/air flow fix)	Average existing stock	Weater/Summer	Ret./Repl.	-	1,964	1,595	369	0.000	0.378	-	-	8	$420.00	-	0%	0	0	0	66	99	205	0	0
53	Contractor service (Duct Sealing)	Average existing stock	Weater/Summer	Ret./Repl.	-	1,964	1,747	217	0.000	0.222	-	-	15	$540.00	-	0%	0	0	0	39	58	120	0	0
54	Energy Star Central Air Conditioner	Current standard for central air conditioner	Weater/Summer	Ret./Repl.	-	1,403	1,052	351	0.000	0.359	-	-	14	$480.00	-	10%	0	0	0	63	94	194	0	0
55	Programmable Thermostat	Average existing stock	Weater/Summer	Ret./Repl.	-	1,964	1,805	159	0.000	0.163	-	-	18	$60.00	-	10%	0	0	0	28	43	88	0	0
	Space Heating Measures- Existing Homes, Single Family Detached																							
56	Programmable Thermostat	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	16,637	1,466	1.175	0.000	-	-	18	$60.00	-	10%	202	231	542	0	0	0	219	272
57	Energy Star Air Source Heat Pump	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	13,577	4,526	3.626	0.000	-	-	18	$5,760.00	-	0%	624	713	1672	0	0	0	676	841
58	Electric Storage Furnace	Average existing stock	Weather/Winter	Ret./Repl.	-	18,103	16,293	1,810	1.451	0.000	-	-	18	$3,000.00	-	0%	249	285	669	0	0	0	270	336
	Apartments/Condos - Various end uses																							
59	Programmable Thermostat (space heating and cooling)	Average existing stock	Weather/Winter	Ret/Repl.	-	3,000	2,757	243	0.097	0.083	-	-	18	$60.00	-	10%	17	19	45	14	22	45	36	45
60	Individul Metering	Average existing stock	Weather/Winter	Ret/Repl.	-	6,000	5,400	600	0.240	0.205	-	-	20	$400.00	-	0%	41	47	111	36	54	111	89	111
	Miscellaneous																							
61	Clothes Line Kit	Average existing stock	Base	New	-	916	687	229	0.000	0.023	-	-	10	$65.00	-	10%	0	0	0	41	61	127	0	0

Assumptions and Measures List: Commercial

Number	Efficient Equipment & Technologies	Base Equipment & Technologies	Decision Type	Annual Operating Time (hrs/yr)	Base Annual Energy (kWh/yr)	Efficient Energy Use (kWh/yr)	Annual Energy Savings with Upgrade (kWh/yr)	Demand Reduction: Winter On Peak (kW)	Demand Reduction: Summer On Peak (kW)	EE Technology Life (yrs)	Incremental Equipment Cost	Lifespan (hrs)	Free Ridership	Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
	Interior Lighting - Fluorescent																				
1	2 - T8 32W (58 W) reflectorized w/EL ballast	4 - T12 34W (156W) 4' Lamps w/2 magnetic ballasts	Ret./Repl.	4000	624	232	392	0.088	0.084	5	$53	20000	10%	45	49	36	42	53	36	95	36
2	4 - T8 32W (112W) 4' Lamps w/EL ballast	2 - T12 75W (184W) 8' HO Lamps w/1 magnetic ballast	Ret./Repl.	4000	736	448	288	0.065	0.062	5	$65	20000	10%	33	36	27	31	39	27	70	27
3	1- T8 32W (38W) w/EL HBF ballast	2 - T12 34W (78W) 4' lamps pendant mount, 1 EM ballast	Ret./Repl.	4000	312	152	160	0.036	0.034	5	$36	20000	10%	18	20	15	17	22	15	39	15
	Interior Lighting - Compact Fluorescent																				
4	11W Screw-In CFL	40W Incandescent	Ret./Repl.	4000	160	50	110	0.025	0.023	2	$5	8000	10%	13	14	11	12	16	11	28	11
5	15W Screw-In CFL	60W Incandescent	Ret./Repl.	4000	240	68	172	0.038	0.037	2	$4	8000	10%	21	22	17	19	24	17	43	17
6	13W CFL fixture w/EM ballast	60W Incandescent	Ret./Repl.	4000	240	74	166	0.041	0.039	2.5	$7	10000	10%	20	22	16	19	24	16	43	16
7	18W CFL fixture w/EM ballast	75W Incandescent	Ret./Repl.	4000	300	83	217	0.049	0.046	2.5	$8	10000	10%	23	25	18	21	27	19	48	19
8	26W CFL fixture w/EM ballast	100W Incandescent	Ret./Repl.	4000	400	120	280	0.063	0.060	2.5	$10	10000	10%	33	36	27	31	39	27	70	27
9	2 - 26W CFL fixture w/EM ballast	150W Incandescent	Ret./Repl.	4000	600	218	382	0.084	0.080	2.5	$75	10000	10%	46	50	37	42	54	37	97	37
	Interior Lighting - Exit Sign																				
10	3W LED EXIT sign	2 - 15W (30W) Incandescent EXIT Sign	Ret./Repl.	8760	263	26	237	0.027	0.026	25	$95	220000	10%	27	29	22	25	32	22	57	22
	Interior Lighting - Metal Halide																				
11	100W Metal Halide fixture	4 - T12 34W (156W) 4' lamps, 2 EM ballasts	Ret./Repl.	4000	624	516	108	0.056	0.053	3	$175	12500	10%	12	13	10	11	15	10	26	10
	Interior Lighting - Warehouse & Workshop[																				
12	250W Metal Halide Lamp, PS	400W Mercury Vapor	Ret./Repl.	4000	1816	1168	648	0.135	0.128	4	$245	15,000	10%	74	81	60	69	88	60	157	60
13	175W Metal Halide Lamp, PS	250W Mercury Vapor	Ret./Repl.	4000	1140	832	308	0.068	0.064	4	$245	15,000	10%	35	38	28	33	42	29	74	29
14	200W High Pressure Sodium	400W Mercury Vapor	Ret./Repl.	4000	1816	960	856	0.180	0.171	6	$245	24,000	10%	98	107	79	91	116	79	207	79
15	6 - T5 HO Lamps in new High Bay fixture (372W)	400W Metal Halide PS High Bay	Ret./Repl.	4000	1816	1488	328	0.025	0.024	5	$436	20,000	10%	38	41	30	35	45	30	79	30
	Occupancy & Timing Control																				
16	Timer Control - Outdoor light (300 W controlled)	On/Off Switch Control - Outdoor light	New/Retro.		1500	1200	300	0.030	0.013	10	$275		10%	34	37	28	32	41	28	72	28
17	Occupancy Sensor Control (private office - 1200 W controlled)	On/Off Switch Control	New/Retro.		5400	3780	1620	0.518	0.437	10	$550		10%	186	202	149	172	220	150	391	150
18	Daylight Sensing Control (general office - 3000 W controlled)	On/Off Switch Control	New/Retro.		13500	9450	4050	1.355	1.595	10	$1,800		10%	465	505	373	429	550	375	979	375
	Water Heater - Heat Loss Reduction																				
19	Upgrade tank insulation	Water Heater (119 USG) Tank Insulation Blanket R-24.9	New/Retro.		770	366	404	0.323	0.277	10	$400		10%	46	50	37	43	55	37	98	37
20	Install pipe insulation - 6 - 10 ft.	Pipe Insulation (10 ft each on inlet & outlet of tank)	New/Retro.		40000	39400	600	0.479	0.411	10	$2		10%	69	75	55	64	81	56	145	56
	Cooking																				
21	EE Fryer	Deep Fryer - fast food restaurant	Ret./Repl.	per fryer	13424	12082	1342	0.194	0.167	15	$7,000		10%	154	167	124	142	182	124	324	124
	Reduced Infiltration																				
22	Air Sealing (non-profit housing)	Caulking	Ret./Repl.	per hsng unit	6600	6270	330	0.171	0.000	25	$700		10%	38	41	30	35	45	31	80	31
	Occupancy Control (Hotel/Motel)																				
23	Manual switches/controls	Occupancy Sensors	Ret./Repl.	per hotel room	2877	1530	1347	1.08	0.92	15	$850		10%	155	168	124	143	183	125	325	125
	Free Cooling																				
24	No economizer	Outside Air Economizer	Ret./Repl.	5 ton cooling	5000	3750	1250	1.00	0.86	12	$2,500		10%	143	156	115	132	170	116	302	116
25	Base Case (30,000 sq ft, 1 storey office)	Winter Free Cooling (water side economizer)	Ret./Repl.	per building	1913898	1368323	545575	436	374	20	$5,500		10%	62623	67979	50260	57781	74036	50540	131816	50540
	Commercial Refrigeration																				
26	Floating Head Pressure Control	Fixed Head Pressure	Ret./Repl.	per 12 ft case	50000	46000	4000	1.90	1.63	15	$2,345		10%	459	498	368	424	543	371	966	371
27	EE Evaporator Fan Motors	Standard Motors	Ret./Repl.	per 12 ft case	50000	48400	1600	0.76	0.65	10	$1,675		10%	184	199	147	169	217	148	387	148
28	Humidistat Anti-sweat heater Control	Continuous operation	Ret./Repl.	per 12 ft case	50000	47500	2500	1.19	1.02	15	$1,250		10%	287	312	230	265	339	232	604	232
	EE Electric Heating/Cooling																				
26	Elec. Res. Heating, DX cooling	Air-to-air heat pumps (5 ton capacity	Ret./Repl.	5 ton unit	46250	32375	13875	4.16	0.00	15	$7,000		10%	1593	1729	1278	1469	1883	1285	3352	1285
27	Elec. Res. Heating, DX cooling	Ground Source Heat Pumps (5 ton capacity)	Ret./Repl.	6 ton unit	46250	25438	20813	16.63	14.26	20	$14,000		10%	2389	2593	1917	2204	2824	1928	5028	1928
	Dishwasher Retrofit																				
28	Low temperature - Hopsital (chemical dishwasher rinse)	High Temperature Dishwasher	Ret./Repl.	per dishwasher	16320	3264	13056	1.96	1.68	10	$0		10%	1499	1627	1203	1383	1772	1209	3154	1209
29	Low Temperature - Sit-down Restaurant (chemical dishwasher rinse)		Ret./Repl.	per dishwasher	11021	2204	8817	0.92	0.79	10	$0		10%	1012	1099	812	934	1196	817	2130	817
	Clothes Dryer Replacement																				
30	Moisture Sensor Dryer	Clothes Dryer - Hospital	Ret./Repl.	per dryer	42840	37271	5569	1.47	1.26	11	$550		10%	639	694	513	590	756	516	1346	516
31	Moisture Sensor Dryer	Clothes Dryer - Laundromat	Ret./Repl.	per dryer	43643	37969	5674	3.12	2.65	11	$550		10%	651	707	523	601	770	526	1371	526

Assumptions and Measures List: Industrial

Number	Efficient Equipment & Technologies	Base Equipment & Technologies	Decision Type	Annual Operating Time hrs/yr	Base Annual Energy (kWh/yr)	Efficient Energy Use (kWh/yr)	Annual Energy Savings with Upgrade (kWh/yr)	Demand Reduction		EE Technology Life	Incremental Equipment Cost $	Lifespan, hrs	Free Ridership	Energy Savings Winter Peak (kW.h)	Energy Savings Winter Mid (kW.h)	Energy Savings Winter Off Peak (kW.h)	Energy Savings Summer Peak (kW.h)	Energy Savings Summer Mid (kW.h)	Energy Savings Summer Off Peak (kW.h)	Energy Savings Shoulder Mid (kW.h)	Energy Savings Shoulder Off (kW.h)
								Winter On Peak (kW)	Summer On Peak (kW)												
	Interior Lighting - Fluorescent																				
1	2 - T8 32W (58 W) reflectorized w/EL ballast	4 - T12 34W (156W) 4' Lamps w/2 magnetic ballasts	Ret./Repl.	6500	1014	377	637	0.088	0.084	3	$93	20000	10%	73	79	59	67	86	59	154	59
2	4 - T8 32W (112W) 4' Lamps w/EL ballast	2 - T12 75W (184W) 8' HO Lamps w/1 magnetic ballast	Ret./Repl.	6500	1196	728	468	0.065	0.062	3	$99	20000	10%	54	58	43	50	64	43	113	43
3	1- T8 32W (38W) w/EL HBF ballast	2 - T12 34W (78W) 4' lamps pendant mount, 1 EM ballast	Ret./Repl.	6500	507	247	260	0.036	0.034	3	$75	20000	10%	30	32	24	28	35	24	63	24
	Interior Lighting - Warehouse & Plant																				
3	250W Metal Halide Lamp, PS	400W Mercury Vapor	Ret./Repl.	6000	2724	1752	972	0.146	0.139	3	$245	15,000	10%	112	121	90	103	132	90	235	90
4	175W Metal Halide Lamp, PS	250W Mercury Vapor	Ret./Repl.	6000	1710	1248	462	0.069	0.066	3	$245	15,000	10%	53	58	43	49	63	43	112	43
5	200W High Pressure Sodium	400W Mercury Vapor	Ret./Repl.	6000	2724	1440	1284	0.193	0.183	4	$245	24,000	10%	147	160	118	136	174	119	310	119
6	6 - T5 HO Lamps in new High Bay fixture (372W)	400W Metal Halide PS High Bay	Ret./Repl.	6000	2724	2232	492	0.074	0.070	3	$436	20,000	10%	56	61	45	52	67	46	119	46
7	100W Metal Halide fixture	4 - T12 34W (156W) 4' lamps, 2 EM ballasts	Ret./Repl.	4000	936	774	162	0.024	0.023	3	$250	12500	10%	19	20	15	17	22	15	39	15
	Interior Lighting - Exit Sign																				
8	3W LED EXIT sign	2 - 15W (30W) Incandescent EXIT Sign	Ret./Repl.	8760	263	26	237	0.027	0.027	25	$95	220000	10%	27	29	22	25	32	22	57	22
	Compressed Air System (100 hp)																				
9	Dessicant Dryer Control Upgrades	Fixed Interval Dessicant Regeneration	Ret./Repl.	1280	95488	81165	14323	3.65	3.07	15	$8,000		10%	1644	1785	1319	1517	1944	1327	3461	1327
10	Convert to On/Off Controls	Bypass or Inlet Throtle Controls	Ret./Repl.	1280	95488	57293	38195	9.73	8.18	15	$6,500		10%	4384	4759	3519	4045	5183	3538	9228	3538