

Commercial Analysis Appendix Tables

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2	Total Resource Cost Test Benefit/Cost Ratio and Levelized Cost of Saved Energy					
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5	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
6	Exhaust Hood Makeup Air	Office	Space Heating	New construction	12.23	(0.28)
7	Exhaust Hood Makeup Air	Office	Space Heating	Remodel/Replacment	15.64	(0.31)
8	High efficiency ENERGY STAR fryer	Office	Cooking	New construction	1.92	0.44
9	Pre-Rinse Spray Valve	Office	Water Heating	Retrofit	33.27	0.00
10	Refrigeration heat recovery	Office	Water Heating	Retrofit	3.19	0.50
11	Refrigeration heat recovery	Office	Water Heating	New construction	2.55	0.31
12	Refrigeration heat recovery	Office	Water Heating	Remodel/Replacment	3.25	0.23
13	Cooling system chilled water reset	Office	Cooling	Retrofit	1.14	1.42
14	Cooling system chilled water reset	Office	Cooling	Remodel/Replacment	1.14	0.65
15	Cooling system water side economizer	Office	Cooling	Retrofit	1.19	1.05
16	Cooling system water side economizer	Office	Cooling	Remodel/Replacment	1.20	0.48
17	Condensing DHW stand-alone	Office	Water Heating	Retrofit	3.05	0.64
18	Condensing DHW stand-alone	Office	Water Heating	New construction	3.50	0.25
19	Condensing DHW stand-alone	Office	Water Heating	Remodel/Replacment	4.52	0.19
20	Faucet aerator	Office	Water Heating	Retrofit	5.87	(2.97)
21	Indirect-fired DHW off space heating boiler	Office	Water Heating	Retrofit	2.58	0.87
22	Indirect-fired DHW off space heating boiler	Office	Water Heating	New construction	2.60	0.34
23	Indirect-fired DHW off space heating boiler	Office	Water Heating	Remodel/Replacment	3.36	0.26
24	Instantaneous. High-Modulating Water Heater	Office	Water Heating	Retrofit	3.10	0.63
25	Instantaneous. High-Modulating Water Heater	Office	Water Heating	New construction	5.95	0.15
26	Instantaneous. High-Modulating Water Heater	Office	Water Heating	Renovation	5.95	0.15
27	Instantaneous. High-Modulating Water Heater	Office	Water Heating	Remodel/Replacment	7.68	0.11
28	Low-flow shower heads	Office	Water Heating	Retrofit	35.31	(2.29)
29	Low-flow shower heads	Office	Water Heating	New construction	20.20	(0.99)
30	Low-flow shower heads	Office	Water Heating	Remodel/Replacment	26.08	(1.01)
31	Pipe insulation - water heating	Office	Water Heating	Retrofit	23.43	0.08
32	Pipe insulation - water heating	Office	Water Heating	New construction	18.32	0.05
33	Pipe insulation - water heating	Office	Water Heating	Renovation	18.32	0.05
34	Tank insulation	Office	Water Heating	Retrofit	1.73	1.10
35	Tank insulation	Office	Water Heating	New construction	1.35	0.65
36	Tank insulation	Office	Water Heating	Remodel/Replacment	1.75	0.50
37	Air Sealing	Office	Space Heating	Retrofit	13.37	(0.25)
38	Air Sealing	Office	Space Heating	New construction	3.83	0.16
39	Air Sealing	Office	Space Heating	Renovation	3.83	0.16
40	Improved heating system high efficiency unit - Tier 1	Office	Space Heating	Retrofit	3.89	0.77
41	Improved heating system condensing unit - Tier 2	Office	Space Heating	Retrofit	0.83	3.60
42	Programmable Thermostat	Office	Space Heating	Retrofit	8.87	0.28
43	Programmable Thermostat	Office	Space Heating	Renovation	3.55	0.33
44	Programmable Thermostat	Office	Space Heating	Remodel/Replacment	4.59	0.25
45	Demand-Controlled Ventilation (controller, sensor)	Office	Space Heating	Retrofit	6.16	0.34
46	Demand-Controlled Ventilation (controller, sensor)	Office	Space Heating	New construction	1.84	0.63
47	Demand-Controlled Ventilation (controller, sensor)	Office	Space Heating	Remodel/Replacment	2.34	0.49
48	Improved wall insulation	Office	Space Heating	New construction	1.05	1.14
49	Improved wall insulation	Office	Space Heating	Renovation	1.05	1.14
50	Improved below-grade insulation	Office	Space Heating	New construction	2.08	0.57
51	Improved below-grade insulation	Office	Space Heating	Renovation	2.08	0.57
52	Pipe insulation - space heating	Office	Space Heating	Retrofit	55.11	0.05

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1	Upstate Commercial Measures					
2	Total Resource Cost Test Benefit/Cost Ratio and Levelized Cost of Saved Energy					
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5	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
53	Pipe insulation - space heating	Office	Space Heating	New construction	44.00	0.03
54	Pipe insulation - space heating	Office	Space Heating	Renovation	44.00	0.03
55	Commissioning	Office	Total	Renovation	2.40	(0.41)
56	Commissioning	Office	Total	Remodel/Replacment	3.09	(0.67)
57	Retrocommissioning	Office	Total	Retrofit	3.36	(0.33)
58	Steam trap Maintenance	Office	Space Heating	Retrofit	2.36	0.49
59	Oxygen Trim	Office	Space Heating	Retrofit	33.58	0.08
60	Oxygen Trim	Office	Space Heating	New construction	49.79	0.02
61	Oxygen Trim	Office	Space Heating	Remodel/Replacment	45.16	0.03
62	Direct fired convection range/oven	Retail	Cooking	New construction	2.99	0.28
63	Direct fired convection range/oven	Retail	Cooking	Remodel/Replacment	2.99	0.28
64	Exhaust Hood Makeup Air	Retail	Space Heating	New construction	11.59	(0.19)
65	Exhaust Hood Makeup Air	Retail	Space Heating	Remodel/Replacment	13.15	(0.20)
66	High efficiency ENERGY STAR fryer	Retail	Cooking	New construction	1.92	0.44
67	High efficiency ENERGY STAR fryer	Retail	Cooking	Remodel/Replacment	1.92	0.44
68	High efficiency ENERGY STAR steam cooker	Retail	Cooking	Retrofit	1.04	1.57
69	High efficiency ENERGY STAR steam cooker	Retail	Cooking	New construction	13.25	(2.23)
70	High efficiency ENERGY STAR steam cooker	Retail	Cooking	Remodel/Replacment	13.25	(2.23)
71	Pre-Rinse Spray Valve	Retail	Water Heating	Retrofit	34.47	0.00
72	Refrigeration heat recovery	Retail	Water Heating	Retrofit	3.24	0.50
73	Refrigeration heat recovery	Retail	Water Heating	New construction	2.58	0.30
74	Refrigeration heat recovery	Retail	Water Heating	Remodel/Replacment	3.30	0.22
75	Cooling system chilled water reset	Retail	Cooling	Retrofit	1.12	1.44
76	Cooling system chilled water reset	Retail	Cooling	Remodel/Replacment	1.13	0.66
77	Cooling system water side economizer	Retail	Cooling	Retrofit	1.19	1.03
78	Cooling system water side economizer	Retail	Cooling	Remodel/Replacment	1.20	0.47
79	Condensing DHW stand-alone	Retail	Water Heating	Retrofit	9,999.00	(0.19)
80	Condensing DHW stand-alone	Retail	Water Heating	New construction	3.50	0.25
81	Condensing DHW stand-alone	Retail	Water Heating	Remodel/Replacment	4.52	0.19
82	Faucet aerator	Retail	Water Heating	Retrofit	18.48	(3.66)
83	Indirect-fired DHW off space heating boiler	Retail	Water Heating	Retrofit	14.01	0.16
84	Indirect-fired DHW off space heating boiler	Retail	Water Heating	New construction	2.60	0.34
85	Indirect-fired DHW off space heating boiler	Retail	Water Heating	Remodel/Replacment	3.36	0.26
86	Instantaneous. High-Modulating Water Heater	Retail	Water Heating	Retrofit	9,999.00	(0.82)
87	Instantaneous. High-Modulating Water Heater	Retail	Water Heating	New construction	5.95	0.15
88	Instantaneous. High-Modulating Water Heater	Retail	Water Heating	Renovation	5.95	0.15
89	Instantaneous. High-Modulating Water Heater	Retail	Water Heating	Remodel/Replacment	7.68	0.11
90	Pipe insulation - water heating	Retail	Water Heating	Retrofit	23.85	0.08
91	Pipe insulation - water heating	Retail	Water Heating	New construction	18.62	0.05
92	Pipe insulation - water heating	Retail	Water Heating	Renovation	18.62	0.05
93	Tank insulation	Retail	Water Heating	Retrofit	1.76	1.08
94	Tank insulation	Retail	Water Heating	New construction	1.37	0.64
95	Tank insulation	Retail	Water Heating	Remodel/Replacment	1.78	0.49
96	Air Sealing	Retail	Space Heating	Retrofit	10.45	0.11
97	Air Sealing	Retail	Space Heating	New construction	5.66	0.15
98	Air Sealing	Retail	Space Heating	Renovation	5.66	0.15
99	Improved heating system high efficiency unit - Tie	Retail	Space Heating	Retrofit	2.00	1.50

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100	Improved heating system high efficiency unit - Tie	Retail	Space Heating	New construction	1.02	1.17
101	Improved heating system high efficiency unit - Tie	Retail	Space Heating	Remodel/Replacment	1.28	0.93
102	Improved heating system condensing unit - Tier 2	Retail	Space Heating	Retrofit	1.66	1.80
103	Improved heating system condensing unit - Tier 2	Retail	Space Heating	New construction	1.27	0.94
104	Improved heating system condensing unit - Tier 2	Retail	Space Heating	Remodel/Replacment	1.59	0.75
105	Programmable Thermostat	Retail	Space Heating	Retrofit	71.07	0.03
106	Programmable Thermostat	Retail	Space Heating	Renovation	8.19	0.14
107	Programmable Thermostat	Retail	Space Heating	Remodel/Replacment	10.57	0.11
108	Demand-Controlled Ventilation (controller, sensor)	Retail	Space Heating	Retrofit	2.76	0.61
109	Demand-Controlled Ventilation (controller, sensor)	Retail	Space Heating	New construction	5.28	0.03
110	Demand-Controlled Ventilation (controller, sensor)	Retail	Space Heating	Remodel/Replacment	6.38	(0.01)
111	Improved below-grade insulation	Retail	Space Heating	New construction	1.61	0.74
112	Improved below-grade insulation	Retail	Space Heating	Renovation	1.61	0.74
113	Sensible Heat Recovery	Retail	Space Heating	Retrofit	8.43	1.30
114	Sensible Heat Recovery	Retail	Space Heating	New construction	2.03	0.85
115	Sensible Heat Recovery	Retail	Space Heating	Remodel/Replacment	2.43	0.80
116	Pipe insulation - space heating	Retail	Space Heating	Retrofit	55.57	0.05
117	Pipe insulation - space heating	Retail	Space Heating	New construction	44.32	0.03
118	Pipe insulation - space heating	Retail	Space Heating	Renovation	44.32	0.03
119	Commissioning	Retail	Total	Renovation	2.50	(0.52)
120	Commissioning	Retail	Total	Remodel/Replacment	3.22	(0.78)
121	Retrocommissioning	Retail	Total	Retrofit	3.46	(0.45)
122	Steam trap Maintenance	Retail	Space Heating	Retrofit	1.66	0.70
123	Oxygen Trim	Retail	Space Heating	Retrofit	23.60	0.11
124	Oxygen Trim	Retail	Space Heating	New construction	49.79	0.02
125	Oxygen Trim	Retail	Space Heating	Remodel/Replacment	32.17	0.04
126	Direct fired convection range/oven	Grocery	Cooking	New construction	2.99	0.28
127	Direct fired convection range/oven	Grocery	Cooking	Remodel/Replacment	2.99	0.28
128	Exhaust Hood Makeup Air	Grocery	Space Heating	New construction	11.78	(0.18)
129	Exhaust Hood Makeup Air	Grocery	Space Heating	Remodel/Replacment	10.22	(0.16)
130	High efficiency ENERGY STAR fryer	Grocery	Cooking	New construction	1.92	0.44
131	High efficiency ENERGY STAR fryer	Grocery	Cooking	Remodel/Replacment	1.92	0.44
132	High efficiency ENERGY STAR steam cooker	Grocery	Cooking	Retrofit	1.04	1.57
133	High efficiency ENERGY STAR steam cooker	Grocery	Cooking	New construction	13.25	(2.23)
134	High efficiency ENERGY STAR steam cooker	Grocery	Cooking	Remodel/Replacment	13.25	(2.23)
135	Pre-Rinse Spray Valve	Grocery	Water Heating	Retrofit	33.82	0.00
136	Refrigeration heat recovery	Grocery	Water Heating	Retrofit	3.19	0.51
137	Refrigeration heat recovery	Grocery	Water Heating	New construction	2.58	0.31
138	Refrigeration heat recovery	Grocery	Water Heating	Remodel/Replacment	3.26	0.23
139	Cooling system chilled water reset	Grocery	Cooling	Retrofit	1.18	1.37
140	Cooling system chilled water reset	Grocery	Cooling	Remodel/Replacment	1.19	0.63
141	Cooling system water side economizer	Grocery	Cooling	Retrofit	1.17	1.09
142	Cooling system water side economizer	Grocery	Cooling	Remodel/Replacment	1.18	0.49
143	Condensing DHW stand-alone	Grocery	Water Heating	Retrofit	2.13	0.92
144	Condensing DHW stand-alone	Grocery	Water Heating	New construction	2.67	0.33
145	Condensing DHW stand-alone	Grocery	Water Heating	Remodel/Replacment	3.39	0.26
146	Faucet aerator	Grocery	Water Heating	Retrofit	18.26	(3.65)

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147	Indirect-fired DHW off space heating boiler	Grocery	Water Heating	Retrofit	1.84	1.22
148	Indirect-fired DHW off space heating boiler	Grocery	Water Heating	New construction	1.98	0.44
149	Indirect-fired DHW off space heating boiler	Grocery	Water Heating	Remodel/Replacment	2.52	0.35
150	Pipe insulation - water heating	Grocery	Water Heating	Retrofit	23.57	0.08
151	Pipe insulation - water heating	Grocery	Water Heating	New construction	18.70	0.05
152	Pipe insulation - water heating	Grocery	Water Heating	Renovation	18.70	0.05
153	Tank insulation	Grocery	Water Heating	Retrofit	1.74	1.10
154	Tank insulation	Grocery	Water Heating	New construction	1.38	0.64
155	Tank insulation	Grocery	Water Heating	Remodel/Replacment	1.76	0.50
156	Improved heating system high efficiency unit - Tier 2	Grocery	Space Heating	Retrofit	1.03	2.92
157	Improved heating system high efficiency unit - Tier 2	Grocery	Space Heating	New construction	1.48	0.81
158	Improved heating system high efficiency unit - Tier 2	Grocery	Space Heating	Remodel/Replacment	1.82	0.66
159	Improved heating system condensing unit - Tier 2	Grocery	Space Heating	Retrofit	2.73	1.10
160	Improved heating system condensing unit - Tier 2	Grocery	Space Heating	New construction	0.52	2.29
161	Improved heating system condensing unit - Tier 2	Grocery	Space Heating	Remodel/Replacment	0.64	1.86
162	Programmable Thermostat	Grocery	Space Heating	Retrofit	7.30	0.36
163	Programmable Thermostat	Grocery	Space Heating	Renovation	7.44	0.16
164	Programmable Thermostat	Grocery	Space Heating	Remodel/Replacment	9.46	0.12
165	Demand-Controlled Ventilation (controller, sensor)	Grocery	Space Heating	Retrofit	15.17	(0.10)
166	Demand-Controlled Ventilation (controller, sensor)	Grocery	Space Heating	New construction	6.41	0.07
167	Demand-Controlled Ventilation (controller, sensor)	Grocery	Space Heating	Remodel/Replacment	8.07	0.03
168	Improved below-grade insulation	Grocery	Space Heating	New construction	2.15	0.56
169	Improved below-grade insulation	Grocery	Space Heating	Renovation	2.15	0.56
170	Sensible Heat Recovery	Grocery	Space Heating	Retrofit	3.06	1.59
171	Sensible Heat Recovery	Grocery	Space Heating	New construction	1.91	0.87
172	Sensible Heat Recovery	Grocery	Space Heating	Remodel/Replacment	2.35	0.80
173	Pipe insulation - space heating	Grocery	Space Heating	Retrofit	55.51	0.05
174	Pipe insulation - space heating	Grocery	Space Heating	New construction	45.17	0.03
175	Pipe insulation - space heating	Grocery	Space Heating	Renovation	45.17	0.03
176	Commissioning	Grocery	Total	Renovation	2.23	(0.19)
177	Commissioning	Grocery	Total	Remodel/Replacment	2.83	(0.44)
178	Retrocommissioning	Grocery	Total	Retrofit	3.14	(0.10)
179	Steam trap Maintenance	Grocery	Space Heating	Retrofit	1.34	0.87
180	Oxygen Trim	Grocery	Space Heating	Retrofit	19.90	0.13
181	Oxygen Trim	Grocery	Space Heating	New construction	49.79	0.02
182	Oxygen Trim	Grocery	Space Heating	Remodel/Replacment	26.02	0.05
183	Infrared Heater	Grocery	Space Heating	Retrofit	27.47	0.11
184	Infrared Heater	Grocery	Space Heating	Remodel/Replacment	90.45	0.01
185	Exhaust Hood Makeup Air	Warehouse	Space Heating	New construction	11.21	(0.12)
186	Exhaust Hood Makeup Air	Warehouse	Space Heating	Remodel/Replacment	11.92	(0.12)
187	High efficiency ENERGY STAR fryer	Warehouse	Cooking	New construction	1.92	0.44
188	High efficiency ENERGY STAR fryer	Warehouse	Cooking	Remodel/Replacment	1.92	0.44
189	Pre-Rinse Spray Valve	Warehouse	Water Heating	Retrofit	34.22	0.00
190	Refrigeration heat recovery	Warehouse	Water Heating	Retrofit	3.23	0.50
191	Refrigeration heat recovery	Warehouse	Water Heating	New construction	2.61	0.30
192	Refrigeration heat recovery	Warehouse	Water Heating	Remodel/Replacment	3.28	0.23
193	Cooling system chilled water reset	Warehouse	Cooling	Retrofit	1.17	1.38

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194	Cooling system chilled water reset	Warehouse	Cooling	Remodel/Replacment	1.18	0.63
195	Cooling system water side economizer	Warehouse	Cooling	Retrofit	1.18	1.08
196	Cooling system water side economizer	Warehouse	Cooling	Remodel/Replacment	1.18	0.49
197	Condensing DHW stand-alone	Warehouse	Water Heating	Retrofit	3.51	0.56
198	Condensing DHW stand-alone	Warehouse	Water Heating	New construction	3.56	0.25
199	Condensing DHW stand-alone	Warehouse	Water Heating	Remodel/Replacment	4.52	0.19
200	Faucet aerator	Warehouse	Water Heating	Retrofit	18.40	(3.66)
201	Indirect-fired DHW off space heating boiler	Warehouse	Water Heating	Retrofit	2.81	0.80
202	Indirect-fired DHW off space heating boiler	Warehouse	Water Heating	New construction	2.64	0.33
203	Indirect-fired DHW off space heating boiler	Warehouse	Water Heating	Remodel/Replacment	3.36	0.26
204	Instantaneous. High-Modulating Water Heater	Warehouse	Water Heating	Retrofit	4.02	0.49
205	Instantaneous. High-Modulating Water Heater	Warehouse	Water Heating	New construction	6.04	0.15
206	Instantaneous. High-Modulating Water Heater	Warehouse	Water Heating	Renovation	6.04	0.15
207	Instantaneous. High-Modulating Water Heater	Warehouse	Water Heating	Remodel/Replacment	7.68	0.11
208	Low-flow shower heads	Warehouse	Water Heating	Retrofit	36.20	(2.30)
209	Low-flow shower heads	Warehouse	Water Heating	New construction	20.84	(1.00)
210	Low-flow shower heads	Warehouse	Water Heating	Remodel/Replacment	26.51	(1.02)
211	Pipe insulation - water heating	Warehouse	Water Heating	Retrofit	23.84	0.08
212	Pipe insulation - water heating	Warehouse	Water Heating	New construction	18.89	0.05
213	Pipe insulation - water heating	Warehouse	Water Heating	Renovation	18.89	0.05
214	Tank insulation	Warehouse	Water Heating	Retrofit	1.76	1.08
215	Tank insulation	Warehouse	Water Heating	New construction	1.39	0.63
216	Tank insulation	Warehouse	Water Heating	Remodel/Replacment	1.77	0.49
217	Air Sealing	Warehouse	Space Heating	Retrofit	2.98	0.95
218	Air Sealing	Warehouse	Space Heating	New construction	2.32	0.50
219	Air Sealing	Warehouse	Space Heating	Renovation	2.32	0.50
220	Improved heating system high efficiency unit - Tier 1	Warehouse	Space Heating	Retrofit	0.78	3.84
221	Improved heating system high efficiency unit - Tier 1	Warehouse	Space Heating	New construction	1.90	0.63
222	Improved heating system high efficiency unit - Tier 1	Warehouse	Space Heating	Remodel/Replacment	2.34	0.51
223	Improved heating system condensing unit - Tier 2	Warehouse	Space Heating	Retrofit	3.03	0.99
224	Improved heating system condensing unit - Tier 2	Warehouse	Space Heating	New construction	2.35	0.51
225	Improved heating system condensing unit - Tier 2	Warehouse	Space Heating	Remodel/Replacment	2.90	0.41
226	Programmable Thermostat	Warehouse	Space Heating	Retrofit	56.59	0.05
227	Programmable Thermostat	Warehouse	Space Heating	Renovation	24.91	0.05
228	Programmable Thermostat	Warehouse	Space Heating	Remodel/Replacment	31.69	0.04
229	Demand-Controlled Ventilation (controller, sensor)	Warehouse	Space Heating	Retrofit	2.95	0.88
230	Demand-Controlled Ventilation (controller, sensor)	Warehouse	Space Heating	New construction	1.95	0.62
231	Demand-Controlled Ventilation (controller, sensor)	Warehouse	Space Heating	Remodel/Replacment	2.41	0.50
232	Improved below-grade insulation	Warehouse	Space Heating	New construction	3.02	0.40
233	Improved below-grade insulation	Warehouse	Space Heating	Renovation	3.02	0.40
234	Improved roof insulation	Warehouse	Space Heating	New construction	1.38	0.86
235	Improved roof insulation	Warehouse	Space Heating	Renovation	1.38	0.86
236	Sensible Heat Recovery	Warehouse	Space Heating	Retrofit	2.39	1.73
237	Sensible Heat Recovery	Warehouse	Space Heating	New construction	1.69	0.92
238	Sensible Heat Recovery	Warehouse	Space Heating	Remodel/Replacment	2.02	0.85
239	Pipe insulation - space heating	Warehouse	Space Heating	Retrofit	55.57	0.05
240	Pipe insulation - space heating	Warehouse	Space Heating	New construction	44.98	0.03

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3	<div style="border: 1px solid black; width: 100px; height: 15px;"></div>					
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5	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
241	Pipe insulation - space heating	Warehouse	Space Heating	Renovation	44.98	0.03
242	Commissioning	Warehouse	Total	New construction	2.30	(0.28)
243	Commissioning	Warehouse	Total	Renovation	2.30	(0.28)
244	Commissioning	Warehouse	Total	Remodel/Replacment	2.93	(0.52)
245	Retrocommissioning	Warehouse	Total	Retrofit	3.21	(0.17)
246	Integrated Design - High Performance (30% > code)	Warehouse	Total	New construction	1.53	0.59
247	Integrated Design - High Performance (50% > code)	Warehouse	Total	New construction	0.46	3.26
248	Steam trap Maintenance	Warehouse	Space Heating	Retrofit	1.54	0.76
249	Oxygen Trim	Warehouse	Space Heating	Retrofit	24.10	0.11
250	Oxygen Trim	Warehouse	Space Heating	New construction	49.79	0.02
251	Oxygen Trim	Warehouse	Space Heating	Remodel/Replacment	35.81	0.03
252	Infrared Heater	Warehouse	Space Heating	Retrofit	18.89	0.16
253	Infrared Heater	Warehouse	Space Heating	Remodel/Replacment	110.83	0.01
254	Direct fired convection range/oven	Education	Cooking	New construction	2.99	0.28
255	Direct fired convection range/oven	Education	Cooking	Remodel/Replacment	2.99	0.28
256	Exhaust Hood Makeup Air	Education	Space Heating	New construction	12.09	(0.26)
257	Exhaust Hood Makeup Air	Education	Space Heating	Remodel/Replacment	11.72	(0.26)
258	High efficiency ENERGY STAR fryer	Education	Cooking	New construction	1.92	0.44
259	High efficiency ENERGY STAR fryer	Education	Cooking	Remodel/Replacment	1.92	0.44
260	Pre-Rinse Spray Valve	Education	Water Heating	Retrofit	29.56	0.00
261	Refrigeration heat recovery	Education	Water Heating	Retrofit	3.14	0.52
262	Refrigeration heat recovery	Education	Water Heating	New construction	2.51	0.31
263	Refrigeration heat recovery	Education	Water Heating	Remodel/Replacment	3.00	0.25
264	Cooling system chilled water reset	Education	Cooling	Retrofit	1.05	1.51
265	Cooling system chilled water reset	Education	Cooling	Remodel/Replacment	1.06	0.69
266	Cooling system water side economizer	Education	Cooling	Retrofit	1.21	0.98
267	Cooling system water side economizer	Education	Cooling	Remodel/Replacment	1.22	0.44
268	Condensing DHW stand-alone	Education	Water Heating	Retrofit	1.73	1.13
269	Condensing DHW stand-alone	Education	Water Heating	New construction	2.19	0.40
270	Condensing DHW stand-alone	Education	Water Heating	Remodel/Replacment	2.83	0.31
271	Faucet aerator	Education	Water Heating	Retrofit	5.43	(2.89)
272	Graywater heat exchanger/GFX	Education	Water Heating	New construction	1.93	0.45
273	Graywater heat exchanger/GFX	Education	Water Heating	Remodel/Replacment	2.50	0.35
274	Indirect-fired DHW off space heating boiler	Education	Water Heating	Retrofit	1.51	1.49
275	Indirect-fired DHW off space heating boiler	Education	Water Heating	New construction	1.62	0.54
276	Indirect-fired DHW off space heating boiler	Education	Water Heating	Remodel/Replacment	2.10	0.42
277	Instantaneous. High-Modulating Water Heater	Education	Water Heating	Retrofit	1.64	1.20
278	Instantaneous. High-Modulating Water Heater	Education	Water Heating	New construction	3.72	0.24
279	Instantaneous. High-Modulating Water Heater	Education	Water Heating	Renovation	3.72	0.24
280	Instantaneous. High-Modulating Water Heater	Education	Water Heating	Remodel/Replacment	4.80	0.18
281	Low-flow shower heads	Education	Water Heating	Retrofit	29.69	(2.27)
282	Low-flow shower heads	Education	Water Heating	New construction	23.90	(1.01)
283	Low-flow shower heads	Education	Water Heating	Remodel/Replacment	30.86	(1.03)
284	Pipe insulation - water heating	Education	Water Heating	Retrofit	23.10	0.08
285	Pipe insulation - water heating	Education	Water Heating	New construction	18.09	0.05
286	Pipe insulation - water heating	Education	Water Heating	Renovation	18.09	0.05
287	Tank insulation	Education	Water Heating	Retrofit	1.71	1.12

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288	Tank insulation	Education	Water Heating	New construction	1.34	0.66
289	Tank insulation	Education	Water Heating	Remodel/Replacment	1.72	0.51
290	Air Sealing	Education	Space Heating	Retrofit	3.10	0.86
291	Air Sealing	Education	Space Heating	New construction	3.79	0.27
292	Air Sealing	Education	Space Heating	Renovation	3.79	0.27
293	Improved heating system high efficiency unit - Tier 1	Education	Space Heating	Retrofit	1.08	2.78
294	Improved heating system high efficiency unit - Tier 1	Education	Space Heating	New construction	2.08	0.58
295	Improved heating system high efficiency unit - Tier 1	Education	Space Heating	Remodel/Replacment	2.60	0.46
296	Improved heating system condensing unit - Tier 2	Education	Space Heating	Retrofit	5.03	0.60
297	Improved heating system condensing unit - Tier 2	Education	Space Heating	New construction	1.86	0.64
298	Improved heating system condensing unit - Tier 2	Education	Space Heating	Remodel/Replacment	2.33	0.51
299	Programmable Thermostat	Education	Space Heating	Retrofit	21.87	0.09
300	Programmable Thermostat	Education	Space Heating	Renovation	9.48	0.11
301	Programmable Thermostat	Education	Space Heating	Remodel/Replacment	12.25	0.09
302	Demand-Controlled Ventilation (controller, sensor)	Education	Space Heating	Retrofit	4.62	0.55
303	Demand-Controlled Ventilation (controller, sensor)	Education	Space Heating	New construction	2.46	0.48
304	Demand-Controlled Ventilation (controller, sensor)	Education	Space Heating	Remodel/Replacment	3.16	0.38
305	Improved below-grade insulation	Education	Space Heating	New construction	2.55	0.47
306	Improved below-grade insulation	Education	Space Heating	Renovation	2.55	0.47
307	Sensible Heat Recovery	Education	Space Heating	Retrofit	2.47	1.25
308	Sensible Heat Recovery	Education	Space Heating	New construction	3.03	0.50
309	Sensible Heat Recovery	Education	Space Heating	Remodel/Replacment	3.75	0.43
310	Pipe insulation - space heating	Education	Space Heating	Retrofit	55.09	0.05
311	Pipe insulation - space heating	Education	Space Heating	New construction	43.98	0.03
312	Pipe insulation - space heating	Education	Space Heating	Renovation	43.98	0.03
313	Energy Star washer	Education	Water Heating	New construction	1.67	(2.10)
314	Energy Star washer	Education	Water Heating	Remodel/Replacment	1.94	(2.71)
315	Swimming pool/spa covers	Education	Miscellaneous	Retrofit	3.97	0.38
316	Swimming pool/spa covers	Education	Miscellaneous	New construction	3.74	0.24
317	Swimming pool/spa covers	Education	Miscellaneous	Remodel/Replacment	3.94	0.22
318	Commissioning	Education	Total	New construction	2.45	(0.47)
319	Commissioning	Education	Total	Renovation	2.45	(0.47)
320	Commissioning	Education	Total	Remodel/Replacment	3.16	(0.73)
321	Retrocommissioning	Education	Total	Retrofit	3.41	(0.39)
322	Integrated Design - High Performance (30% > code)	Education	Total	New construction	1.60	0.51
323	Integrated Design - High Performance (50% > code)	Education	Total	New construction	0.48	3.17
324	Steam trap Maintenance	Education	Space Heating	Retrofit	1.49	0.78
325	Oxygen Trim	Education	Space Heating	Retrofit	21.26	0.12
326	Oxygen Trim	Education	Space Heating	New construction	49.79	0.02
327	Oxygen Trim	Education	Space Heating	Remodel/Replacment	31.01	0.04
328	Direct fired convection range/oven	Health	Cooking	New construction	2.99	0.28
329	Direct fired convection range/oven	Health	Cooking	Remodel/Replacment	2.99	0.28
330	Exhaust Hood Makeup Air	Health	Space Heating	New construction	12.81	(0.18)
331	Exhaust Hood Makeup Air	Health	Space Heating	Remodel/Replacment	14.74	(0.20)
332	High efficiency ENERGY STAR fryer	Health	Cooking	New construction	1.92	0.44
333	High efficiency ENERGY STAR fryer	Health	Cooking	Remodel/Replacment	1.92	0.44
334	High efficiency ENERGY STAR steam cooker	Health	Cooking	Retrofit	1.04	1.57

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335	High efficiency ENERGY STAR steam cooker	Health	Cooking	New construction	13.25	(2.23)
336	High efficiency ENERGY STAR steam cooker	Health	Cooking	Remodel/Replacment	13.25	(2.23)
337	Pre-Rinse Spray Valve	Health	Water Heating	Retrofit	32.36	0.00
338	Refrigeration heat recovery	Health	Water Heating	Retrofit	3.12	0.52
339	Refrigeration heat recovery	Health	Water Heating	New construction	2.80	0.27
340	Refrigeration heat recovery	Health	Water Heating	Remodel/Replacment	3.18	0.23
341	Cooling system chilled water reset	Health	Cooling	Retrofit	1.19	1.36
342	Cooling system chilled water reset	Health	Cooling	New construction	1.04	0.70
343	Cooling system chilled water reset	Health	Cooling	Remodel/Replacment	1.20	0.62
344	Cooling system water side economizer	Health	Cooling	Retrofit	1.17	1.10
345	Cooling system water side economizer	Health	Cooling	New construction	1.05	0.65
346	Cooling system water side economizer	Health	Cooling	Remodel/Replacment	1.18	0.50
347	Condensing DHW stand-alone	Health	Water Heating	Retrofit	2.78	0.70
348	Condensing DHW stand-alone	Health	Water Heating	New construction	3.94	0.22
349	Condensing DHW stand-alone	Health	Water Heating	Remodel/Replacment	4.52	0.19
350	Faucet aerator	Health	Water Heating	Retrofit	5.76	(2.95)
351	Graywater heat exchanger/GFX	Health	Water Heating	New construction	2.17	0.40
352	Graywater heat exchanger/GFX	Health	Water Heating	Remodel/Replacment	2.49	0.35
353	Indirect-fired DHW off space heating boiler	Health	Water Heating	Retrofit	2.43	0.93
354	Indirect-fired DHW off space heating boiler	Health	Water Heating	New construction	2.92	0.30
355	Indirect-fired DHW off space heating boiler	Health	Water Heating	Remodel/Replacment	3.36	0.26
356	Instantaneous. High-Modulating Water Heater	Health	Water Heating	Retrofit	2.64	0.74
357	Instantaneous. High-Modulating Water Heater	Health	Water Heating	New construction	6.69	0.13
358	Instantaneous. High-Modulating Water Heater	Health	Water Heating	Renovation	6.69	0.13
359	Instantaneous. High-Modulating Water Heater	Health	Water Heating	Remodel/Replacment	7.68	0.11
360	Low-flow shower heads	Health	Water Heating	Retrofit	3,933.29	(2.41)
361	Low-flow shower heads	Health	Water Heating	New construction	5.93	(0.76)
362	Low-flow shower heads	Health	Water Heating	Remodel/Replacment	6.82	(0.80)
363	Pipe insulation - water heating	Health	Water Heating	Retrofit	23.00	0.08
364	Pipe insulation - water heating	Health	Water Heating	New construction	20.26	0.04
365	Pipe insulation - water heating	Health	Water Heating	Renovation	20.26	0.04
366	Tank insulation	Health	Water Heating	Retrofit	1.70	1.12
367	Tank insulation	Health	Water Heating	New construction	1.50	0.59
368	Tank insulation	Health	Water Heating	Remodel/Replacment	1.72	0.51
369	Air Sealing	Health	Space Heating	Retrofit	4.34	(0.29)
370	Air Sealing	Health	Space Heating	New construction	3.47	(0.02)
371	Air Sealing	Health	Space Heating	Renovation	3.47	(0.02)
372	Improved heating system high efficiency unit - Tier 1	Health	Space Heating	Retrofit	6.14	0.72
373	Improved heating system high efficiency unit - Tier 1	Health	Space Heating	New construction	3.07	0.46
374	Improved heating system high efficiency unit - Tier 1	Health	Space Heating	Remodel/Replacment	3.42	0.43
375	Improved heating system condensing unit - Tier 2	Health	Space Heating	Retrofit	6.50	0.46
376	Improved heating system condensing unit - Tier 2	Health	Space Heating	New construction	5.33	0.22
377	Improved heating system condensing unit - Tier 2	Health	Space Heating	Remodel/Replacment	5.93	0.20
378	Outdoor Air Reset	Health	Space Heating	Retrofit	3.39	0.75
379	High Performance Glazing double pane, low-E, low-U	Health	Space Heating	New construction	1.38	0.68
380	High Performance Glazing double pane, low-E, low-U	Health	Space Heating	Renovation	1.38	0.68
381	Improved below-grade insulation	Health	Space Heating	New construction	1.60	0.75

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382	Improved below-grade insulation	Health	Space Heating	Renovation	1.60	0.75
383	Improved roof insulation	Health	Space Heating	New construction	1.37	0.84
384	Improved roof insulation	Health	Space Heating	Renovation	1.37	0.84
385	Sensible Heat Recovery	Health	Space Heating	Retrofit	2.17	2.33
386	Pipe insulation - space heating	Health	Space Heating	Retrofit	55.09	0.05
387	Pipe insulation - space heating	Health	Space Heating	New construction	49.45	0.02
388	Pipe insulation - space heating	Health	Space Heating	Renovation	49.45	0.02
389	Swimming pool/spa covers	Health	Miscellaneous	Retrofit	3.97	0.38
390	Swimming pool/spa covers	Health	Miscellaneous	New construction	3.85	0.23
391	Swimming pool/spa covers	Health	Miscellaneous	Remodel/Replacment	3.94	0.22
392	Commissioning	Health	Total	New construction	2.55	(0.39)
393	Commissioning	Health	Total	Renovation	2.55	(0.39)
394	Commissioning	Health	Total	Remodel/Replacment	2.93	(0.52)
395	Retrocommissioning	Health	Total	Retrofit	3.23	(0.20)
396	Integrated Design - High Performance (30% > code)	Health	Total	New construction	1.54	0.58
397	Integrated Design - High Performance (50% > code)	Health	Total	New construction	9,999.00	0.00
398	Steam trap Maintenance	Health	Space Heating	Retrofit	2.86	0.41
399	Oxygen Trim	Health	Space Heating	Retrofit	40.66	0.06
400	Oxygen Trim	Health	Space Heating	New construction	49.79	0.02
401	Oxygen Trim	Health	Space Heating	Remodel/Replacment	43.31	0.03
402	Direct fired convection range/oven	Lodging	Cooking	New construction	2.99	0.28
403	Direct fired convection range/oven	Lodging	Cooking	Remodel/Replacment	2.99	0.28
404	Exhaust Hood Makeup Air	Lodging	Space Heating	New construction	11.68	(0.20)
405	Exhaust Hood Makeup Air	Lodging	Space Heating	Remodel/Replacment	15.00	(0.22)
406	High efficiency ENERGY STAR fryer	Lodging	Cooking	New construction	1.92	0.44
407	High efficiency ENERGY STAR fryer	Lodging	Cooking	Remodel/Replacment	1.92	0.44
408	High efficiency ENERGY STAR steam cooker	Lodging	Cooking	Retrofit	1.04	1.57
409	High efficiency ENERGY STAR steam cooker	Lodging	Cooking	New construction	13.25	(2.23)
410	High efficiency ENERGY STAR steam cooker	Lodging	Cooking	Remodel/Replacment	13.25	(2.23)
411	Pre-Rinse Spray Valve	Lodging	Water Heating	Retrofit	30.75	0.00
412	Refrigeration heat recovery	Lodging	Water Heating	Retrofit	3.12	0.53
413	Refrigeration heat recovery	Lodging	Water Heating	New construction	2.51	0.31
414	Refrigeration heat recovery	Lodging	Water Heating	Remodel/Replacment	3.07	0.25
415	Cooling system chilled water reset	Lodging	Cooling	Retrofit	1.12	1.43
416	Cooling system chilled water reset	Lodging	Cooling	Remodel/Replacment	1.13	0.66
417	Cooling system water side economizer	Lodging	Cooling	Retrofit	1.19	1.04
418	Cooling system water side economizer	Lodging	Cooling	Remodel/Replacment	1.20	0.47
419	Condensing DHW stand-alone	Lodging	Water Heating	Retrofit	3.50	0.56
420	Condensing DHW stand-alone	Lodging	Water Heating	New construction	3.53	0.25
421	Condensing DHW stand-alone	Lodging	Water Heating	Remodel/Replacment	4.52	0.19
422	Faucet aerator	Lodging	Water Heating	Retrofit	8.42	(3.27)
423	Graywater heat exchanger/GFX	Lodging	Water Heating	New construction	1.00	0.87
424	Graywater heat exchanger/GFX	Lodging	Water Heating	Remodel/Replacment	1.29	0.68
425	Indirect-fired DHW off space heating boiler	Lodging	Water Heating	Retrofit	2.80	0.80
426	Indirect-fired DHW off space heating boiler	Lodging	Water Heating	New construction	2.62	0.33
427	Indirect-fired DHW off space heating boiler	Lodging	Water Heating	Remodel/Replacment	3.36	0.26
428	Low-flow shower heads	Lodging	Water Heating	Retrofit	629.57	(2.41)

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429	Low-flow shower heads	Lodging	Water Heating	New construction	5.15	(0.71)
430	Low-flow shower heads	Lodging	Water Heating	Remodel/Replacment	6.60	(0.79)
431	Pipe insulation - water heating	Lodging	Water Heating	Retrofit	23.08	0.08
432	Pipe insulation - water heating	Lodging	Water Heating	New construction	18.21	0.05
433	Pipe insulation - water heating	Lodging	Water Heating	Renovation	18.21	0.05
434	Tank insulation	Lodging	Water Heating	Retrofit	1.70	1.12
435	Tank insulation	Lodging	Water Heating	New construction	1.34	0.65
436	Tank insulation	Lodging	Water Heating	Remodel/Replacment	1.72	0.51
437	Air Sealing	Lodging	Space Heating	Retrofit	2.88	1.03
438	Air Sealing	Lodging	Space Heating	New construction	2.17	0.55
439	Air Sealing	Lodging	Space Heating	Renovation	2.17	0.55
440	Improved heating system high efficiency unit - Tier 2	Lodging	Space Heating	Retrofit	0.79	3.81
441	Improved heating system high efficiency unit - Tier 2	Lodging	Space Heating	New construction	3.51	0.34
442	Improved heating system high efficiency unit - Tier 2	Lodging	Space Heating	Remodel/Replacment	4.36	0.27
443	Improved heating system condensing unit - Tier 2	Lodging	Space Heating	Retrofit	6.47	0.46
444	Improved heating system condensing unit - Tier 2	Lodging	Space Heating	New construction	4.86	0.25
445	Improved heating system condensing unit - Tier 2	Lodging	Space Heating	Remodel/Replacment	6.04	0.20
446	Programmable Thermostat	Lodging	Space Heating	Retrofit	4.65	0.57
447	Improved below-grade insulation	Lodging	Space Heating	New construction	2.25	0.53
448	Improved below-grade insulation	Lodging	Space Heating	Renovation	2.25	0.53
449	Pipe insulation - space heating	Lodging	Space Heating	Retrofit	55.15	0.05
450	Pipe insulation - space heating	Lodging	Space Heating	New construction	44.35	0.03
451	Pipe insulation - space heating	Lodging	Space Heating	Renovation	44.35	0.03
452	Energy Star washer	Lodging	Water Heating	New construction	1.63	(1.87)
453	Energy Star washer	Lodging	Water Heating	Remodel/Replacment	1.92	(2.55)
454	Swimming pool/spa covers	Lodging	Miscellaneous	Retrofit	3.97	0.38
455	Swimming pool/spa covers	Lodging	Miscellaneous	New construction	3.75	0.24
456	Swimming pool/spa covers	Lodging	Miscellaneous	Remodel/Replacment	3.94	0.22
457	Commissioning	Lodging	Total	New construction	2.47	(0.48)
458	Commissioning	Lodging	Total	Renovation	2.47	(0.48)
459	Commissioning	Lodging	Total	Remodel/Replacment	3.16	(0.73)
460	Retrocommissioning	Lodging	Total	Retrofit	3.41	(0.39)
461	Integrated Design - High Performance (30% > code)	Lodging	Total	New construction	1.60	0.51
462	Integrated Design - High Performance (50% > code)	Lodging	Total	New construction	0.48	3.17
463	Steam trap Maintenance	Lodging	Space Heating	Retrofit	3.09	0.38
464	Oxygen Trim	Lodging	Space Heating	Retrofit	44.00	0.06
465	Oxygen Trim	Lodging	Space Heating	New construction	49.79	0.02
466	Oxygen Trim	Lodging	Space Heating	Remodel/Replacment	47.58	0.02
467	Direct fired convection range/oven	Restaurant	Cooking	New construction	2.99	0.28
468	Direct fired convection range/oven	Restaurant	Cooking	Remodel/Replacment	2.99	0.28
469	Exhaust Hood Makeup Air	Restaurant	Space Heating	New construction	12.55	(0.14)
470	Exhaust Hood Makeup Air	Restaurant	Space Heating	Remodel/Replacment	11.90	(0.13)
471	High efficiency ENERGY STAR fryer	Restaurant	Cooking	New construction	1.92	0.44
472	High efficiency ENERGY STAR fryer	Restaurant	Cooking	Remodel/Replacment	1.92	0.44
473	High efficiency ENERGY STAR steam cooker	Restaurant	Cooking	Retrofit	1.04	1.57
474	High efficiency ENERGY STAR steam cooker	Restaurant	Cooking	New construction	13.25	(2.23)
475	High efficiency ENERGY STAR steam cooker	Restaurant	Cooking	Remodel/Replacment	13.25	(2.23)

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476	Pre-Rinse Spray Valve	Restaurant	Water Heating	Retrofit	28.82	0.00
477	Refrigeration heat recovery	Restaurant	Water Heating	Retrofit	3.19	0.51
478	Refrigeration heat recovery	Restaurant	Water Heating	New construction	2.86	0.27
479	Refrigeration heat recovery	Restaurant	Water Heating	Remodel/Replacment	2.94	0.26
480	Cooling system chilled water reset	Restaurant	Cooling	Retrofit	1.16	1.40
481	Cooling system chilled water reset	Restaurant	Cooling	New construction	1.01	0.71
482	Cooling system chilled water reset	Restaurant	Cooling	Remodel/Replacment	1.16	0.64
483	Cooling system water side economizer	Restaurant	Cooling	Retrofit	1.18	1.07
484	Cooling system water side economizer	Restaurant	Cooling	New construction	1.06	0.64
485	Cooling system water side economizer	Restaurant	Cooling	Remodel/Replacment	1.19	0.48
486	Condensing DHW stand-alone	Restaurant	Water Heating	Retrofit	2.05	0.96
487	Condensing DHW stand-alone	Restaurant	Water Heating	New construction	2.95	0.30
488	Condensing DHW stand-alone	Restaurant	Water Heating	Remodel/Replacment	3.39	0.26
489	Faucet aerator	Restaurant	Water Heating	Retrofit	16.44	(3.62)
490	Graywater heat exchanger/GFX	Restaurant	Water Heating	New construction	2.21	0.39
491	Graywater heat exchanger/GFX	Restaurant	Water Heating	Remodel/Replacment	2.54	0.34
492	Indirect-fired DHW off space heating boiler	Restaurant	Water Heating	Retrofit	1.80	1.25
493	Indirect-fired DHW off space heating boiler	Restaurant	Water Heating	New construction	2.19	0.40
494	Indirect-fired DHW off space heating boiler	Restaurant	Water Heating	Remodel/Replacment	2.52	0.35
495	Pipe insulation - water heating	Restaurant	Water Heating	Retrofit	23.57	0.08
496	Pipe insulation - water heating	Restaurant	Water Heating	New construction	20.71	0.04
497	Pipe insulation - water heating	Restaurant	Water Heating	Renovation	20.71	0.04
498	Tank insulation	Restaurant	Water Heating	Retrofit	1.74	1.10
499	Tank insulation	Restaurant	Water Heating	New construction	1.53	0.57
500	Tank insulation	Restaurant	Water Heating	Remodel/Replacment	1.76	0.50
501	Air Sealing	Restaurant	Space Heating	Retrofit	3.47	0.76
502	Air Sealing	Restaurant	Space Heating	New construction	8.32	0.10
503	Air Sealing	Restaurant	Space Heating	Renovation	8.32	0.10
504	Improved heating system high efficiency unit - Tier 1	Restaurant	Space Heating	New construction	1.52	0.78
505	Improved heating system high efficiency unit - Tier 1	Restaurant	Space Heating	Remodel/Replacment	1.70	0.71
506	Improved heating system condensing unit - Tier 2	Restaurant	Space Heating	New construction	0.57	2.11
507	Improved heating system condensing unit - Tier 2	Restaurant	Space Heating	Remodel/Replacment	0.63	1.89
508	Programmable Thermostat	Restaurant	Space Heating	Retrofit	11.58	0.23
509	Programmable Thermostat	Restaurant	Space Heating	Renovation	10.32	0.11
510	Programmable Thermostat	Restaurant	Space Heating	Remodel/Replacment	11.85	0.10
511	Demand-Controlled Ventilation (controller, sensor)	Restaurant	Space Heating	Retrofit	7.84	0.31
512	Demand-Controlled Ventilation (controller, sensor)	Restaurant	Space Heating	New construction	5.13	0.23
513	Demand-Controlled Ventilation (controller, sensor)	Restaurant	Space Heating	Remodel/Replacment	5.66	0.20
514	Improved below-grade insulation	Restaurant	Space Heating	New construction	2.57	0.47
515	Improved below-grade insulation	Restaurant	Space Heating	Renovation	2.57	0.47
516	Improved roof insulation	Restaurant	Space Heating	New construction	1.46	0.79
517	Improved roof insulation	Restaurant	Space Heating	Renovation	1.46	0.79
518	Sensible Heat Recovery	Restaurant	Space Heating	Retrofit	3.20	1.80
519	Sensible Heat Recovery	Restaurant	Space Heating	New construction	2.15	0.91
520	Sensible Heat Recovery	Restaurant	Space Heating	Remodel/Replacment	2.35	0.89
521	Pipe insulation - space heating	Restaurant	Space Heating	Retrofit	55.57	0.05
522	Pipe insulation - space heating	Restaurant	Space Heating	New construction	50.04	0.02

	A	C	D	E	F	G
1	Upstate Commercial Measures					
2	Total Resource Cost Test Benefit/Cost Ratio and Levelized Cost of Saved Energy					
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5	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
523	Pipe insulation - space heating	Restaurant	Space Heating	Renovation	50.04	0.02
524	Commissioning	Restaurant	Total	Renovation	2.55	(0.39)
525	Commissioning	Restaurant	Total	Remodel/Replacment	2.93	(0.52)
526	Retrocommissioning	Restaurant	Total	Retrofit	3.21	(0.18)
527	Steam trap Maintenance	Restaurant	Space Heating	Retrofit	1.35	0.86
528	Oxygen Trim	Restaurant	Space Heating	Retrofit	19.26	0.14
529	Oxygen Trim	Restaurant	Space Heating	New construction	49.79	0.02
530	Oxygen Trim	Restaurant	Space Heating	Remodel/Replacment	29.94	0.04
531	Exhaust Hood Makeup Air	Other	Space Heating	New construction	9.35	(0.14)
532	Exhaust Hood Makeup Air	Other	Space Heating	Remodel/Replacment	11.85	(0.17)
533	High efficiency ENERGY STAR fryer	Other	Cooking	New construction	1.92	0.44
534	High efficiency ENERGY STAR fryer	Other	Cooking	Remodel/Replacment	1.92	0.44
535	High efficiency ENERGY STAR steam cooker	Other	Cooking	Retrofit	1.04	1.57
536	High efficiency ENERGY STAR steam cooker	Other	Cooking	New construction	13.25	(2.23)
537	High efficiency ENERGY STAR steam cooker	Other	Cooking	Remodel/Replacment	13.25	(2.23)
538	Pre-Rinse Spray Valve	Other	Water Heating	Retrofit	32.24	0.00
539	Refrigeration heat recovery	Other	Water Heating	Retrofit	3.18	0.51
540	Refrigeration heat recovery	Other	Water Heating	New construction	2.07	0.39
541	Refrigeration heat recovery	Other	Water Heating	Remodel/Replacment	3.17	0.24
542	Cooling system chilled water reset	Other	Cooling	Retrofit	1.15	1.40
543	Cooling system chilled water reset	Other	Cooling	Remodel/Replacment	1.16	0.64
544	Cooling system water side economizer	Other	Cooling	Retrofit	1.18	1.06
545	Cooling system water side economizer	Other	Cooling	Remodel/Replacment	1.19	0.48
546	Condensing DHW stand-alone	Other	Water Heating	Retrofit	2.97	0.66
547	Condensing DHW stand-alone	Other	Water Heating	New construction	2.86	0.31
548	Condensing DHW stand-alone	Other	Water Heating	Remodel/Replacment	4.52	0.19
549	Faucet aerator	Other	Water Heating	Retrofit	8.68	(3.30)
550	Graywater heat exchanger/GFX	Other	Water Heating	Remodel/Replacment	1.31	0.67
551	Indirect-fired DHW off space heating boiler	Other	Water Heating	Retrofit	2.53	0.89
552	Indirect-fired DHW off space heating boiler	Other	Water Heating	New construction	2.13	0.41
553	Indirect-fired DHW off space heating boiler	Other	Water Heating	Remodel/Replacment	3.36	0.26
554	Instantaneous. High-Modulating Water Heater	Other	Water Heating	Retrofit	2.96	0.66
555	Instantaneous. High-Modulating Water Heater	Other	Water Heating	New construction	4.86	0.18
556	Instantaneous. High-Modulating Water Heater	Other	Water Heating	Renovation	4.86	0.18
557	Instantaneous. High-Modulating Water Heater	Other	Water Heating	Remodel/Replacment	7.68	0.11
558	Low-flow shower heads	Other	Water Heating	Retrofit	43.06	(2.31)
559	Low-flow shower heads	Other	Water Heating	New construction	10.34	(0.90)
560	Low-flow shower heads	Other	Water Heating	Remodel/Replacment	16.32	(0.97)
561	Pipe insulation - water heating	Other	Water Heating	Retrofit	23.47	0.08
562	Pipe insulation - water heating	Other	Water Heating	New construction	15.01	0.06
563	Pipe insulation - water heating	Other	Water Heating	Renovation	15.01	0.06
564	Tank insulation	Other	Water Heating	Retrofit	1.73	1.10
565	Tank insulation	Other	Water Heating	New construction	1.11	0.79
566	Tank insulation	Other	Water Heating	Remodel/Replacment	1.75	0.50
567	Air Sealing	Other	Space Heating	Retrofit	9.03	0.16
568	Air Sealing	Other	Space Heating	New construction	2.57	0.42
569	Air Sealing	Other	Space Heating	Renovation	2.57	0.42

	A	C	D	E	F	G
1	Upstate Commercial Measures					
2	Total Resource Cost Test Benefit/Cost Ratio and Levelized Cost of Saved Energy					
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4						
5	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
570	Improved heating system high efficiency unit - Tie	Other	Space Heating	Retrofit	0.83	3.61
571	Improved heating system high efficiency unit - Tie	Other	Space Heating	Remodel/Replacment	1.34	0.90
572	Improved heating system condensing unit - Tier 2	Other	Space Heating	Retrofit	2.01	1.49
573	Improved heating system condensing unit - Tier 2	Other	Space Heating	Remodel/Replacment	1.91	0.63
574	Programmable Thermostat	Other	Space Heating	Retrofit	22.42	0.09
575	Programmable Thermostat	Other	Space Heating	Renovation	1.65	0.71
576	Programmable Thermostat	Other	Space Heating	Remodel/Replacment	2.61	0.45
577	Demand-Controlled Ventilation (controller, sensor	Other	Space Heating	Retrofit	17.64	(0.11)
578	Demand-Controlled Ventilation (controller, sensor	Other	Space Heating	New construction	4.43	0.17
579	Demand-Controlled Ventilation (controller, sensor	Other	Space Heating	Remodel/Replacment	6.86	0.07
580	Improved below-grade insulation	Other	Space Heating	New construction	2.00	0.60
581	Improved below-grade insulation	Other	Space Heating	Renovation	2.00	0.60
582	Sensible Heat Recovery	Other	Space Heating	Retrofit	4.54	1.46
583	Sensible Heat Recovery	Other	Space Heating	New construction	1.55	0.96
584	Sensible Heat Recovery	Other	Space Heating	Remodel/Replacment	2.32	0.81
585	Pipe insulation - space heating	Other	Space Heating	Retrofit	55.38	0.05
586	Pipe insulation - space heating	Other	Space Heating	New construction	36.21	0.03
587	Pipe insulation - space heating	Other	Space Heating	Renovation	36.21	0.03
588	Energy Star washer	Other	Water Heating	New construction	1.38	(1.15)
589	Energy Star washer	Other	Water Heating	Remodel/Replacment	2.04	(2.87)
590	Swimming pool/spa covers	Other	Miscellaneous	Retrofit	3.98	0.38
591	Swimming pool/spa covers	Other	Miscellaneous	New construction	3.55	0.25
592	Swimming pool/spa covers	Other	Miscellaneous	Remodel/Replacment	3.96	0.22
593	Commissioning	Other	Total	New construction	1.90	(0.07)
594	Commissioning	Other	Total	Renovation	1.90	(0.07)
595	Commissioning	Other	Total	Remodel/Replacment	3.00	(0.58)
596	Retrocommissioning	Other	Total	Retrofit	3.27	(0.24)
597	Integrated Design - High Performance (30% > code)	Other	Total	New construction	1.55	0.57
598	Steam trap Maintenance	Other	Space Heating	Retrofit	1.82	0.64
599	Oxygen Trim	Other	Space Heating	Retrofit	26.41	0.10
600	Oxygen Trim	Other	Space Heating	New construction	49.79	0.02
601	Oxygen Trim	Other	Space Heating	Remodel/Replacment	31.74	0.04
602	Infrared Heater	Other	Space Heating	Retrofit	26.69	0.11
603	Infrared Heater	Other	Space Heating	Remodel/Replacment	106.39	0.01
604	Faucet aerator	Multifamily	Water Heating	Retrofit	9.97	(3.38)
605	Graywater heat exchanger/GFX	Multifamily	Water Heating	New construction	1.18	0.74
606	Graywater heat exchanger/GFX	Multifamily	Water Heating	Remodel/Replacment	1.51	0.58
607	Low-flow shower heads	Multifamily	Water Heating	Retrofit	9,999.00	(2.44)
608	Low-flow shower heads	Multifamily	Water Heating	New construction	6.03	(0.76)
609	Low-flow shower heads	Multifamily	Water Heating	Remodel/Replacment	7.73	(0.84)
610	Pipe insulation - water heating	Multifamily	Water Heating	Retrofit	27.34	0.07
611	Pipe insulation - water heating	Multifamily	Water Heating	New construction	21.33	0.04
612	Pipe insulation - water heating	Multifamily	Water Heating	Renovation	21.33	0.04
613	Tank insulation	Multifamily	Water Heating	Retrofit	2.02	0.94
614	Tank insulation	Multifamily	Water Heating	New construction	1.57	0.56
615	Tank insulation	Multifamily	Water Heating	Remodel/Replacment	2.02	0.43
616	Air Sealing	Multifamily	Space Heating	Retrofit	2.88	1.03

	A	C	D	E	F	G
1	Upstate Commercial Measures					
2	Total Resource Cost Test Benefit/Cost Ratio and Levelized Cost of Saved Energy					
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5	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
617	Air Sealing	Multifamily	Space Heating	New construction	2.17	0.55
618	Air Sealing	Multifamily	Space Heating	Renovation	2.17	0.55
619	Improved heating system high efficiency unit - Tier 2	Multifamily	Space Heating	Retrofit	0.79	3.81
620	Improved heating system high efficiency unit - Tier 2	Multifamily	Space Heating	New construction	3.51	0.34
621	Improved heating system high efficiency unit - Tier 2	Multifamily	Space Heating	Remodel/Replacment	4.36	0.27
622	Improved heating system condensing unit - Tier 2	Multifamily	Space Heating	Retrofit	6.47	0.46
623	Improved heating system condensing unit - Tier 2	Multifamily	Space Heating	New construction	4.86	0.25
624	Improved heating system condensing unit - Tier 2	Multifamily	Space Heating	Remodel/Replacment	6.04	0.20
625	Programmable Thermostat	Multifamily	Space Heating	Retrofit	4.65	0.57
626	Programmable Thermostat	Multifamily	Space Heating	Renovation	1.97	0.60
627	Programmable Thermostat	Multifamily	Space Heating	Remodel/Replacment	2.53	0.47
628	Pipe insulation - space heating	Multifamily	Space Heating	Retrofit	55.15	0.05
629	Pipe insulation - space heating	Multifamily	Space Heating	New construction	44.35	0.03
630	Pipe insulation - space heating	Multifamily	Space Heating	Renovation	44.35	0.03
631	Energy Star washer	Multifamily	Water Heating	New construction	1.90	(2.51)
632	Energy Star washer	Multifamily	Water Heating	Remodel/Replacment	2.25	(3.09)
633	Swimming pool/spa covers	Multifamily	Miscellaneous	Retrofit	4.11	0.37
634	Swimming pool/spa covers	Multifamily	Miscellaneous	Remodel/Replacment	4.08	0.22
635	Commissioning	Multifamily	Total	New construction	2.47	(0.48)
636	Commissioning	Multifamily	Total	Renovation	2.47	(0.48)
637	Commissioning	Multifamily	Total	Remodel/Replacment	3.16	(0.73)
638	Retrocommissioning	Multifamily	Total	Retrofit	3.41	(0.39)
639	Integrated Design - High Performance (30% > code)	Multifamily	Total	New construction	1.60	0.51
640	Integrated Design - High Performance (50% > code)	Multifamily	Total	New construction	0.48	3.17
641	Steam trap Maintenance	Multifamily	Space Heating	Retrofit	3.09	0.38
642	Oxygen Trim	Multifamily	Space Heating	Retrofit	44.00	0.06
643	Oxygen Trim	Multifamily	Space Heating	New construction	49.79	0.02
644	Oxygen Trim	Multifamily	Space Heating	Remodel/Replacment	47.58	0.02
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Subtracted Cost Effective Measures -- Upstate -- Low Avoided Costs

#	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
16	Cooling system chilled water reset	Office	Cooling	Retrofit	0.78	1.42
18	Cooling system chilled water reset	Office	Cooling	Remodel/Replacment	0.79	0.65
54	Improved heating system condensing unit - Tier 2	Office	Space Heating	Retrofit	0.62	3.60
70	Improved wall insulation	Office	Space Heating	New construction	0.80	1.14
71	Improved wall insulation	Office	Space Heating	Renovation	0.80	1.14
105	High efficiency ENERGY STAR steam cooker	Retail	Cooking	Retrofit	0.97	1.57
114	Cooling system chilled water reset	Retail	Cooling	Retrofit	0.76	1.44
116	Cooling system chilled water reset	Retail	Cooling	Remodel/Replacment	0.77	0.66
150	Improved heating system high efficiency unit - Tier 1	Retail	Space Heating	New construction	0.77	1.17
151	Improved heating system high efficiency unit - Tier 1	Retail	Space Heating	Remodel/Replacment	0.96	0.93
153	Improved heating system condensing unit - Tier 2	Retail	Space Heating	New construction	0.95	0.94
154	Improved heating system condensing unit - Tier 2	Retail	Space Heating	Remodel/Replacment	1.19	0.75
203	High efficiency ENERGY STAR steam cooker	Grocery	Cooking	Retrofit	0.97	1.57
212	Cooling system chilled water reset	Grocery	Cooling	Retrofit	0.83	1.37
214	Cooling system chilled water reset	Grocery	Cooling	Remodel/Replacment	0.83	0.63
247	Improved heating system high efficiency unit - Tier 1	Grocery	Space Heating	Retrofit	0.77	2.92
250	Improved heating system condensing unit - Tier 2	Grocery	Space Heating	Retrofit	2.05	1.10
251	Improved heating system condensing unit - Tier 2	Grocery	Space Heating	New construction	0.39	2.29
252	Improved heating system condensing unit - Tier 2	Grocery	Space Heating	Remodel/Replacment	0.48	1.86
310	Cooling system chilled water reset	Warehouse	Cooling	Retrofit	0.82	1.38
312	Cooling system chilled water reset	Warehouse	Cooling	Remodel/Replacment	0.83	0.63
345	Improved heating system high efficiency unit - Tier 1	Warehouse	Space Heating	Retrofit	0.59	3.84
348	Improved heating system condensing unit - Tier 2	Warehouse	Space Heating	Retrofit	2.27	0.99
371	Sensible Heat Recovery	Warehouse	Space Heating	New construction	0.96	0.92
386	Integrated Design - High Performance (50% > codes) Tier 2	Warehouse	Total	New construction	0.38	3.26
408	Cooling system chilled water reset	Education	Cooling	Retrofit	0.70	1.51
410	Cooling system chilled water reset	Education	Cooling	Remodel/Replacment	0.71	0.69
443	Improved heating system high efficiency unit - Tier 1	Education	Space Heating	Retrofit	0.81	2.78
446	Improved heating system condensing unit - Tier 2	Education	Space Heating	Retrofit	3.78	0.60
484	Integrated Design - High Performance (50% > codes) Tier 2	Education	Total	New construction	0.40	3.17
497	High efficiency ENERGY STAR steam cooker	Health	Cooking	Retrofit	0.97	1.57
506	Cooling system chilled water reset	Health	Cooling	Retrofit	0.83	1.36
507	Cooling system chilled water reset	Health	Cooling	New construction	0.73	0.70
508	Cooling system chilled water reset	Health	Cooling	Remodel/Replacment	0.84	0.62
510	Cooling system water side economizer	Health	Cooling	New construction	0.92	0.65
566	Sensible Heat Recovery	Health	Space Heating	Retrofit	-0.64	2.33
582	Integrated Design - High Performance (50% > codes) Tier 2	Health	Total	New construction	9999.00	0.00
595	High efficiency ENERGY STAR steam cooker	Lodging	Cooking	Retrofit	0.97	1.57
604	Cooling system chilled water reset	Lodging	Cooling	Retrofit	0.77	1.43
606	Cooling system chilled water reset	Lodging	Cooling	Remodel/Replacment	0.78	0.66
618	Graywater heat exchanger/GFX	Lodging	Water Heating	New construction	0.75	0.87
619	Graywater heat exchanger/GFX	Lodging	Water Heating	Remodel/Replacment	0.97	0.68
639	Improved heating system high efficiency unit - Tier 1	Lodging	Space Heating	Retrofit	0.59	3.81
642	Improved heating system condensing unit - Tier 2	Lodging	Space Heating	Retrofit	4.85	0.46
680	Integrated Design - High Performance (50% > codes) Tier 2	Lodging	Total	New construction	0.40	3.17
693	High efficiency ENERGY STAR steam cooker	Restaurant	Cooking	Retrofit	0.97	1.57
702	Cooling system chilled water reset	Restaurant	Cooling	Retrofit	0.80	1.40
703	Cooling system chilled water reset	Restaurant	Cooling	New construction	0.70	0.71
704	Cooling system chilled water reset	Restaurant	Cooling	Remodel/Replacment	0.81	0.64
706	Cooling system water side economizer	Restaurant	Cooling	New construction	0.93	0.64
741	Improved heating system condensing unit - Tier 2	Restaurant	Space Heating	New construction	0.43	2.11
742	Improved heating system condensing unit - Tier 2	Restaurant	Space Heating	Remodel/Replacment	0.47	1.89
763	Sensible Heat Recovery	Restaurant	Space Heating	New construction	0.95	0.91
889	High efficiency ENERGY STAR steam cooker	Other	Cooking	Retrofit	0.97	1.57
898	Cooling system chilled water reset	Other	Cooling	Retrofit	0.80	1.40
900	Cooling system chilled water reset	Other	Cooling	Remodel/Replacment	0.80	0.64
913	Graywater heat exchanger/GFX	Other	Water Heating	Remodel/Replacment	0.98	0.67
928	Tank insulation	Other	Water Heating	New construction	0.83	0.79
933	Improved heating system high efficiency unit - Tier 1	Other	Space Heating	Retrofit	0.62	3.61
935	Improved heating system high efficiency unit - Tier 1	Other	Space Heating	Remodel/Replacment	1.00	0.90
936	Improved heating system condensing unit - Tier 2	Other	Space Heating	Retrofit	1.51	1.49
938	Improved heating system condensing unit - Tier 2	Other	Space Heating	Remodel/Replacment	1.43	0.63
959	Sensible Heat Recovery	Other	Space Heating	New construction	0.86	0.96

Added Cost Effective Measures -- Upstate -- High Avoided Costs

#	Measure Name	Measure ID4 (e.g., Bldg type)	Measure ID5 (e.g., End Use)	Measure ID6 (e.g., Market: Retrofit, NC, ROB)	Total Resource BCR	TRC Levelized Cost per Saved Therm (\$/Therm)
31	Graywater heat exchanger/GFX	Office	Water Heating	Remodel/Replacment	1.10	0.99
76	Sensible Heat Recovery	Office	Space Heating	Retrofit	2.33	2.71
115	Cooling system chilled water reset	Retail	Cooling	New construction	1.15	0.81
118	Cooling system water side economizer	Retail	Cooling	New construction	1.09	0.77
213	Cooling system chilled water reset	Grocery	Cooling	New construction	1.21	0.76
216	Cooling system water side economizer	Grocery	Cooling	New construction	1.08	0.77
270	Improved roof insulation	Grocery	Space Heating	New construction	1.19	1.29
271	Improved roof insulation	Grocery	Space Heating	Renovation	1.19	1.29
311	Cooling system chilled water reset	Warehouse	Cooling	New construction	1.21	0.77
314	Cooling system water side economizer	Warehouse	Cooling	New construction	1.09	0.77
325	Graywater heat exchanger/GFX	Warehouse	Water Heating	Remodel/Replacment	1.12	0.98
409	Cooling system chilled water reset	Education	Cooling	New construction	1.10	0.84
412	Cooling system water side economizer	Education	Cooling	New construction	1.10	0.74
560	Improved wall insulation	Health	Space Heating	New construction	1.16	1.23
561	Improved wall insulation	Health	Space Heating	Renovation	1.16	1.23
567	Sensible Heat Recovery	Health	Space Heating	New construction	1.31	1.37
568	Sensible Heat Recovery	Health	Space Heating	Remodel/Replacment	1.45	1.33
605	Cooling system chilled water reset	Lodging	Cooling	New construction	1.16	0.80
608	Cooling system water side economizer	Lodging	Cooling	New construction	1.09	0.76
662	Improved roof insulation	Lodging	Space Heating	New construction	1.09	1.37
663	Improved roof insulation	Lodging	Space Heating	Renovation	1.09	1.37
912	Graywater heat exchanger/GFX	Other	Water Heating	New construction	1.04	1.05
934	Improved heating system high efficiency unit - Tier 1	Other	Space Heating	New construction	1.10	1.36
937	Improved heating system condensing unit - Tier 2	Other	Space Heating	New construction	1.56	0.96

New York Upstate Natural Gas Sales ('000 dTh)

SALES_A	1	2	3	4	5	6	7	8	9	10	
	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other	TOTAL
EXISTING END USE SALES FORECAST ('000 dTh), 2007 ESales_Up											
1 Space Heating	31,872	10,163	3,435	3,028	15,168	8,523	4,124	3,490	4,739	8,928	93469.64834
2 Water Heating	11,339	3,662	1,501	635	6,139	7,037	2,647	2,791	1,593	5,289	42633.38288
3 Cooking	0	2,410	1,031	114	3,165	2,831	679	3,851	156	3,754	17991.70074
4 Cooling	1,015	106	152	107	193	354	78	166	0	276	2445.919815
5 Miscellaneous	0	0	0	79	566	383	232	0	40	189	1489.270267
6 Total	44,227	16,342	6,118	3,963	25,232	19,127	7,759	10,298	6,529	18,436	158,030
New Construction Sales in 2007 ('000 dTh): NSALES_UP											
1 Space Heating	257.0	82.0	27.7	24.4	122.3	68.7	33.3	28.1	38.2	72.0	753.7874866
2 Water Heating	91.4	29.5	12.1	5.1	49.5	56.8	21.3	22.5	12.8	42.7	343.8176039
4 Cooling	0.0	19.4	8.3	0.9	25.5	22.8	5.5	31.1	1.3	30.3	145.0943608
5 Miscellaneous	8.2	0.9	1.2	0.9	1.6	2.9	0.6	1.3	0.0	2.2	19.72515979
6 Total	0.0	0.0	0.0	0.6	4.6	3.1	1.9	0.0	0.3	1.5	12
5 Miscellaneous	356.6659	131.7884	49.3379317	31.96188064	203.4809852	154.2536933	62.5734866	83.04896566	52.64964715	148.6738813	1,274
											159,304
Growth Factors — Annual percents apply to 2007 gas sales to get each years new and existing sales.											
Existing	Year	200800.0%	200900.0%	201000.0%	201100.0%	201200.0%	201300.0%	201400.0%	201500.0%	201600.0%	2017
1 Office		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
2 Retail		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
3 Grocery		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
4 Warehouse		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
5 Education		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
6 Health		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
7 Lodging		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
8 Restaurant		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
9 Multifamily		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
1000.0% Other		100.9%	101.7%	102.6%	103.5%	104.4%	105.3%	106.3%	107.2%	108.1%	
NC											
1 Office		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
2 Retail		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
3 Grocery		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
4 Warehouse		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
5 Education		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
6 Health		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
7 Lodging		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
8 Restaurant		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
9 Multifamily		100.8%	101.6%	102.4%	103.2%	104.1%	105.1%	106.2%	107.2%	108.3%	
10 Other		1.008	1.016064	1.024192512	1.032386052	1.04064514	1.051051592	1.061562108	1.072177729	1.082899506	

MEASURES #	Measure	Life	Enduse	Existing Life	NG Loadshape Name	Elec Loadshape Name
1	Direct fired convection range/oven	8	Cooking	8	NG Base	None
2	Exhaust Hood Makeup Air	20	Space Heating	20	NG Com Space Heat	Com Cooling
3	High efficiency ENERGY STAR fryer	8	Cooking	8	NG Base	None
4	High efficiency ENERGY STAR steam cooker	10	Cooking	10	NG Base	None
5	High efficiency griddle	8	Cooking	8	NG Base	None
6	Pre-Rinse Spray Valve	5	Water Heating	5	NG DHW	None
7	Refrigeration heat recovery	15	Water Heating	15	NG DHW	Com Refrigeration
8						None
9	Cooling system chilled water reset	15	Cooling	15	NG Cooling	Com Cooling
10	Cooling system water side economizer	15	Cooling	15	NG Cooling	Com Cooling
11	Cooling system oversized cooling tower	20	Cooling	20	NG Cooling	Com Cooling
12	Condensing DHW stand-alone	15	Water Heating	15	NG DHW	None
13	Faucet aerator	10	Water Heating	10	NG DHW	None
14	Graywater heat exchanger/GFX	20	Water Heating	20	NG DHW	None
15	Indirect-fired DHW off space heating boiler	25	Water Heating	25	NG DHW	None
16	Instantaneous. High-Modulating Water Heater	15	Water Heating	15	NG DHW	None
17	Low-flow shower heads	10	Water Heating	10	NG DHW	None
18	Pipe insulation - water heating	15	Water Heating	15	NG DHW	None
19	Tank insulation	15	Water Heating	15	NG DHW	None
20	Air Sealing	20	Space Heating	20	NG Com Space Heat	Com Ventilation
21	Improved heating system high efficiency unit - Tier 1	25	Space Heating	25	NG Com Space Heat	Com Heating
22	Improved heating system condensing unit - Tier 2	25	Space Heating	25	NG Com Space Heat	None
23	Programmable Thermostat	10	Space Heating	10	NG Com Space Heat	Com Cooling
24	Demand-Controlled Ventilation (controller, sensor)	15	Space Heating	15	NG Com Space Heat	Com Cooling
25	Outdoor Air Reset	2	Space Heating	2	NG Com Space Heat	None
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	30	Space Heating	30	NG Com Space Heat	Com Cooling
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	30	Space Heating	30	NG Com Space Heat	Com Cooling
28	Improved wall insulation	30	Space Heating	30	NG Com Space Heat	Com Cooling
29	Improved below-grade insulation	30	Space Heating	30	NG Com Space Heat	None
30	Improved roof insulation	30	Space Heating	30	NG Com Space Heat	Com Cooling
31	Sensible Heat Recovery	15	Space Heating	15	NG Com Space Heat	Com Economizer
32	Pipe insulation - space heating	15	Space Heating	15	NG Com Space Heat	None
33	Energy Star washer	11	Water Heating	11	NG DHW	Com Water Heating
34	Swimming pool/spa covers	5	Miscellaneous	5	NG DHW	None
35	Commissioning	7	Total	7	NG Com Space Heat	Com Total Building
36	Retrocommissioning	7	Total	7	NG Com Space Heat	Com Total Building
37	Integrated Design - High Performance (30% > codes) - Tier 1	25	Total	25	NG Com Space Heat	Com Total Building
38	Integrated Design - High Performance (50% > codes) Tier 2	25	Total	25	NG Com Space Heat	Com Total Building
39	Steam trap Maintenance	1	Space Heating	1	NG Com Space Heat	None
40	Oxygen Trim	10	Space Heating	10	NG Com Space Heat	None
41	Infrared Heater	20	Space Heating	20	NG Com Space Heat	None

Development Of Measure Factors

Applicability factors represent the share of end-use level gas usage that is attributable to a particular technology. The analysis drew on a variety of sources to develop applicability factors for each measure by building type. In general, data on market shares for different types and sizes of technologies are weighted based on overall energy consumption or capacity. For example, the applicability factor for condensing boilers reflects the share of total commercial square feet heated by gas that uses hot water boilers of less than approximately 3 million British thermal units per hour (Btuh) capacity. This reflects that condensing boilers are only applicable for hydronic (not steam) systems, and are currently available only up to about 3 million Btuh capacity. Where possible, separate applicability factors for each building type were developed. Where building type data was not available, average data for the total commercial market was used for all building types. New York-specific data was used when available. Alternatively, data from the Northeast or Mid-Atlantic states were used if possible. These data reflect a variety of baseline and market assessment data, including studies done for Long Island Power Authority (LIPA), NYSERDA, proprietary analyses for a number of New York and New Jersey utilities, the Commercial Building Energy Consumption survey (CBECS) developed by EIA, ACEEE, and published market assessments and other potential studies.

Feasibility factors are the fraction of the applicable end use technically feasible for conversion to the high-efficiency technology. Feasibility is not reduced for economic or behavioral barriers. Rather, feasibility reflects only technical or physical constraints that would make measure adoption inappropriate. For example, it is not feasible to install refrigeration heat recovery to supplement domestic hot water usage in buildings that do not have walk-in or other large refrigeration systems and relatively constant hot water loads. In most cases, it is feasible to replace baseline technology with an efficient alternative, resulting in a 100% feasibility factor. These data are based on various studies or engineering judgment. Major sources of data include a number of proprietary U.S. potential studies conducted in the past 5-years.

Measure savings factors are calculated based on individual measure data and assumptions about existing stock efficiency (for retrofit measures), standard practice for construction and purchases (for market-driven measures), and high-efficiency options. Measure-savings characteristics were developed using public and private information sources, including NYSERDA, CBECS, California Energy Commission, Efficiency Vermont, American Council for an Energy Efficient Economy (ACEEE), Lawrence Berkeley Laboratory (LBL), National Fenestration Rating Council (NFRC), various Northeastern U.S. baseline and market assessment studies, recent gas potential studies, and communications with manufacturers and vendors. Measure savings are expressed in % of baseline energy usage.

Baseline adjustment factors were used to adjust long term savings downward for retrofit measures. The initial savings for retrofit measures is the difference between the typical existing stock efficiency and the high-efficiency alternative. However, the long-term savings are the difference between the typical baseline efficiency of new construction and equipment and the high-efficiency alternative, which is typically lower. If retrofits were not considered, the existing stock eventually would get replaced with new baseline efficiency measures anyway. In most cases, the current baseline efficiency is more efficient than the average existing stock. For example, clothes washing equipment meeting U.S. Energy Policy Act (EPA) efficiency levels are baseline for new clothes washer purchases. However, the average efficiency of clothes washers existing today in commercial buildings falls short of EPA levels. The baseline adjustment factor adjusts the savings downward in future years for retrofit measures. The analysis assumes the vintage of all measures replaced in retrofit markets is half of its estimated measure life. Therefore, the baseline adjustment applies in the year immediately following half of the measure life. Baseline adjustment factors were developed based on the relative baseline efficiencies of new and existing stock, from current and historical technology, baseline and market assessment studies. Baseline adjustment factors are expressed in % of first year energy savings.

Electric and water savings factors (kWh/Dth-yr) and (gallons/Dth-yr) were developed based on engineering calculations or simulation modeling to calculate non-gas resource impacts.

Annual to peak-day ratios were used to estimate the measure peak-day impacts. The analysis relies on 8,760 hourly end-use and building-type specific load shape data to estimate these ratios, separately for each building type and measure. Load shape data is from Regional Economic Research.

Measure lives were developed from various sources including prior potential studies, NYSERDA, DOE, EPA, ACEEE, ASHRAE, Efficiency Vermont, NFRC, equipment manufacturers and professional judgment. The estimated measure lives reflect both engineering service life and estimated remodel activity.

Measure costs for each of the 40 technologies were developed based on a variety of sources, including but not limited to proprietary studies or data from northeastern United States utilities, R.S. Means, Efficiency Vermont, Grainger, and a California Energy Commission database of equipment costs, and discussions with equipment vendors. Measure costs obtained outside the Northeast region were adjusted based on R.S. Means location factors to better reflect New York costs. Retrofit measure costs include the total material and labor cost. Market-driven measure costs reflect the incremental material and labor cost of high efficiency as compared to standard practice.

Measure costs per Dth annual savings (\$/Dth) were developed for each building type for each of the 40 technologies analyzed, based on building-type-specific data, and the market applied to.

O&M cost impacts are considered in addition to measure installation costs. These reflect any incremental effects on O&M costs for each measure over its lifetime. O&M cost impacts reflect changes in measure and replacement component lives and costs for both the high- and standard-efficiency options.

Deferral credits were captured to properly estimate the long-term societal costs of retrofit measures. Related to O&M costs, the analysis accounts for the time value of permanently deferring the equipment purchase cycle for early-retirement (retrofit) measures. For example, a high-efficiency space heating unit typically lasts 25-years. If an existing space heating unit expected to last another 10-years is retrofitted with a new, high-efficiency model, the customer no longer has to purchase a new one in 10-years. Rather, the next space heating purchase will be in 25-years. Thus, all future space heating purchases have now been shifted out by fifteen years in perpetuity. This deferral of future capital investments provides a societal benefit by lowering present-value replacement costs. This societal value is captured through a “deferral credit.” The analysis assumed the remaining life of all existing measures to be retrofitted was, on average, equal to one half of the total measure life (for example, for an HVAC unit with a 25- year life, it was assumed the average existing unit was 12.5-years old and would normally be replaced 12.5-years hence).

Base-case penetrations were used to estimate the current and future market penetration of measures without any program intervention. The potential efficiency for any given measure is a function of the size of the market, the measure characteristics and the base-case penetration that would occur absent any market intervention. Base-case penetrations for each of the 40 technologies were separately estimated. In some cases, differing estimates by building-type are used, but in many cases, this level of disaggregation was not supported by the data. The base-case represents the existing and forecast measure penetrations that are assumed to underlie the forecast, which assumes no gas program interventions, but does take into account current and expected codes and standards, as well as current and expected New York electric efficiency programs. For retrofit measures, 5% of existing stock is assumed to likely be modified for retrofit reasons over the 10-year planning horizon (equivalent to assuming a 5% freeridership for the economic potential). Base-case penetrations for each of the market-driven measures were estimated to reflect expectations about likely market adoptions, based on expert judgment, review of market assessments, and knowledge of likely codes and standards changes over the planning period.

“Not complete” factors were used to eliminate any opportunities in the retrofit market where efficient equipment already exists rather than relying on base-case penetrations. These factors represent the remaining share of existing stock that has not already adopted the efficient measures. In other words, if 10% of existing buildings have condensing furnaces, the not complete factor for this measure would be 90%. Therefore, for retrofit measures base-case penetrations start at 0%.

Competing Technologies are accounted for with the economic potential penetrations. For the economic potential, by definition, 100% penetration is assumed whenever a measure is applicable and feasible. However, some of the technologies modeled are mutually exclusive -- that is, one or the other could be installed, but not both. For example, water heaters can be replaced with a stand-alone unit, an integrated system off a boiler, or point-of-use heaters. When two or more measures compete with one another, the adoption of the measure offering the highest per-unit savings or greatest anticipated cost-effectiveness is counted first. The penetration of the next competing measure was then estimated based on the remaining potential, taking into account the applicability, feasibility, and achievable penetration of the first measure. In other words, if 100% of water heaters could be replaced with condensing stand-alone units (and this measure is considered first), then 0% penetration opportunity remains for the other competing measures.

Interactions factors were used to account for interactions among measures. Individual measure savings are not additive. Because of interactions between measures, the total potential for all measures is less than the sum of individual measure opportunities taken independently. For example, installing high performance windows will reduce heating load and therefore lower the savings opportunities from installing a condensing boiler. Interaction factors are separately estimated for retrofit, existing building market-driven, and new construction markets. This is because some measures only apply to one market. For example, integrated high efficiency design applies only for new construction, retrocommissioning applies only for retrofit. As a result, the measures that interact with each other differ for each market. The measures within a group that interact, typically by end-use, are ranked based on priority. Although some measures, like commissioning, interact with all end uses. This ranking is based on per unit savings, or judgment about what measures are typically most cost-effective and likely to offer the greatest customer benefit. Each subsequent interacting measure is then adjusted for the potential savings captured by the prior measure.

It should be noted that the rank order does not affect ultimate total potential savings. However, it does effect the per measure savings and cost-effectiveness. A measure further down in the ranking would still cost the same amount to install, but is assumed to save less because of prior measures already assumed to be installed.

Note that both competing measure issues and interactions are not considered for the program scenario potential estimate. This is because the program scenario is sufficiently lower than likely maximum achievable potential that penetrations are not high enough to assume most customers are pursuing numerous measures at once.

APPLICABILITY		1	2	3	4	5	6	7	8	9	10
		Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other
1	Direct fired convection range/oven	0%	18%	18%	0%	18%	18%	18%	18%	0%	0%
2	Exhaust Hood Makeup Air	1%	2%	3%	6%	1%	1%	1%	20%	0%	1%
3	High efficiency ENERGY STAR fryer	54%	46%	46%	54%	46%	46%	46%	46%	0%	78%
4	High efficiency ENERGY STAR steam cooker	0%	6%	6%	0%	0%	6%	5%	6%	0%	5%
5	High efficiency griddle	46%	10%	10%	46%	10%	10%	10%	10%	0%	17%
6	Pre-Rinse Spray Valve	1%	1%	10%	1%	2%	2%	2%	40%	0%	1%
7	Refrigeration heat recovery	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%
8											
9	Cooling system chilled water reset	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
10	Cooling system water side economizer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
11	Cooling system oversized cooling tower	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
12	Condensing DHW stand-alone	62%	62%	62%	62%	62%	62%	62%	62%	0%	62%
13	Faucet aerator	50%	60%	5%	60%	15%	15%	5%	5%	5%	26%
14	Graywater heat exchanger/GFX	2%	0%	0%	2%	33%	2%	20%	50%	20%	13%
15	Indirect-fired DHW off space heating boiler	21%	6%	16%	6%	32%	36%	33%	16%	0%	20%
16	Instantaneous. High-Modulating Water Heater	62%	62%	62%	62%	62%	62%	62%	62%	0%	62%
17	Low-flow shower heads	2%	0%	0%	2%	33%	2%	20%	0%	20%	13%
18	Pipe insulation - water heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
19	Tank insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
20	Air Sealing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
21	Improved heating system high efficiency unit - Tier 1	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
22	Improved heating system condensing unit - Tier 2	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
23	Programmable Thermostat	74%	74%	74%	74%	74%	74%	74%	74%	74%	74%
24	Demand-Controlled Ventilation (controller, sensor)	10%	100%	100%	100%	100%	100%	100%	100%	100%	100%
25	Outdoor Air Reset	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
28	Improved wall insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
29	Improved below-grade insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
30	Improved roof insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
31	Sensible Heat Recovery	74%	74%	74%	74%	74%	74%	74%	74%	74%	74%
32	Pipe insulation - space heating	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
33	Energy Star washer	0%	0%	0%	0%	1%	0%	1%	0%	1%	0%
34	Swimming pool/spa covers	0%	0%	0%	0%	70%	20%	90%	0%	90%	20%
35	Commissioning	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%
36	Retrocommissioning	54%	54%	54%	54%	54%	54%	54%	54%	54%	54%
37	Integrated Design - High Performance (30% > codes) - Tier 1	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%
38	Integrated Design - High Performance (50% > codes) Tier 2	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%
39	Steam trap Maintenance	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%
40	Oxygen Trim	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%
41	Infrared Heater	0%	0%	50%	75%	0%	0%	0%	0%	0%	50%

FEASIBILITY		1	2	3	4	5	6	7	8	9	10
		Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other
1	Direct fired convection range/oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	Exhaust Hood Makeup Air	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	High efficiency ENERGY STAR fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	High efficiency ENERGY STAR steam cooker	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
5	High efficiency griddle	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
6	Pre-Rinse Spray Valve	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	Refrigeration heat recovery	10%	5%	80%	10%	15%	80%	20%	80%	0%	5%
8											
9	Cooling system chilled water reset	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
10	Cooling system water side economizer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
11	Cooling system oversized cooling tower	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
12	Condensing DHW stand-alone	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%
13	Faucet aerator	95%	95%	25%	95%	50%	25%	50%	25%	50%	75%
14	Graywater heat exchanger/GFX	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
15	Indirect-fired DHW off space heating boiler	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%
16	Instantaneous. High-Modulating Water Heater	10%	10%	0%	10%	10%	10%	0%	0%	0%	10%
17	Low-flow shower heads	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
18	Pipe insulation - water heating	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
19	Tank insulation	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
20	Air Sealing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
21	Improved heating system high efficiency unit - Tier 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
22	Improved heating system condensing unit - Tier 2	22%	22%	22%	22%	22%	22%	22%	22%	22%	21%
23	Programmable Thermostat	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%
24	Demand-Controlled Ventilation (controller, sensor)	100%	100%	100%	100%	100%	0%	0%	100%	0%	100%
25	Outdoor Air Reset	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	75%	75%	0%	0%	75%	75%	75%	75%	75%	75%
28	Improved wall insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
29	Improved below-grade insulation	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%
30	Improved roof insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
31	Sensible Heat Recovery	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%
32	Pipe insulation - space heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
33	Energy Star washer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
34	Swimming pool/spa covers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
35	Commissioning	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%
36	Retrocommissioning	54%	54%	54%	54%	54%	54%	54%	54%	54%	54%
37	Integrated Design - High Performance (30% > codes) - Tier 1	80%	80%	80%	80%	80%	50%	80%	50%	80%	100%
38	Integrated Design - High Performance (50% > codes) Tier 2	13%	13%	5%	5%	13%	0%	9%	0%	9%	80%
39	Steam trap Maintenance	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
40	Oxygen Trim	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%
41	Infrared Heater	0%	0%	65%	100%	0%	0%	0%	0%	0%	35%

% of retrofit measures not complete											
RET_Not	Complete	1	2	3	4	5	6	7	8	9	10
		Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other
1	Direct fired convection range/oven										
2	Exhaust Hood Makeup Air										
3	High efficiency ENERGY STAR fryer										
4	High efficiency ENERGY STAR steam cooker	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
5	High efficiency griddle										
6	Pre-Rinse Spray Valve	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
7	Refrigeration heat recovery	96%	96%	96%	96%	96%	96%	96%	96%	96%	96%
8											
9	Cooling system chilled water reset	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
10	Cooling system water side economizer	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
11	Cooling system oversized cooling tower	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
12	Condensing DHW stand-alone	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
13	Faucet aerator	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
14	Graywater heat exchanger/GFX	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
15	Indirect-fired DHW off space heating boiler	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
16	Instantaneous. High-Modulating Water Heater	93%	89%	100%	94%	99%	92%	100%	97%	100%	93%
17	Low-flow shower heads	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
18	Pipe insulation - water heating	50%	73%	70%	76%	14%	33%	49%	75%	49%	59%
19	Tank insulation	89%	76%	100%	100%	25%	25%	25%	86%	25%	25%
20	Air Sealing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
21	Improved heating system high efficiency unit - Tier 1	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
22	Improved heating system condensing unit - Tier 2	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%
23	Programmable Thermostat	49%	79%	78%	38%	49%	49%	34%	50%	34%	42%
24	Demand-Controlled Ventilation (controller, sensor)	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%
25	Outdoor Air Reset	53%	79%	80%	78%	17%	75%	57%	100%	57%	17%
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1										
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2										
28	Improved wall insulation										
29	Improved below-grade insulation										
30	Improved roof insulation										
31	Sensible Heat Recovery	90%	90%	76%	69%	74%	90%	62%	78%	50%	50%
32	Pipe insulation - space heating	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
33	Energy Star washer										
34	Swimming pool/spa covers	0%	0%	0%	0%	27%	50%	80%	0%	80%	63%
35	Commissioning										
36	Retrocommissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
37	Integrated Design - High Performance (30% > codes) - Tier 1										
38	Integrated Design - High Performance (50% > codes) Tier 2										
39	Steam trap Maintenance	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
40	Oxygen Trim	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
41	Infrared Heater	100%	100%	100%	94%	100%	100%	100%	100%	100%	93%

Annual dTh saved/Peak day dTh saved											
kWh_kW_ratio	1	2	3	4	5	6	7	8	9	10	
	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other	
1	Direct fired convection range/oven	268	351	363	281	226	351	365	363	365	343
2	Exhaust Hood Makeup Air	95	81	90	102	75	95	85	96	85	101
3	High efficiency ENERGY STAR fryer	268	351	363	281	226	351	365	363	365	343
4	High efficiency ENERGY STAR steam cooker	268	351	363	281	226	351	365	363	365	343
5	High efficiency griddle	268	351	363	281	226	351	365	363	365	343
6	Pre-Rinse Spray Valve	261	464	267	571	201	260	266	267	266	258
7	Refrigeration heat recovery	261	464	267	571	201	260	266	267	266	258
8											
9	Cooling system chilled water reset	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999
10	Cooling system water side economizer	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999
11	Cooling system oversized cooling tower	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999	999,999,999
12	Condensing DHW stand-alone	261	464	267	571	201	260	266	267	266	258
13	Faucet aerator	261	464	267	571	201	260	266	267	266	258
14	Graywater heat exchanger/GFX	261	464	267	571	201	260	266	267	266	258
15	Indirect-fired DHW off space heating boiler	261	464	267	571	201	260	266	267	266	258
16	Instantaneous. High-Modulating Water Heater	261	464	267	571	201	260	266	267	266	258
17	Low-flow shower heads	261	464	267	571	201	260	266	267	266	258
18	Pipe insulation - water heating	261	464	267	571	201	260	266	267	266	258
19	Tank insulation	261	464	267	571	201	260	266	267	266	258
20	Air Sealing	95	81	90	102	75	95	85	96	85	101
21	Improved heating system high efficiency unit - Tier 1	95	81	90	102	75	95	85	96	85	101
22	Improved heating system condensing unit - Tier 2	95	81	90	102	75	95	85	96	85	101
23	Programmable Thermostat	95	81	90	102	75	95	85	96	85	101
24	Demand-Controlled Ventilation (controller, sensor)	95	81	90	102	75	95	85	96	85	101
25	Outdoor Air Reset	95	81	90	102	75	95	85	96	85	101
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	95	81	90	102	75	95	85	96	85	101
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	95	81	90	102	75	95	85	96	85	101
28	Improved wall insulation	95	81	90	102	75	95	85	96	85	101
29	Improved below-grade insulation	95	81	90	102	75	95	85	96	85	101
30	Improved roof insulation	95	81	90	102	75	95	85	96	85	101
31	Sensible Heat Recovery	95	81	90	102	75	95	85	96	85	101
32	Pipe insulation - space heating	95	81	90	102	75	95	85	96	85	101
33	Energy Star washer	261	464	267	571	201	260	266	267	266	258
34	Swimming pool/spa covers	261	464	267	571	201	260	266	267	266	258
35	Commissioning	95	81	90	102	75	95	85	96	85	101
36	Retrocommissioning	95	81	90	102	75	95	85	96	85	101
37	Integrated Design - High Performance (30% > codes) - Tier 1	95	81	90	102	75	95	85	96	85	101
38	Integrated Design - High Performance (50% > codes) Tier 2	95	81	90	102	75	95	85	96	85	101
39	Steam trap Maintenance	95	81	90	102	75	95	85	96	85	101
40	Oxygen Trim	95	81	90	102	75	95	85	96	85	101
41	Infrared Heater	95	81	90	102	75	95	85	96	85	101

% replacement/remodel interaction or overlap factor														rank order	interacts with
MD_Interactions	1	2	3	4	5	6	7	8	9	10					
	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other					
1	Direct fired convection range/oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
2	Exhaust Hood Makeup Air	93%	83%	65%	79%	70%	94%	94%	78%	94%	76%	10	2a,3,9		
3	High efficiency ENERGY STAR fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
4	High efficiency ENERGY STAR steam cooker	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
5	High efficiency griddle	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
6	Pre-Rinse Spray Valve	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
7	Refrigeration heat recovery	85%	87%	86%	87%	79%	84%	81%	78%	95%	84%	8	,1,2,4,6,7		
8															
9	Cooling system chilled water reset	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	5	,2a,3		
10	Cooling system water side economizer	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	4	,2a,3		
11	Cooling system oversized cooling tower	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	3	,2a		
12	Condensing DHW stand-alone	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	1			
13	Faucet aerator	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%				
14	Graywater heat exchanger/GFX	87%	88%	87%	88%	85%	85%	85%	87%	100%	87%	4	,1,2		
15	Indirect-fired DHW off space heating boiler	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	2			
16	Instantaneous, High-Modulating Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	3			
17	Low-flow shower heads	86%	88%	87%	88%	80%	85%	82%	79%	96%	84%	5	,1,2,4		
18	Pipe insulation - water heating	87%	88%	87%	88%	85%	85%	85%	87%	100%	87%	7	,1,2		
19	Tank insulation	87%	88%	87%	88%	85%	85%	85%	87%	100%	87%	6	,1,2		
20	Air Sealing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
21	Improved heating system high efficiency unit - Tier 1	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	3	2a		
22	Improved heating system condensing unit - Tier 2	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	3	2a		
23	Programmable Thermostat	94%	94%	95%	94%	94%	94%	94%	95%	94%	94%	4	,2a,3		
24	Demand-Controlled Ventilation (controller, sensor)	94%	94%	95%	94%	94%	94%	94%	95%	94%	94%	5	,2a,3		
25	Outdoor Air Reset	93%	83%	65%	79%	70%	94%	94%	78%	94%	76%	7	,2a,3,4,5		
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	92%	83%	64%	79%	70%	94%	94%	78%	94%	75%	12	,2a,3,5,9		
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	92%	83%	64%	79%	70%	94%	94%	78%	94%	75%	12	,2a,3,5,9		
28	Improved wall insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%				
29	Improved below-grade insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%				
30	Improved roof insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%				
31	Sensible Heat Recovery	92%	82%	64%	78%	69%	93%	93%	77%	93%	75%	8	2a,3,4,5,7		
32	Pipe insulation - space heating	92%	82%	64%	78%	69%	93%	93%	77%	93%	75%	9	2a,3,4,5,7		
33	Energy Star washer	83%	85%	84%	84%	77%	81%	79%	76%	92%	81%	9	2a,1,2,4,6,7		
34	Swimming pool/spa covers	83%	85%	84%	84%	82%	82%	82%	84%	96%	83%	10	2a,1,2,6,7		
35	Commissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	2a	0		
36	Retrocommissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
37	Integrated Design - High Performance (30% > codes) - Tier 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0		
38	Integrated Design - High Performance (50% > codes) Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0		
39	Steam trap Maintenance	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0			
40	Oxygen Trim	91%	65%	52%	72%	62%	87%	96%	60%	96%	64%	11	2a,4,5,7,8,9		
41	Infrared Heater	96%	85%	66%	81%	73%	97%	97%	80%	97%	78%	13	2a,4,5		

Interaction interim factors (prod of %savings, applicability, feasibility, and max pen)											
MD interim interactions	1	2	3	4	5	6	7	8	9	10	
	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other	
1	Direct fired convection range/oven	0%	5%	5%	0%	5%	5%	5%	0%	0%	0%
2	Exhaust Hood Makeup Air	0%	1%	1%	2%	0%	0%	6%	0%	0%	0%
3	High efficiency ENERGY STAR	14%	12%	12%	14%	12%	12%	12%	0%	20%	
4	High efficiency ENERGY STAR	0%	2%	2%	0%	2%	2%	2%	0%	2%	
5	High efficiency griddle	3%	1%	1%	3%	1%	1%	1%	0%	1%	
6	Pre-Rinse Spray Valve										
7	Refrigeration heat recovery	0%	0%	10%	7%	3%	2%	34%	0%	0%	
8											
9	Cooling system chilled water re	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	
10	Cooling system water side economizer	15%	15%	15%	15%	15%	15%	15%	15%	15%	
11	Cooling system oversized cooling coil	2%	2%	2%	2%	2%	2%	2%	2%	2%	
12	Condensing DHW stand-alone	11%	11%	11%	11%	11%	11%	11%	0%	11%	
13	Faucet aerator										
14	Graywater heat exchanger/GFEX	0%	0%	0%	0%	6%	0%	4%	10%	4%	3%
15	Indirect-fired DHW off space heating	2%	1%	2%	1%	4%	4%	4%	2%	0%	2%
16	Instantaneous, High-Modulating	-0.04%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17	Low-flow shower heads	1%	0%	0%	1%	10%	1%	6%	0%	6%	4%
18	Pipe insulation - water heating	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
19	Tank insulation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Air Sealing	21%	12%	1%	7%	14%	3%	7%	13%	7%	14%
21	Improved heating system high capacity	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
22	Improved heating system condensing	1%	1%	0%	1%	1%	1%	0%	1%	1%	1%
23	Programmable Thermostat	1%	1%	1%	6%	2%	0%	0%	1%	0%	1%
24	Demand-Controlled Ventilation	0%	11%	31%	11%	23%	0%	0%	17%	0%	19%
25	Outdoor Air Reset	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
26	High Performance Glazing double pane	3%	1%	0%	1%	2%	4%	3%	3%	3%	3%
27	High Performance Glazing triple pane	11%	4%	0%	0%	7%	9%	4%	7%	10%	6%
28	Improved wall insulation	3%	3%	2%	3%	1%	4%	2%	2%	2%	3%
29	Improved below-grade insulating	1%	2%	1%	3%	1%	0%	1%	2%	0%	1%
30	Improved roof insulation	3%	2%	5%	7%	4%	2%	2%	4%	2%	3%
31	Sensible Heat Recovery	4%	23%	20%	10%	13%	9%	0%	24%	0%	17%
32	Pipe insulation - space heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Energy Star washer	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
34	Swimming pool/spa covers	0%	0%	0%	0%	17%	5%	22%	0%	22%	5%
35	Commissioning	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
36	Retrocommissioning	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Integrated Design - High Performance	21%	21%	21%	21%	21%	13%	21%	13%	21%	26%
38	Integrated Design - High Performance	2%	2%	1%	1%	2%	0%	2%	0%	2%	15%
39	Steam trap Maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Oxygen Trim	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
41	Infrared Heater	0%	0%	1%	3%	0%	0%	0%	0%	0%	1%

Interaction interim factors (prod of %savings, applicability, feasibility, and max pen)

NC Interim Interactions	10										
	1	2	3	4	5	6	7	8	9	10	
	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other	
1	Direct fired convection range/ov	0%	5%	5%	0%	5%	5%	5%	5%	0%	0%
2	Exhaust Hood Makeup Air	0%	1%	1%	2%	0%	0%	0%	6%	0%	0%
3	High efficiency ENERGY STAR	14%	12%	12%	14%	12%	12%	12%	12%	0%	20%
4	High efficiency ENERGY STAR	0%	2%	2%	0%	0%	2%	2%	2%	0%	2%
5	High efficiency griddle	3%	1%	1%	3%	1%	1%	1%	1%	0%	1%
6	Pre-Rinse Spray Valve										
7	Refrigeration heat recovery	0%	0%	10%	7%	3%	2%	1%	34%	0%	0%
8											
9	Cooling system chilled water re	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
10	Cooling system water side econ	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
11	Cooling system oversized cooli	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
12	Condensing DHW stand-alone	11%	11%	11%	11%	11%	11%	11%	11%	0%	11%
13	Faucet aerator										
14	Graywater heat exchanger/GF>	0%	0%	0%	0%	6%	0%	4%	10%	4%	3%
15	Indirect-fired DHW off space he	2%	1%	2%	1%	4%	4%	4%	2%	0%	2%
16	Instantaneous. High-Modulating	-0.04%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17	Low-flow shower heads	1%	0%	0%	1%	10%	1%	6%	0%	6%	4%
18	Pipe insulation - water heating	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
19	Tank insulation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20	Air Sealing	21%	12%	1%	7%	14%	3%	7%	13%	7%	14%
21	Improved heating system high ε	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
22	Improved heating system cond	1%	1%	0%	1%	1%	1%	1%	0%	1%	1%
23	Programmable Thermostat	1%	1%	1%	6%	2%	0%	0%	1%	0%	1%
24	Demand-Controlled Ventilation	0%	11%	31%	11%	23%	0%	0%	17%	0%	19%
25	Outdoor Air Reset	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
26	High Performance Glazing dou	3%	1%	0%	1%	2%	4%	3%	3%	3%	3%
27	High Performance Glazing tripl	11%	4%	0%	0%	7%	9%	4%	7%	10%	6%
28	Improved wall insulation	3%	3%	2%	3%	1%	4%	2%	2%	2%	3%
29	Improved below-grade insulatio	1%	2%	1%	3%	1%	0%	1%	2%	0%	1%
30	Improved roof insulation	3%	2%	5%	7%	4%	2%	2%	4%	2%	3%
31	Sensible Heat Recovery	4%	23%	20%	10%	13%	9%	0%	24%	0%	17%
32	Pipe insulation - space heating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33	Energy Star washer	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
34	Swimming pool/spa covers	0%	0%	0%	0%	17%	5%	22%	0%	22%	5%
35	Commissioning	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
36	Retrocommissioning	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37	Integrated Design - High Perfor	21%	21%	21%	21%	21%	13%	21%	13%	21%	26%
38	Integrated Design - High Perfor	2%	2%	1%	1%	2%	0%	2%	0%	2%	15%
39	Steam trap Maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40	Oxygen Trim	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
41	Infrared Heater	0%	0%	1%	3%	0%	0%	0%	0%	0%	1%

RET_Interactions													rank order	interacts with
	1	2	3	4	5	6	7	8	9	10				
	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other				
1	Direct fired convection range/oven	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0		
2	Exhaust Hood Makeup Air	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
3	High efficiency ENERGY STAR fryer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0		
4	High efficiency ENERGY STAR steam cooker	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0		
5	High efficiency griddle	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0		
6	Pre-Rinse Spray Valve	84%	86%	84%	85%	77%	82%	79%	76%	94%	82%	10	,1,2,4,7,8	
7	Refrigeration heat recovery	84%	86%	84%	85%	83%	82%	83%	84%	98%	84%	9	,1,2,7,8	
8														
9	Cooling system chilled water reset	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	3	1a,1	
10	Cooling system water side economizer	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	2	1a,1	
11	Cooling system oversized cooling tower	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	1	1a	
12	Condensing DHW stand-alone	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	1		
13	Faucet aerator	85%	87%	86%	87%	79%	84%	81%	78%	96%	84%	6	,1,2,3,4	
14	Graywater heat exchanger/GFX	86%	87%	86%	87%	84%	84%	84%	86%	100%	86%	4	,1,2	
15	Indirect-fired DHW off space heating boiler	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	2		
16	Instantaneous, High-Modulating Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	3		
17	Low-flow shower heads	85%	87%	86%	87%	79%	84%	81%	78%	96%	84%	5	,1,2,4	
18	Pipe insulation - water heating	86%	87%	86%	87%	84%	84%	84%	86%	100%	86%	8	,1,2	
19	Tank insulation	86%	87%	86%	87%	84%	84%	84%	86%	100%	86%	7	,1,2	
20	Air Sealing	88%	76%	53%	59%	58%	93%	93%	64%	93%	78%	6	1a,2,3,4,5	
21	Improved heating system high efficiency unit - Tier 1	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	2	1a	
22	Improved heating system condensing unit - Tier 2	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	2	1a	
23	Programmable Thermostat	95%	96%	95%	96%	95%	95%	95%	96%	95%	95%	3	1a,2	
24	Demand-Controlled Ventilation (controller, sensor)	90%	91%	92%	70%	86%	95%	95%	92%	95%	90%	4	1a,2,3	
25	Outdoor Air Reset	90%	78%	54%	60%	60%	95%	95%	65%	95%	79%	5	1a,2,3,4	
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
28	Improved wall insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
29	Improved below-grade insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
30	Improved roof insulation	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
31	Sensible Heat Recovery	69%	66%	53%	54%	50%	90%	86%	55%	86%	66%	7	1a,2,3,4,5,6	
32	Pipe insulation - space heating	93%	94%	93%	94%	93%	93%	93%	94%	93%	93%	8	1a,2,5	
33	Energy Star washer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
34	Swimming pool/spa covers	86%	87%	86%	87%	84%	84%	84%	86%	100%	86%	10	1,2	
35	Commissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
36	Retrocommissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	1a		
37	Integrated Design - High Performance (30% > codes) - Tier 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
38	Integrated Design - High Performance (50% > codes) Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0	0	
39	Steam trap Maintenance	69%	48%	39%	45%	44%	83%	90%	39%	90%	53%	10	1a,3,4,6,7,8,9	
40	Oxygen Trim	67%	47%	40%	48%	43%	82%	88%	39%	88%	53%	9	1a,3,4,5,6,7,8	
41	Infrared Heater	94%	94%	95%	72%	89%	98%	98%	95%	98%	93%	11	1a,3	

Interaction interim factors (prod of %savings, applicability, feasibility, and max pen)

RET	interim interactions	1	2	3	4	5	6	7	8	9	10
		Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Multifamily	Other
1	Direct fired convection range/oven										
2	Exhaust Hood Makeup Air	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	High efficiency ENERGY STAR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	High efficiency ENERGY STAR	0%	3%	3%	0%	0%	3%	2%	3%	0%	2%
5	High efficiency griddle	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	Pre-Rinse Spray Valve	0%	0%	5%	0%	1%	1%	1%	19%	0%	0%
7	Refrigeration heat recovery	1%	0%	11%	8%	3%	2%	1%	38%	0%	0%
8											
9	Cooling system chilled water re	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10	Cooling system water side ecor	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%
11	Cooling system oversized cooli	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
12	Condensing DHW stand-alone	12%	12%	12%	12%	12%	12%	12%	0%	0%	12%
13	Faucet aerator	35%	43%	1%	43%	4%	2%	2%	1%	2%	10%
14	Graywater heat exchanger/GF)	0%	0%	0%	0%	7%	0%	4%	10%	4%	3%
15	Indirect-fired DHW off space he	2%	1%	2%	1%	4%	4%	4%	2%	0%	2%
16	Instantaneous. High-Modulatin	0.00%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17	Low-flow shower heads	1%	0%	0%	1%	16%	1%	10%	0%	10%	6%
18	Pipe insulation - water heating	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
19	Tank insulation	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
20	Air Sealing	22%	13%	1%	8%	14%	3%	7%	14%	7%	14%
21	Improved heating system high	3%	2%	2%	2%	3%	3%	3%	2%	3%	2%
22	Improved heating system condi	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
23	Programmable Thermostat	5%	4%	4%	26%	9%	0%	0%	4%	0%	6%
24	Demand-Controlled Ventilation	0%	15%	41%	15%	31%	0%	0%	29%	0%	12%
25	Outdoor Air Reset	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
26	High Performance Glazing dou	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27	High Performance Glazing tripl	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28	Improved wall insulation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29	Improved below-grade insulatic	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30	Improved roof insulation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31	Sensible Heat Recovery	5%	30%	26%	13%	17%	12%	0%	31%	0%	22%
32	Pipe insulation - space heating	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
33	Energy Star washer	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
34	Swimming pool/spa covers	0%	0%	0%	0%	42%	12%	54%	0%	54%	12%
35	Commissioning	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36	Retrocommissioning	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
37	Integrated Design - High Perfor	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38	Integrated Design - High Perfor	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39	Steam trap Maintenance	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
40	Oxygen Trim	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
41	Infrared Heater	0%	0%	4%	9%	0%	0%	0%	0%	0%	2%

Elect_Loadshapes		% of Annual Energy Savings						Coincidence Factors	
		Summer On- Peak Energy	Summer Off- Peak Energy	Summer Shoulder Energy	Winter On- Peak Energy	Winter Off- Peak Energy	Winter Shoulder Energy	Summer Generation Capacity	Winter Generation Capacity
1	Com Cooling	21%	49%	25%	0%	4%	0%	99%	4%
2	Com Refrigeration	5%	38%	8%	6%	37%	6%	92%	86%
3	Com Ventilation	5%	32%	7%	7%	43%	7%	90%	94%
4	Com Heating	0%	1%	0%	14%	66%	18%	1%	69%
5	Com Economizer	25%	45%	28%	0%	1%	0%	62%	0%
6	Com Water Heating	6%	33%	8%	10%	37%	7%	69%	85%
7	Com Total Building	8%	38%	11%	6%	32%	5%	78%	45%

Market Driven Achievable Penetrations		Net Penetrations (Penetration above baseline)									
MD_PEN_TECH		1	2	3	4	5	6	7	8	9	10
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
1	Direct fired convection range/oven	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
2	Exhaust Hood Makeup Air	0.05	0.1	0.16	0.23	0.3	0.2	0.22	0.24	0.26	0.28
3	High efficiency ENERGY STAR fryer	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
4	High efficiency ENERGY STAR steam cooker	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
5	High efficiency griddle										
6	Pre-Rinse Spray Valve										
7	Refrigeration heat recovery	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
8											
9	Cooling system chilled water reset	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
10	Cooling system water side economizer	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
11	Cooling system oversized cooling tower										
12	Condensing DHW stand-alone	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
13	Faucet aerator										
14	Graywater heat exchanger/GFX	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
15	Indirect-fired DHW off space heating boiler	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
16	Instantaneous, High-Modulating Water Heater	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
17	Low-flow shower heads	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
18	Pipe insulation - water heating	0.04	0.08	0.12	0.16	0.2	0.1	0.12	0.14	0.16	0.18
19	Tank insulation	0.03	0.05	0.07	0.1	0.12	0.075	0.085	0.09	0.1	0.1
20	Air Sealing	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
21	Improved heating system high efficiency unit - Tier 1	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
22	Improved heating system condensing unit - Tier 2	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
23	Programmable Thermostat	0.03	0.05	0.07	0.1	0.12	0.075	0.085	0.09	0.1	0.1
24	Demand-Controlled Ventilation (controller, sensor)	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
25	Outdoor Air Reset	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
28	Improved wall insulation	0.01	0.02	0.03	0.04	0.05	0.01	0.02	0.03	0.04	0.05
29	Improved below-grade insulation	0.01	0.02	0.03	0.04	0.05	0.01	0.02	0.03	0.04	0.05
30	Improved roof insulation	0.01	0.02	0.03	0.04	0.05	0.01	0.02	0.03	0.04	0.05
31	Sensible Heat Recovery	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
32	Pipe insulation - space heating	0.03	0.05	0.07	0.1	0.12	0.075	0.085	0.09	0.1	0.1
33	Energy Star washer	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
34	Swimming pool/spa covers	0.03	0.05	0.08	0.11	0.13	0.05	0.06	0.07	0.08	0.09
35	Commissioning	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
36	Retrocommissioning										
37	Integrated Design - High Performance (30% > codes) - Tier 1	0.03	0.05	0.08	0.11	0.13	0.05	0.06	0.07	0.08	0.09
38	Integrated Design - High Performance (50% > codes) Tier 2	0.01	0.02	0.03	0.04	0.05	0.01	0.02	0.03	0.04	0.05
39	Steam trap Maintenance										
40	Oxygen Trim	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
41	Infrared Heater	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19

New Construction Achievable Penetrations		Net Penetrations (Penetration above baseline)									
NC_PEN_TECH		1	2	3	4	5	6	7	8	9	10
1	Direct fired convection range/oven	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
2	Exhaust Hood Makeup Air	0.05	0.1	0.16	0.23	0.3	0.2	0.22	0.24	0.26	0.28
3	High efficiency ENERGY STAR fryer	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
4	High efficiency ENERGY STAR steam cooker	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
5	High efficiency griddle	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
6	Pre-Rinse Spray Valve										
7	Refrigeration heat recovery	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
8											
9	Cooling system chilled water reset	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
10	Cooling system water side economizer	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
11	Cooling system oversized cooling tower	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
12	Condensing DHW stand-alone	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
13	Faucet aerator										
14	Graywater heat exchanger/GFX	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
15	Indirect-fired DHW off space heating boiler	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
16	Instantaneous, High-Modulating Water Heater	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
17	Low-flow shower heads	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
18	Pipe insulation - water heating	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
19	Tank insulation	0.03	0.05	0.07	0.1	0.12	0.075	0.085	0.09	0.1	0.1
20	Air Sealing	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
21	Improved heating system high efficiency unit - Tier 1	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
22	Improved heating system condensing unit - Tier 2	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
23	Programmable Thermostat	0.03	0.05	0.07	0.1	0.12	0.075	0.085	0.09	0.1	0.1
24	Demand-Controlled Ventilation (controller, sensor)	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
25	Outdoor Air Reset	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
28	Improved wall insulation	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
29	Improved below-grade insulation	0.04	0.09	0.14	0.2	0.25	0.12	0.13	0.14	0.15	0.16
30	Improved roof insulation	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
31	Sensible Heat Recovery	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
32	Pipe insulation - space heating	0.03	0.05	0.07	0.1	0.12	0.075	0.085	0.09	0.1	0.1
33	Energy Star washer	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19
34	Swimming pool/spa covers	0.03	0.05	0.08	0.11	0.13	0.05	0.06	0.07	0.08	0.09
35	Commissioning	0.02	0.04	0.06	0.08	0.1	0.02	0.03	0.04	0.05	0.06
36	Retrocommissioning										
37	Integrated Design - High Performance (30% > codes) - Tier 1	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
38	Integrated Design - High Performance (50% > codes) Tier 2	0.01	0.02	0.03	0.04	0.05	0.01	0.02	0.03	0.04	0.05
39	Steam trap Maintenance										
40	Oxygen Trim	0.04	0.08	0.12	0.16	0.2	0.08	0.09	0.1	0.11	0.12
41	Infrared Heater	0.05	0.1	0.16	0.23	0.3	0.15	0.16	0.17	0.18	0.19

Retrofit Achievable Penetrations		Net Penetrations (Penetration above baseline)				
RET_PEN_TECH		1	2	3	4	5
		2007	2008	2009	2010	2011
1	Direct fired convection range/oven					
2	Exhaust Hood Makeup Air					
3	High efficiency ENERGY STAR fryer					
4	High efficiency ENERGY STAR steam cooker	0.00125	0.0025	0.0035	0.005	0.0075
5	High efficiency griddle					
6	Pre-Rinse Spray Valve	0.005	0.01	0.015	0.02	0.03
7	Refrigeration heat recovery	0.0025	0.0035	0.0045	0.005	0.005
8						
9	Cooling system chilled water reset	0.005	0.01	0.015	0.02	0.03
10	Cooling system water side economizer	0.0035	0.005	0.0075	0.01	0.0125
11	Cooling system oversized cooling tower	0.00125	0.0025	0.0035	0.005	0.0075
12	Condensing DHW stand-alone	0.0035	0.005	0.0075	0.01	0.0125
13	Faucet aerator	0.005	0.01	0.015	0.02	0.03
14	Graywater heat exchanger/GFX	0.00125	0.0025	0.0035	0.005	0.0075
15	Indirect-fired DHW off space heating boiler	0.0035	0.005	0.0075	0.01	0.0125
16	Instantaneous, High-Modulating Water Heater	0.0035	0.005	0.0075	0.01	0.0125
17	Low-flow shower heads	0.005	0.01	0.015	0.02	0.03
18	Pipe insulation - water heating	0.0035	0.005	0.0075	0.01	0.0125
19	Tank insulation	0.005	0.01	0.015	0.02	0.03
20	Air Sealing	0.005	0.01	0.015	0.02	0.03
21	Improved heating system high efficiency unit - Tier 1	0.00125	0.0025	0.0035	0.005	0.0075
22	Improved heating system condensing unit - Tier 2	0.00125	0.0025	0.0035	0.005	0.0075
23	Programmable Thermostat	0.005	0.01	0.015	0.02	0.03
24	Demand-Controlled Ventilation (controller, sensor)	0.005	0.01	0.015	0.02	0.03
25	Outdoor Air Reset	0.005	0.01	0.015	0.02	0.03
26	High Performance Glazing double pane, low-E, low conductivity frame - Tier 1					
27	High Performance Glazing triple pane, low-E, low conductivity frame - Tier 2					
28	Improved wall insulation					
29	Improved below-grade insulation					
30	Improved roof insulation					
31	Sensible Heat Recovery	0.0025	0.0035	0.0045	0.005	0.005
32	Pipe insulation - space heating	0.0035	0.005	0.0075	0.01	0.0125
33	Energy Star washer					
34	Swimming pool/spa covers	0.0025	0.0035	0.0045	0.005	0.005
35	Commissioning					
36	Retrocommissioning	0.005	0.01	0.015	0.02	0.03
37	Integrated Design - High Performance (30% > codes) - Tier 1					
38	Integrated Design - High Performance (50% > codes) Tier 2					
39	Steam trap Maintenance	0.005	0.01	0.015	0.02	0.03
40	Oxygen Trim	0.0035	0.005	0.0075	0.01	0.0125
41	Infrared Heater	0.0025	0.0035	0.0045	0.005	0.005