New York State Energy Research and Development Authority

Energy Efficiency and Renewable Energy Potential Study of New York State

Volume 4: Energy Efficiency Technical Appendices

Final Report

April 2014

Report Number 14-19

The New NY WORKS for Energy

nyserda
Energy. Innovation. Solutions.

NYSERDA's Promise to New Yorkers:

NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst—advancing energy innovation and technology, transforming New York's economy, empowering people to choose clean and efficient energy as part of their everyday lives.

Core Values:

Objectivity, integrity, public service, partnership, and innovation.

Portfolios

NYSERDA programs are organized into five portfolios, each representing a complementary group of offerings with common areas of energy-related focus and objectives.

Energy Efficiency and Renewable Energy Deployment

Helping New York State to achieve its aggressive energy efficiency and renewable energy goals – including programs to motivate increased efficiency in energy consumption by consumers (residential, commercial, municipal, institutional, industrial, and transportation), to increase production by renewable power suppliers, to support market transformation, and to provide financing.

Energy Technology Innovation and Business Development

Helping to stimulate a vibrant innovation ecosystem and a clean-energy economy in New York State – including programs to support product research, development, and demonstrations; clean-energy business development; and the knowledge-based community at the Saratoga Technology + Energy Park® (STEP®).

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Helping to build a generation of New Yorkers ready to lead and work in a clean energy economy – including consumer behavior, youth education, workforce development, and training programs for existing and emerging technologies.

Energy and the Environment

Helping to assess and mitigate the environmental impacts of energy production and use in New York State – including environmental research and development, regional initiatives to improve environmental sustainability, and West Valley Site Management.

Energy Data, Planning, and Policy

Helping to ensure that New York State policymakers and consumers have objective and reliable information to make informed energy decisions – including State Energy Planning, policy analysis to support the Regional Greenhouse Gas Initiative and other energy initiatives, emergency preparedness, and a range of energy data reporting.

Energy Efficiency and Renewable Energy Potential Study of New York State

Volume 4: Energy Efficiency Technical Appendices

Final Report

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Notice

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Abstract

This study presents the potential for increased adoption of energy efficiency and renewable energy technologies in New York State. It focuses on the long-term potential using a twenty-year study period, 2013–2032. Efficiency potential results are presented in terms of "achievable potential" and "economic potential" (the cost-effective energy savings). The report presents these results statewide as well as separately for each of four regional zones (Long Island, New York City, Hudson Valley, and Upstate). The efficiency portion of the study includes electricity, natural gas, and petroleum fuels in the building and industrial sectors, but excludes transportation energy use. For renewable energy, the study analyzes the economic potential and the "bounded technical potential," a measurement of what theoretically would be possible if cost were not a factor. These figures are for renewable resources serving the energy needs of buildings and electric generation. The major renewable resource categories include biomass, hydro, solar, and wind. The study also assesses alternative allocations between various renewable technology options. Overall, the study finds that large amounts of energy efficiency and renewable energy potential exist through the study period. Pursuing additional cost-effective clean energy potential in the State is anticipated to result in long-term net benefits to New York citizens.

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Appendix A: Avoided Costs

Notes on Avoided Electric Costs:

1. All costs are presented in 2012$

2. The capacity price was allocated to the top 10% of peak hours in each year.

3. The Firm Power price is the sum of the energy only price and the capacity price that has been allocated to the peak periods.

4. Zone F and Upstate energy prices were combined based on the load in each region.

5. The avoided energy supply costs ($/kWh) include the avoided costs of generation and transmission capacity. The avoided costs for distribution capacity ($/kW-yr) are provided separately for each zone.

Energy Period Definitions

Summer On -peak	June through August, weekdays from 12 noon to 6:00 p.m.
Summer Off -peak	June through August, all weekend hours and weekdays from 12 midnight to 8:00 a.m.; and all hours in May, September, and October
Summer Shoulder	June through August, weekdays from 8:00 a.m. to 12 noon and 6:00 p.m. to 12 midnight
Winter On -peak	December through February, weekdays from 12 noon to 8:00 p.m.
Winter Off -peak	December through February, all weekend hours and weekdays from 12 midnight to 8:00 a.m.; and all hours in March, April, and November
Winter Shoulder	December through February, weekdays from 8:00 a.m. to 12 noon and 8:00 p.m. to 12 midnight

	Avoided Electric Costs - Upstate						
	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	Summer Distribution
Year	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kW-yr
2013	$0.080	$0.037	$0.046	$0.071	$0.042	$0.056	$34.99
2014	$0.091	$0.037	$0.047	$0.077	$0.042	$0.055	$34.99
2015	$0.105	$0.037	$0.050	$0.085	$0.043	$0.057	$34.99
2016	$0.176	$0.037	$0.050	$0.137	$0.044	$0.059	$34.99
2017	$0.180	$0.037	$0.050	$0.142	$0.045	$0.062	$34.99
2018	$0.184	$0.037	$0.051	$0.147	$0.046	$0.064	$34.99
2019	$0.188	$0.038	$0.051	$0.152	$0.047	$0.067	$34.99
2020	$0.191	$0.038	$0.052	$0.157	$0.049	$0.070	$34.99
2021	$0.195	$0.039	$0.053	$0.162	$0.050	$0.072	$34.99
2022	$0.199	$0.040	$0.055	$0.167	$0.051	$0.074	$34.99
2023	$0.203	$0.041	$0.056	$0.172	$0.053	$0.076	$34.99
2024	$0.207	$0.042	$0.058	$0.177	$0.054	$0.078	$34.99
2025	$0.211	$0.042	$0.059	$0.181	$0.055	$0.080	$34.99
2026	$0.213	$0.043	$0.060	$0.182	$0.056	$0.081	$34.99
2027	$0.215	$0.044	$0.061	$0.182	$0.056	$0.081	$34.99
2028	$0.216	$0.044	$0.063	$0.182	$0.057	$0.081	$34.99
2029	$0.218	$0.045	$0.064	$0.183	$0.057	$0.082	$34.99
2030	$0.220	$0.045	$0.065	$0.183	$0.058	$0.082	$34.99
2031	$0.224	$0.047	$0.067	$0.184	$0.059	$0.083	$34.99
2032	$0.227	$0.048	$0.069	$0.184	$0.059	$0.084	$34.99
2033	$0.231	$0.049	$0.071	$0.185	$0.060	$0.085	$34.99
2034	$0.235	$0.050	$0.073	$0.185	$0.061	$0.086	$34.99
2035	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2036	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2037	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2038	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2039	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2040	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2041	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2042	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2043	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2044	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2045	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2046	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2047	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2048	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2049	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2050	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2051	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2052	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2053	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2054	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2055	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2056	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2057	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2058	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2059	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2060	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2061	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99
2062	$0.239	$0.051	$0.076	$0.186	$0.062	$0.088	$34.99

	Avoided Electric Costs - Hudson Valley						
	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	Summer Distribution
Year	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kW-yr
2013	$0.111	$0.043	$0.055	$0.075	$0.047	$0.061	$34.99
2014	$0.126	$0.046	$0.058	$0.082	$0.049	$0.061	$34.99
2015	$0.137	$0.046	$0.059	$0.088	$0.049	$0.063	$34.99
2016	$0.232	$0.049	$0.062	$0.138	$0.052	$0.069	$34.99
2017	$0.226	$0.048	$0.061	$0.146	$0.052	$0.070	$34.99
2018	$0.220	$0.047	$0.061	$0.155	$0.052	$0.071	$34.99
2019	$0.214	$0.046	$0.060	$0.163	$0.053	$0.072	$34.99
2020	$0.208	$0.045	$0.060	$0.172	$0.053	$0.073	$34.99
2021	$0.217	$0.046	$0.060	$0.172	$0.054	$0.074	$34.99
2022	$0.226	$0.047	$0.061	$0.172	$0.055	$0.076	$34.99
2023	$0.235	$0.048	$0.062	$0.172	$0.057	$0.078	$34.99
2024	$0.245	$0.049	$0.062	$0.172	$0.058	$0.079	$34.99
2025	$0.254	$0.049	$0.063	$0.172	$0.060	$0.081	$34.99
2026	$0.255	$0.050	$0.064	$0.172	$0.060	$0.081	$34.99
2027	$0.256	$0.051	$0.064	$0.173	$0.060	$0.082	$34.99
2028	$0.257	$0.051	$0.065	$0.173	$0.061	$0.082	$34.99
2029	$0.258	$0.052	$0.065	$0.173	$0.061	$0.082	$34.99
2030	$0.259	$0.053	$0.066	$0.173	$0.061	$0.082	$34.99
2031	$0.265	$0.054	$0.069	$0.174	$0.063	$0.084	$34.99
2032	$0.270	$0.056	$0.071	$0.174	$0.064	$0.085	$34.99
2033	$0.275	$0.058	$0.074	$0.174	$0.066	$0.087	$34.99
2034	$0.281	$0.059	$0.077	$0.175	$0.067	$0.088	$34.99
2035	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2036	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2037	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2038	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2039	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2040	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2041	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2042	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2043	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2044	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2045	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2046	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2047	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2048	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2049	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2050	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2051	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2052	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2053	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2054	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2055	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2056	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2057	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2058	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2059	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2060	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2061	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99
2062	$0.286	$0.061	$0.079	$0.175	$0.068	$0.090	$34.99

	Avoided Electric Costs - New York City						
	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	Summer Distribution
Year	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kW-yr
2013	$0.325	$0.045	$0.059	$0.154	$0.048	$0.061	$104.50
2014	$0.382	$0.047	$0.060	$0.211	$0.049	$0.061	$104.50
2015	$0.417	$0.046	$0.061	$0.231	$0.049	$0.063	$104.50
2016	$0.352	$0.049	$0.062	$0.217	$0.052	$0.069	$104.50
2017	$0.341	$0.049	$0.062	$0.227	$0.053	$0.070	$104.50
2018	$0.329	$0.048	$0.062	$0.237	$0.053	$0.071	$104.50
2019	$0.318	$0.047	$0.062	$0.247	$0.053	$0.072	$104.50
2020	$0.307	$0.047	$0.062	$0.257	$0.054	$0.074	$104.50
2021	$0.307	$0.048	$0.064	$0.244	$0.056	$0.076	$104.50
2022	$0.308	$0.050	$0.066	$0.231	$0.057	$0.078	$104.50
2023	$0.309	$0.051	$0.068	$0.218	$0.059	$0.080	$104.50
2024	$0.309	$0.053	$0.070	$0.206	$0.061	$0.082	$104.50
2025	$0.310	$0.054	$0.072	$0.193	$0.062	$0.084	$104.50
2026	$0.303	$0.055	$0.073	$0.199	$0.063	$0.085	$104.50
2027	$0.296	$0.056	$0.074	$0.204	$0.064	$0.085	$104.50
2028	$0.289	$0.057	$0.075	$0.210	$0.065	$0.086	$104.50
2029	$0.282	$0.058	$0.075	$0.215	$0.066	$0.087	$104.50
2030	$0.275	$0.059	$0.076	$0.221	$0.067	$0.088	$104.50
2031	$0.308	$0.061	$0.079	$0.244	$0.068	$0.090	$104.50
2032	$0.340	$0.063	$0.081	$0.267	$0.070	$0.092	$104.50
2033	$0.372	$0.064	$0.084	$0.290	$0.071	$0.095	$104.50
2034	$0.405	$0.066	$0.087	$0.313	$0.073	$0.097	$104.50
2035	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2036	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2037	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2038	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2039	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2040	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2041	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2042	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2043	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2044	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2045	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2046	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2047	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2048	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2049	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2050	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2051	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2052	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2053	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2054	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2055	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2056	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2057	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2058	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2059	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2060	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2061	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50
2062	$0.437	$0.068	$0.089	$0.336	$0.074	$0.099	$104.50

	Avoided Electric Costs - Long Island						
	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	Summer Distribution
Year	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kWh	$/kW-yr
2013	$0.136	$0.101	$0.107	$0.120	$0.104	$0.114	$34.99
2014	$0.155	$0.155	$0.155	$0.155	$0.155	$0.155	$34.99
2015	$0.175	$0.049	$0.060	$0.085	$0.053	$0.065	$34.99
2016	$0.269	$0.049	$0.061	$0.109	$0.054	$0.070	$34.99
2017	$0.262	$0.049	$0.061	$0.127	$0.055	$0.072	$34.99
2018	$0.256	$0.049	$0.061	$0.144	$0.056	$0.075	$34.99
2019	$0.249	$0.049	$0.061	$0.161	$0.057	$0.077	$34.99
2020	$0.243	$0.049	$0.061	$0.179	$0.058	$0.079	$34.99
2021	$0.251	$0.051	$0.063	$0.182	$0.060	$0.081	$34.99
2022	$0.260	$0.052	$0.064	$0.185	$0.062	$0.084	$34.99
2023	$0.268	$0.053	$0.066	$0.189	$0.063	$0.086	$34.99
2024	$0.276	$0.054	$0.068	$0.192	$0.065	$0.089	$34.99
2025	$0.285	$0.055	$0.069	$0.195	$0.066	$0.092	$34.99
2026	$0.287	$0.056	$0.070	$0.195	$0.067	$0.092	$34.99
2027	$0.289	$0.057	$0.071	$0.196	$0.067	$0.092	$34.99
2028	$0.290	$0.058	$0.072	$0.196	$0.068	$0.093	$34.99
2029	$0.292	$0.058	$0.073	$0.196	$0.068	$0.093	$34.99
2030	$0.294	$0.059	$0.074	$0.196	$0.069	$0.093	$34.99
2031	$0.304	$0.061	$0.077	$0.195	$0.070	$0.094	$34.99
2032	$0.315	$0.062	$0.079	$0.193	$0.072	$0.096	$34.99
2033	$0.325	$0.064	$0.082	$0.191	$0.073	$0.097	$34.99
2034	$0.335	$0.066	$0.085	$0.190	$0.075	$0.098	$34.99
2035	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2036	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2037	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2038	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2039	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2040	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2041	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2042	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2043	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2044	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2045	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2046	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2047	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2048	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2049	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2050	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2051	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2052	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2053	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2054	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2055	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2056	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2057	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2058	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2059	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2060	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2061	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99
2062	$0.345	$0.067	$0.087	$0.188	$0.076	$0.100	$34.99

	Avoided Natural Gas Costs (2012$/MMBtu)											
	Upstate			Hudson Valley			New York City			Long Island		
Year	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind
2013	$5.95	$6.02	$6.16	$8.35	$8.46	$8.65	$8.46	$8.58	$8.77	$7.72	$7.82	$7.99
2014	$5.95	$6.04	$6.18	$8.36	$8.48	$8.68	$8.47	$8.59	$8.79	$7.73	$7.83	$8.02
2015	$5.99	$6.09	$6.25	$8.41	$8.55	$8.78	$8.52	$8.66	$8.90	$7.77	$7.90	$8.12
2016	$5.98	$6.08	$6.25	$8.41	$8.55	$8.78	$8.52	$8.66	$8.90	$7.77	$7.90	$8.11
2017	$6.01	$6.13	$6.32	$8.45	$8.61	$8.88	$8.56	$8.72	$9.00	$7.81	$7.96	$8.21
2018	$6.06	$6.20	$6.43	$8.51	$8.71	$9.03	$8.62	$8.82	$9.15	$7.86	$8.04	$8.34
2019	$6.09	$6.25	$6.51	$8.56	$8.78	$9.15	$8.67	$8.90	$9.27	$7.91	$8.11	$8.45
2020	$6.11	$6.28	$6.56	$8.58	$8.82	$9.21	$8.70	$8.94	$9.33	$7.93	$8.15	$8.51
2021	$6.17	$6.37	$6.70	$8.67	$8.95	$9.42	$8.78	$9.07	$9.54	$8.01	$8.27	$8.70
2022	$6.25	$6.50	$6.90	$8.78	$9.13	$9.69	$8.90	$9.25	$9.82	$8.12	$8.43	$8.96
2023	$6.31	$6.58	$7.03	$8.86	$9.25	$9.88	$8.98	$9.37	$10.01	$8.19	$8.54	$9.13
2024	$6.35	$6.65	$7.14	$8.92	$9.34	$10.03	$9.04	$9.46	$10.16	$8.24	$8.63	$9.27
2025	$6.39	$6.71	$7.23	$8.98	$9.42	$10.16	$9.10	$9.55	$10.30	$8.30	$8.71	$9.39
2026	$6.45	$6.80	$7.38	$9.06	$9.56	$10.37	$9.18	$9.68	$10.51	$8.37	$8.83	$9.58
2027	$6.51	$6.89	$7.52	$9.14	$9.68	$10.56	$9.26	$9.80	$10.70	$8.45	$8.94	$9.76
2028	$6.51	$6.89	$7.52	$9.14	$9.68	$10.56	$9.27	$9.81	$10.70	$8.45	$8.94	$9.76
2029	$6.49	$6.86	$7.47	$9.12	$9.64	$10.50	$9.24	$9.77	$10.64	$8.42	$8.91	$9.70
2030	$6.51	$6.89	$7.53	$9.15	$9.69	$10.58	$9.27	$9.81	$10.72	$8.45	$8.95	$9.77
2031	$6.57	$6.99	$7.67	$9.23	$9.82	$10.78	$9.36	$9.95	$10.92	$8.53	$9.07	$9.96
2032	$6.64	$7.09	$7.84	$9.33	$9.97	$11.02	$9.45	$10.10	$11.16	$8.62	$9.21	$10.18
2033	$6.68	$7.16	$7.94	$9.39	$10.05	$11.15	$9.51	$10.19	$11.30	$8.67	$9.29	$10.31
2034	$6.72	$7.22	$8.03	$9.44	$10.14	$11.29	$9.57	$10.27	$11.44	$8.72	$9.37	$10.43
2035	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2036	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2037	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2038	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2039	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2040	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2041	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2042	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2043	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2044	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2045	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2046	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2047	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2048	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2049	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2050	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2051	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2052	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2053	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2054	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2055	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2056	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2057	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2058	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2059	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2060	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2061	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61
2062	$6.78	$7.31	$8.18	$9.52	$10.26	$11.49	$9.65	$10.40	$11.64	$8.80	$9.48	$10.61

	Avoided Petroleum Fuel Costs (2012$/MMBtu)											
	Upstate			Hudson Valley			New York City			Long Island		
Year	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind
2013	$26.69	$22.05	$22.74	$27.55	$22.10	$23.48	$28.61	$18.05	$24.38	$28.42	$24.25	$24.22
2014	$27.99	$23.33	$24.17	$28.89	$23.39	$24.95	$30.00	$19.31	$25.91	$29.80	$25.64	$25.74
2015	$29.15	$24.47	$25.40	$30.09	$24.52	$26.22	$31.25	$20.47	$27.23	$31.04	$26.87	$27.04
2016	$29.63	$24.95	$25.88	$30.59	$25.00	$26.72	$31.77	$21.10	$27.75	$31.56	$27.37	$27.56
2017	$30.16	$25.45	$26.40	$31.13	$25.51	$27.26	$32.33	$21.78	$28.31	$32.11	$27.91	$28.12
2018	$30.32	$25.58	$26.54	$31.30	$25.64	$27.40	$32.50	$22.19	$28.46	$32.28	$28.06	$28.27
2019	$30.50	$25.74	$26.71	$31.49	$25.80	$27.58	$32.70	$22.63	$28.64	$32.48	$28.24	$28.44
2020	$30.72	$25.92	$26.91	$31.71	$25.98	$27.78	$32.93	$23.13	$28.84	$32.71	$28.44	$28.65
2021	$31.01	$26.18	$27.17	$32.01	$26.24	$28.05	$33.24	$23.72	$29.13	$33.02	$28.72	$28.93
2022	$31.24	$26.36	$27.37	$32.25	$26.42	$28.26	$33.49	$24.30	$29.35	$33.27	$28.94	$29.15
2023	$31.47	$26.56	$27.59	$32.49	$26.62	$28.48	$33.74	$24.90	$29.57	$33.51	$29.16	$29.38
2024	$31.72	$26.77	$27.82	$32.74	$26.83	$28.72	$34.00	$25.55	$29.82	$33.77	$29.39	$29.62
2025	$32.05	$27.06	$28.14	$33.09	$27.13	$29.05	$34.36	$26.34	$30.17	$34.13	$29.72	$29.97
2026	$32.22	$27.20	$28.29	$33.26	$27.27	$29.21	$34.54	$27.01	$30.33	$34.31	$29.87	$30.13
2027	$32.48	$27.43	$28.54	$33.53	$27.49	$29.46	$34.82	$27.83	$30.59	$34.59	$30.12	$30.39
2028	$32.73	$27.65	$28.77	$33.79	$27.71	$29.70	$35.09	$28.71	$30.85	$34.86	$30.36	$30.64
2029	$32.93	$27.81	$28.95	$33.99	$27.87	$29.88	$35.30	$29.60	$31.03	$35.07	$30.54	$30.83
2030	$33.24	$28.08	$29.24	$34.31	$28.14	$30.18	$35.63	$30.70	$31.34	$35.39	$30.83	$31.13
2031	$33.45	$28.26	$29.43	$34.53	$28.32	$30.38	$35.86	$30.90	$31.55	$35.62	$31.03	$31.34
2032	$33.66	$28.43	$29.61	$34.75	$28.50	$30.57	$36.09	$31.09	$31.74	$35.84	$31.22	$31.53
2033	$33.85	$28.58	$29.76	$34.94	$28.65	$30.73	$36.29	$31.26	$31.91	$36.04	$31.39	$31.70
2034	$34.00	$28.70	$29.89	$35.10	$28.77	$30.86	$36.45	$31.39	$32.05	$36.21	$31.52	$31.83
2035	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2036	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2037	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2038	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2039	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2040	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2041	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2042	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2043	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2044	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2045	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2046	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2047	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2048	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2049	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2050	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2051	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2052	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2053	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2054	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2055	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2056	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2057	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2058	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2059	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2060	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2061	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94
2062	$34.13	$28.79	$30.00	$35.23	$28.86	$30.97	$36.59	$31.49	$32.16	$36.34	$31.62	$31.94

Appendix B: Sales Forecast

Electric Sales Forecast

Econometric Generation and Load by Sector (in GWh)						
Year	Generation	Load	Commercial	Residential	Industrial	Transportation
1990	140,919	129,324	56,026	38,574	31,929	2,795
1991	145,019	129,411	56,408	39,177	31,112	2,714
1992	143,431	128,470	56,079	38,720	31,027	2,644
1993	144,866	130,170	57,410	39,897	30,187	2,676
1994	145,628	131,177	58,802	40,105	29,467	2,803
1995	146,352	130,471	62,509	39,887	25,317	2,757
1996	146,350	131,527	62,663	40,285	25,947	2,632
1997	146,838	131,944	64,033	40,059	25,285	2,567
1998	149,166	134,196	65,834	40,563	25,218	2,580
1999	154,294	139,378	67,969	42,919	25,835	2,654
2000	154,793	142,027	70,418	43,018	25,838	2,753
2001	155,121	144,181	71,849	44,236	25,450	2,646
2002	158,508	147,440	73,198	46,457	25,148	2,637
2003	158,012	144,045	72,495	47,116	21,745	2,689
2004	160,211	145,082	74,378	47,379	20,675	2,650
2005	167,208	150,148	76,822	50,533	19,947	2,846
2006	162,238	142,238	76,029	48,427	14,976	2,806
2007	167,341	148,178	74,326	50,241	20,213	3,397
2008	165,612	144,053	77,416	49,034	14,685	2,918
2009	158,780	140,035	75,347	48,246	13,417	3,025
2010	163,505	144,624	77,276	50,946	13,480	2,922
2011	163,330	143,681	76,027	49,334	15,311	3,010
2012	165,578	151,066	83,907	50,120	13,961	3,078
2013	168,089	152,502	85,205	50,388	13,833	3,076
2014	170,480	153,970	86,538	50,656	13,703	3,074
2015	172,675	155,472	87,907	50,922	13,571	3,072
2016	174,818	157,009	89,312	51,188	13,439	3,069
2017	176,146	158,581	90,755	51,454	13,305	3,067
2018	178,087	160,189	92,236	51,718	13,171	3,064
2019	180,079	161,835	93,757	51,982	13,034	3,061
2020	182,406	163,518	95,317	52,245	12,897	3,059
2021	184,269	165,239	96,919	52,506	12,758	3,056
2022	185,813	167,001	98,562	52,767	12,618	3,053
2023	187,809	168,803	100,249	53,027	12,476	3,050
2024	189,827	170,646	101,980	53,286	12,334	3,047
2025	191,867	172,532	103,755	53,544	12,189	3,043
2026	193,928	174,461	105,577	53,801	12,043	3,040
2027	196,012	176,434	107,446	54,056	11,896	3,036
2028	198,118	178,453	109,363	54,310	11,747	3,033
2029	200,246	180,518	111,329	54,563	11,596	3,029
2030	202,397	182,631	113,346	54,815	11,444	3,025
2031	204,572	184,792	115,415	55,065	11,291	3,021
2032	206,770	187,003	117,537	55,314	11,135	3,017
2033	208,991	189,265	119,713	55,562	10,978	3,013
2034	211,237	191,579	121,944	55,807	10,820	3,008
2035	213,506	193,946	124,232	56,052	10,659	3,004

Natural Gas Sales Forecast (Tbtu)

	Upstate			Hudson Valley			New York City			Long Island		
Year	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind
2013	146.3	111.8	81.2	18.4	16.8	7.0	186.8	171.8	8.2	48.2	42.7	4.9
2014	146.3	113.1	83.6	18.4	17.0	7.2	186.8	175.5	8.6	48.2	43.2	5.1
2015	146.3	114.2	86.6	18.4	17.1	7.5	186.8	178.9	9.1	48.2	43.7	5.3
2016	146.3	115.2	89.2	18.4	17.3	7.7	186.8	182.0	9.5	48.2	44.0	5.4
2017	146.3	116.0	91.5	18.4	17.4	7.9	186.8	185.1	9.9	48.2	44.3	5.6
2018	146.3	116.7	93.6	18.4	17.5	8.1	186.8	188.2	10.3	48.2	44.6	5.7
2019	146.3	117.4	95.7	18.4	17.6	8.3	186.8	191.2	10.7	48.2	44.9	5.8
2020	146.3	117.8	96.7	18.4	17.7	8.4	186.8	194.0	11.0	48.2	45.0	5.9
2021	146.3	118.2	98.0	18.4	17.7	8.5	186.8	196.5	11.3	48.2	45.2	5.9
2022	146.3	118.4	99.2	18.4	17.8	8.6	186.8	199.1	11.6	48.2	45.2	6.0
2023	146.3	118.7	100.6	18.4	17.8	8.7	186.8	201.6	11.9	48.2	45.4	6.1
2024	146.3	119.3	101.6	18.4	17.9	8.8	186.8	204.5	12.2	48.2	45.6	6.2
2025	146.3	120.1	102.9	18.4	18.0	8.9	186.8	207.8	12.5	48.2	45.9	6.2
2026	146.3	120.9	104.6	18.4	18.1	9.1	186.8	210.9	12.9	48.2	46.2	6.4
2027	146.3	121.7	106.0	18.4	18.3	9.2	186.8	214.1	13.2	48.2	46.5	6.4
2028	146.3	122.8	108.0	18.4	18.4	9.4	186.8	217.9	13.6	48.2	46.9	6.6
2029	146.3	124.2	110.2	18.4	18.6	9.6	186.8	221.9	14.0	48.2	47.5	6.7
2030	146.3	125.3	112.3	18.4	18.8	9.7	186.8	225.6	14.3	48.2	47.9	6.8
2031	146.3	126.1	114.5	18.4	18.9	9.9	186.8	226.8	14.6	48.2	48.2	7.0
2032	146.3	126.7	116.6	18.4	19.0	10.1	186.8	227.8	14.8	48.2	48.4	7.1
2033	146.3	127.6	119.0	18.4	19.2	10.3	186.8	229.2	15.0	48.2	48.8	7.2
2034	146.3	128.7	121.4	18.4	19.3	10.5	186.8	230.8	15.2	48.2	49.2	7.4
2035	146.3	129.9	124.0	18.4	19.5	10.7	186.8	232.5	15.5	48.2	49.6	7.5

Petroleum Fuels Sales Forecast (Tbtu)

	Upstate			Hudson Valley			New York City			Long Island		
Year	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind	Res	Com	Ind
2013	53.0	27.8	8.2	16.4	10.3	3.1	45.3	72.7	13.4	22.9	10.8	3.8
2014	51.8	27.7	8.5	16.0	10.3	3.2	44.3	70.6	13.8	22.4	10.8	4.0
2015	50.8	27.7	8.7	15.7	10.3	3.3	43.4	68.5	14.0	21.9	10.8	4.1
2016	49.8	27.6	8.7	15.4	10.3	3.3	42.6	66.4	14.0	21.5	10.8	4.1
2017	48.9	27.6	8.8	15.1	10.3	3.3	41.8	64.3	14.1	21.1	10.8	4.2
2018	48.0	27.6	8.8	14.8	10.3	3.3	41.0	62.3	14.2	20.7	10.8	4.2
2019	47.1	27.6	8.8	14.5	10.3	3.3	40.2	60.4	14.2	20.3	10.8	4.2
2020	46.2	27.6	8.8	14.3	10.3	3.3	39.5	58.4	14.2	19.9	10.8	4.2
2021	45.4	27.6	8.8	14.0	10.3	3.3	38.8	56.4	14.1	19.6	10.8	4.2
2022	44.6	27.6	8.8	13.8	10.3	3.3	38.1	54.5	14.1	19.2	10.8	4.2
2023	43.8	27.6	8.8	13.5	10.3	3.3	37.4	52.5	14.1	18.9	10.8	4.2
2024	43.0	27.6	8.8	13.3	10.3	3.3	36.7	50.5	14.1	18.5	10.8	4.2
2025	42.2	27.6	8.8	13.0	10.3	3.3	36.1	48.5	14.1	18.2	10.8	4.2
2026	41.5	27.6	8.9	12.8	10.3	3.3	35.5	46.5	14.1	17.9	10.8	4.2
2027	40.8	27.6	8.9	12.6	10.3	3.3	34.8	44.5	14.1	17.6	10.8	4.2
2028	40.1	27.6	8.8	12.4	10.3	3.3	34.2	42.6	14.1	17.3	10.8	4.2
2029	39.4	27.6	8.8	12.2	10.3	3.3	33.6	40.6	14.0	17.0	10.8	4.2
2030	38.7	27.5	8.8	11.9	10.3	3.3	33.0	38.6	14.0	16.7	10.8	4.2
2031	38.0	27.5	8.8	11.7	10.3	3.3	32.5	38.5	14.0	16.4	10.7	4.2
2032	37.3	27.5	8.8	11.5	10.3	3.3	31.9	38.5	14.0	16.1	10.7	4.2
2033	36.7	27.5	8.8	11.3	10.3	3.3	31.4	38.5	14.0	15.8	10.7	4.2
2034	36.1	27.5	8.8	11.1	10.3	3.3	30.8	38.5	14.0	15.6	10.7	4.2
2035	35.5	27.5	8.9	10.9	10.2	3.3	30.3	38.5	14.0	15.3	10.7	4.2

Appendix C: Sales Disaggregations

UPSTATE - ELECTRICITY

Existing End Use Sales Forecast for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	2,646,420	1,272,061	560,386	530,636	1,328,397	609,370	300,146	579,125	21,108	0	2,896,056	10,743,099
Outdoor Lighting	283,769	107,223	67,955	95,421	132,129	40,984	60,667	167,828	0	142,376	280,949	1,379,225
Cooling	921,077	469,394	200,067	45,784	316,069	473,126	164,015	292,226	527,697	0	1,017,832	4,427,112
Ventilation	704,353	424,835	111,153	297,947	582,201	195,322	226,201	209,422	211,079	0	1,082,264	4,044,577
Water Heating	22,998	8,352	10,787	4,310	38,466	28,470	20,767	76,901	0	0	32,729	243,767
Refrigeration	35,454	121,340	1,471,787	413,049	201,272	68,244	31,547	922,202	0	0	392,167	3,656,855
Space Heating	225,848	93,864	29,664	123,056	185,200	69,068	53,291	81,904	0	0	419,459	1,281,281
Office Equipment	760,646	102,081	22,904	42,571	121,773	41,336	36,931	28,079	0	0	184,963	1,341,209
Food Preparation	5,675	813	403	1,004	1,482	1,034	357	3,340	0	0	3,671	17,779
Miscellaneous	537,732	121,742	37,968	76,338	109,488	455,801	67,343	98,096	0	0	245,589	1,749,997
Data Center	1,163,815	0	0	0	571,393	375,581	0	0	1,350,905	0	0	3,461,992
Total	7,307,540	2,721,552	2,512,931	1,630,022	3,587,750	2,358,254	961,211	2,458,984	2,110,971	142,371	6,555,309	32,346,894

New Construction/Renovation Sales for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	137,827	66,250	29,185	27,636	69,184	31,736	15,632	30,161	1,099	0	150,829	559,499
Outdoor Lighting	14,779	5,584	3,539	4,970	6,881	2,134	3,160	8,741	0	7,415	14,632	71,830
Cooling	47,970	24,446	10,420	2,384	16,461	24,641	8,542	15,219	27,483	0	53,009	230,563
Ventilation	36,683	22,126	5,789	15,517	30,321	10,172	11,781	10,907	10,993	0	56,365	210,641
Water Heating	1,198	435	562	224	2,003	1,483	1,082	4,005	0	0	1,705	12,695
Refrigeration	1,846	6,319	76,652	21,512	10,482	3,554	1,643	48,029	0	0	20,424	190,448
Space Heating	11,762	4,889	1,545	6,409	9,645	3,597	2,775	4,266	0	0	21,846	66,729
Office Equipment	39,615	5,316	1,193	2,217	6,342	2,153	1,923	1,462	0	0	9,633	69,850
Food Preparation	296	42	21	52	77	54	19	174	0	0	191	926
Miscellaneous	28,005	6,340	1,977	3,976	5,702	23,738	3,507	5,109	0	0	12,790	91,140
Data Center	60,612	0	0	0	29,759	19,561	0	0	70,356	0	0	180,300
Total	380,575	141,738	130,873	84,891	186,849	122,817	50,060	128,063	109,939	7,415	341,399	1,684,620
Total Elec Sales (MWh)	**7,688,115**	**2,863,289**	**2,643,804**	**1,714,914**	**3,774,599**	**2,481,071**	**1,011,271**	**2,587,048**	**2,220,910**	**149,786**	**6,896,708**	**34,031,514**

UPSTATE - NATURAL GAS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	21,390,999	6,824,602	2,303,805	2,030,938	10,206,850	5,715,636	2,764,314	2,339,131	0	3,178,848	8,260,580	65,015,702
Water Heating	7,591,665	2,451,201	1,006,764	425,484	4,093,387	4,720,456	1,776,561	1,872,676	0	1,068,498	1,805,393	26,812,086
Miscellaneous	0	0	0	53,265	379,684	256,973	155,485	0	0	26,735	249,480	1,121,623
Food Service	0	1,613,883	691,197	76,718	2,113,822	1,898,800	455,766	2,584,010	0	104,747	1,864,824	11,403,766
Cooling	680,950	71,050	101,630	71,838	129,604	237,287	52,060	111,297	0	0	184,808	1,640,525
Total	29,663,614	10,960,736	4,103,395	2,658,243	16,923,347	12,829,153	5,204,186	6,907,114	0	4,378,828	12,365,085	105,993,702

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	1,179,694	376,371	127,053	112,004	562,898	315,212	152,449	129,001	0	175,311	455,563	3,585,557
Water Heating	418,673	135,181	55,522	23,465	225,747	260,329	97,976	103,276	0	58,927	99,566	1,478,662
Miscellaneous	0	0	0	2,938	20,939	14,172	8,575	0	0	1,474	13,759	61,856
Food Service	0	89,004	38,119	4,231	116,575	104,717	25,135	142,506	0	5,777	102,843	628,907
Cooling	37,554	3,918	5,605	3,962	7,148	13,086	2,871	6,138	0	0	10,192	90,473
Total	1,635,921	604,475	226,299	146,600	933,307	707,516	287,006	380,921	0	241,488	681,923	5,845,456
Total NG Sales (MMBtu)	31,299,536	11,565,211	4,329,694	2,804,843	17,856,654	13,536,669	5,491,192	7,288,035	0	4,620,316	13,047,008	111,839,158

UPSTATE - PETROFUELS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	5,454,213	2,009,004	711,380	535,904	2,931,362	1,708,345	763,122	955,648	0	811,335	2,466,803	32,780,939
Water Heating	1,935,700	721,576	310,874	112,273	1,175,603	1,410,896	490,441	765,079	0	272,712	539,133	13,818,910
Miscellaneous	0	0	0	14,055	109,044	76,807	42,924	0	0	6,824	74,501	579,167
Total	13,203,616	4,878,750	1,826,468	1,183,215	7,532,776	5,710,404	2,316,443	3,074,436	0	1,949,067	5,503,842	47,179,016

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	284,762	104,889	37,141	27,979	153,045	89,192	39,842	49,894	0	42,359	128,791	1,712,030
Water Heating	101,062	37,673	16,231	5,862	61,378	73,662	25,606	39,944	0	14,238	28,148	721,712
Miscellaneous	0	0	0	734	5,693	4,010	2,241	0	0	356	3,890	30,248
Total	689,577	254,799	95,390	61,795	393,410	298,234	120,979	160,567	0	101,793	287,446	2,463,989
Total Petro Sales (MMBtu)	13,893,193	5,133,549	1,921,858	1,245,010	7,926,186	6,008,637	2,437,422	3,235,003	0	2,050,859	5,791,287	49,643,005

HUDSON VALLEY - ELECTRICITY

Existing End Use Sales Forecast for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	754,295	362,569	159,724	151,244	378,626	173,685	85,549	165,065	6,027	0	825,447	3,061,848
Outdoor Lighting	80,881	30,561	19,369	27,197	37,660	11,682	17,292	47,835	0	54,405	80,078	406,909
Cooling	262,530	133,789	57,024	13,050	90,087	134,852	46,748	83,292	150,666	0	290,107	1,262,009
Ventilation	200,758	121,088	31,681	84,922	165,942	55,672	64,473	59,691	60,266	0	308,472	1,152,829
Water Heating	6,555	2,381	3,075	1,228	10,964	8,115	5,919	21,919	0	0	9,329	69,475
Refrigeration	10,105	34,585	419,495	117,729	57,368	19,451	8,992	262,850	0	0	111,777	1,042,222
Space Heating	64,372	26,754	8,455	35,074	52,787	19,686	15,189	23,345	0	0	119,556	365,172
Office Equipment	216,803	29,096	6,528	12,134	34,708	11,782	10,526	8,003	0	0	52,719	382,251
Food Preparation	1,618	232	115	286	423	295	102	952	0	0	1,046	5,067
Miscellaneous	153,267	34,699	10,822	21,758	31,207	129,914	19,194	27,960	0	0	69,999	498,758
Data Center	332,288	0	0	0	163,142	107,234	0	0	385,705	0	0	988,387
Total	2,083,258	775,656	716,198	464,565	1,022,808	672,299	273,950	700,823	602,675	54,400	1,868,296	9,234,926

New Construction/Renovation Sales for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	42,289	20,327	8,955	8,479	21,227	9,738	4,796	9,254	338	0	46,278	171,878
Outdoor Lighting	4,535	1,713	1,086	1,525	2,111	655	969	2,682	0	3,050	4,490	22,842
Cooling	14,719	7,501	3,197	732	5,051	7,560	2,621	4,670	8,447	0	16,265	70,844
Ventilation	11,255	6,789	1,776	4,761	9,303	3,121	3,615	3,347	3,379	0	17,294	64,715
Water Heating	368	133	172	69	615	455	332	1,229	0	0	523	3,900
Refrigeration	567	1,939	23,519	6,600	3,216	1,091	504	14,737	0	0	6,267	58,506
Space Heating	3,609	1,500	474	1,966	2,959	1,104	852	1,309	0	0	6,703	20,499
Office Equipment	12,155	1,631	366	680	1,946	661	590	449	0	0	2,956	21,458
Food Preparation	91	13	6	16	24	17	6	53	0	0	59	284
Miscellaneous	8,593	1,945	607	1,220	1,750	7,284	1,076	1,568	0	0	3,924	27,998
Data Center	18,630	0	0	0	9,146	6,012	0	0	21,624	0	0	55,484
Total	116,945	43,542	40,204	26,079	57,416	37,740	15,378	39,341	33,831	3,054	104,878	518,407
Total Elec Sales (MWh)	**2,200,202**	**819,198**	**756,402**	**490,643**	**1,080,223**	**710,039**	**289,328**	**740,164**	**636,506**	**57,453**	**1,973,174**	**9,753,333**

HUDSON VALLEY - NATURAL GAS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	3,210,669	1,024,334	345,788	304,832	1,531,991	857,885	414,908	351,090	0	477,127	1,239,867	9,758,492
Water Heating	1,139,466	367,911	151,110	63,863	614,394	708,514	266,652	281,078	0	160,376	270,979	4,024,344
Food Service	0	0	0	7,995	56,988	38,570	23,337	0	0	4,013	37,446	168,349
Miscellaneous	0	242,235	103,745	11,515	317,273	284,999	68,408	387,845	0	15,722	279,900	1,711,641
Cooling	102,207	10,664	15,254	10,783	19,453	35,616	7,814	16,705	0	0	27,739	246,234
Total	4,452,342	1,645,145	615,897	398,987	2,540,099	1,925,584	781,119	1,036,719	0	657,237	1,855,930	15,909,060

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	177,065	56,491	19,070	16,811	84,488	47,312	22,882	19,362	0	26,313	68,378	538,172
Water Heating	62,841	20,290	8,334	3,522	33,883	39,074	14,706	15,501	0	8,845	14,944	221,939
Food Service	0	0	0	441	3,143	2,127	1,287	0	0	221	2,065	9,284
Miscellaneous	0	13,359	5,721	635	17,497	15,717	3,773	21,389	0	867	15,436	94,395
Cooling	5,637	588	841	595	1,073	1,964	431	921	0	0	1,530	13,580
Total	245,543	90,728	33,966	22,004	140,084	106,194	43,078	57,174	0	36,246	102,353	877,370
Total NG Sales (MMBtu)	4,697,885	1,735,873	649,863	420,991	2,680,184	2,031,778	824,197	1,093,893	0	693,484	1,958,283	16,786,430

HUDSON VALLEY - PETROFUELS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	2,031,674	748,346	264,986	199,622	1,091,922	636,352	284,260	355,975	0	302,219	918,875	9,394,922
Water Heating	721,041	268,785	115,799	41,821	437,908	525,553	182,687	284,989	0	101,584	200,825	3,960,460
Miscellaneous	0	0	0	5,235	40,618	28,610	15,989	0	0	2,542	27,751	165,988
Total	3,784,118	1,398,236	523,461	339,106	2,158,872	1,636,585	663,886	881,124	0	558,597	1,577,385	13,521,369

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	106,072	39,071	13,835	10,422	57,008	33,223	14,841	18,585	0	15,779	47,974	490,663
Water Heating	37,645	14,033	6,046	2,183	22,863	27,439	9,538	14,879	0	5,304	10,485	206,840
Miscellaneous	0	0	0	273	2,121	1,494	835	0	0	133	1,449	8,669
Total	197,631	73,025	27,338	17,710	112,750	85,473	34,672	46,018	0	29,173	82,381	706,172
Total Petro Sales (MMBtu)	3,981,749	1,471,260	550,799	356,816	2,271,622	1,722,058	698,558	927,142	0	587,770	1,659,766	14,227,541

NEW YORK CITY - ELECTRICITY

Existing End Use Sales Forecast for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	4,959,871	641,058	503,099	327,976	596,518	706,884	229,081	395,947	18,187	0	201,297	8,579,918
Outdoor Lighting	417,769	47,872	60,278	58,274	58,579	46,974	34,676	113,372	0	4,936	19,309	862,040
Cooling	2,537,545	703,796	234,958	43,031	176,275	733,082	187,725	259,802	454,677	0	89,705	5,420,596
Ventilation	1,160,570	517,747	99,724	183,746	261,484	225,494	138,377	142,446	181,871	0	74,843	2,986,303
Water Heating	48,332	25,496	9,065	2,508	16,163	30,907	14,896	50,255	0	0	2,136	199,758
Refrigeration	223,817	237,721	1,321,331	252,628	90,382	79,165	38,760	630,508	0	0	27,147	2,901,458
Space Heating	194,897	115,353	15,806	52,040	52,575	51,792	15,318	37,563	0	0	18,761	554,104
Office Equipment	1,169,091	56,162	20,562	26,312	54,665	47,951	18,974	19,198	0	0	12,909	1,425,824
Food Preparation	3,240	4,675	362	621	666	1,199	453	2,284	0	0	255	13,754
Miscellaneous	1,077,803	72,616	34,087	47,183	49,140	528,740	51,812	67,068	0	0	17,054	1,945,502
Data Center	1,374,728	0	0	0	158,124	285,857	0	0	1,163,973	0	0	2,982,682
Total	13,167,663	2,422,497	2,299,273	994,319	1,514,571	2,738,045	730,071	1,718,442	1,818,708	4,936	463,417	27,871,941

New Construction/Renovation Sales for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	265,991	34,379	26,981	17,589	31,990	37,909	12,285	21,234	975	0	10,795	460,130
Outdoor Lighting	22,404	2,567	3,233	3,125	3,142	2,519	1,860	6,080	0	265	1,036	46,230
Cooling	136,085	37,744	12,600	2,308	9,453	39,314	10,067	13,933	24,384	0	4,811	290,699
Ventilation	62,240	27,766	5,348	9,854	14,023	12,093	7,421	7,639	9,753	0	4,014	160,151
Water Heating	2,592	1,367	486	134	867	1,658	799	2,695	0	0	115	10,713
Refrigeration	12,003	12,749	70,861	13,548	4,847	4,245	2,079	33,813	0	0	1,456	155,601
Space Heating	10,452	6,186	848	2,791	2,820	2,778	821	2,014	0	0	1,006	29,716
Office Equipment	62,697	3,012	1,103	1,411	2,932	2,572	1,018	1,030	0	0	692	76,465
Food Preparation	174	251	19	33	36	64	24	122	0	0	14	738
Miscellaneous	57,801	3,894	1,828	2,530	2,635	28,356	2,779	3,597	0	0	915	104,335
Data Center	73,725	0	0	0	8,480	15,330	0	0	62,422	0	0	159,957
Total	706,164	129,915	123,307	53,324	81,224	146,838	39,153	92,158	97,535	265	24,852	1,494,735
Total Elec Sales (MWh)	**13,873,827**	**2,552,412**	**2,422,580**	**1,047,643**	**1,595,795**	**2,884,882**	**769,224**	**1,810,600**	**1,916,243**	**5,201**	**488,269**	**29,366,676**

NEW YORK CITY - NATURAL GAS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	12,487,316	10,109,960	1,417,101	2,341,545	4,207,470	5,028,153	1,364,702	2,634,758	0	35,723,465	1,142,598	76,457,068
Water Heating	7,979,374	9,858,718	898,138	659,071	2,397,730	5,481,375	1,894,363	2,962,394	0	14,313,008	338,966	46,783,138
Food Service	0	0	0	88,100	237,297	318,866	179,200	0	0	327,482	47,316	1,198,261
Miscellaneous	5,804,797	9,488,790	658,833	126,891	1,322,646	2,356,133	848,086	4,276,844	0	1,775,911	367,636	27,026,567
Cooling	5,258,937	1,459,808	510,902	53,366	362,742	1,372,195	354,064	532,192	0	0	157,046	10,061,253
Total	31,530,424	30,917,276	3,484,975	3,268,973	8,527,886	14,556,723	4,640,415	10,406,189	-	52,139,866	2,053,562	161,526,287

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	795,067	643,701	90,227	149,086	267,890	320,142	86,891	167,755	-	2,274,513	72,749	4,868,021
Water Heating	508,047	627,704	57,184	41,963	152,663	348,999	120,614	188,616	-	911,309	21,582	2,978,682
Food Service	-	-	-	5,609	15,109	20,302	11,410	-	-	20,851	3,013	76,293
Miscellaneous	369,591	604,151	41,948	8,079	84,213	150,015	53,998	272,307	-	113,072	23,407	1,720,781
Cooling	334,836	92,946	32,529	3,398	23,096	87,368	22,543	33,885	-	-	9,999	640,600
Total	2,007,542	1,968,503	221,888	208,136	542,970	926,826	295,455	662,562	-	3,319,745	130,750	10,284,377
Total NG Sales (MMBtu)	**33,537,966**	**32,885,778**	**3,706,863**	**3,477,109**	**9,070,856**	**15,483,549**	**4,935,870**	**11,068,750**	**0**	**55,459,611**	**2,184,313**	**171,810,665**

NEW YORK CITY - PETROFUELS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	9,144,206	8,905,375	934,818	1,075,584	2,286,613	2,868,452	810,264	2,163,852	-	15,806,050	663,714	44,658,929
Water Heating	4,331,437	4,308,217	554,609	284,602	1,239,116	3,173,742	1,074,371	2,283,601	-	6,332,872	188,213	23,770,779
Miscellaneous	-	-	-	36,925	118,965	179,137	98,611	-	-	144,896	25,735	604,271
Total	13,475,643	13,213,592	1,489,427	1,397,112	3,644,694	6,221,331	1,983,246	4,447,453	-	22,283,818	877,663	69,033,979

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	480,012	467,475	49,072	56,461	120,033	150,575	42,534	113,588	-	829,716	34,841	2,344,308
Water Heating	227,373	226,154	29,113	14,940	65,046	166,601	56,398	119,874	-	332,435	9,880	1,247,814
Miscellaneous	-	-	-	1,938	6,245	9,404	5,176	-	-	7,606	1,351	31,720
Total	707,385	693,629	78,185	73,339	191,323	326,580	104,108	233,463	-	1,169,758	46,072	3,623,842
Total Petro Sales (MMBtu)	**14,183,028**	**13,907,221**	**1,567,613**	**1,470,451**	**3,836,017**	**6,547,911**	**2,087,353**	**4,680,916**	**0**	**23,453,576**	**923,734**	**72,657,820**

LONG ISLAND - ELECTRICITY

Existing End Use Sales Forecast for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	872,234	414,042	182,638	177,023	441,620	201,277	103,256	189,688	7,015	0	947,187	3,535,980
Outdoor Lighting	93,478	34,881	22,136	31,817	43,858	13,530	15,811	54,942	0	116,746	91,872	519,072
Cooling	328,298	174,889	78,507	20,774	116,829	163,182	71,683	109,635	175,367	0	393,739	1,632,902
Ventilation	232,035	137,760	36,212	99,284	193,744	64,477	62,379	68,404	70,147	0	353,058	1,317,499
Water Heating	7,240	2,607	3,391	1,391	12,328	9,070	6,920	24,573	0	0	10,336	77,855
Refrigeration	11,685	39,495	479,676	136,550	66,912	22,541	17,471	302,061	0	0	127,974	1,204,365
Space Heating	51,771	20,954	6,394	30,789	42,365	15,488	7,428	19,577	0	0	95,802	290,569
Office Equipment	250,701	33,226	7,465	14,202	40,465	13,653	8,552	9,197	0	0	60,660	438,122
Food Preparation	1,870	265	131	335	493	341	204	1,094	0	0	1,199	5,933
Miscellaneous	177,231	39,626	12,374	25,467	36,373	150,553	23,354	32,130	0	0	80,254	577,362
Data Center	386,749	0	0	0	189,885	124,832	0	0	448,939	0	0	1,150,405
Total	2,413,296	897,745	828,923	537,631	1,184,873	778,945	317,058	811,302	701,466	116,746	2,162,080	10,750,065

New Construction/Renovation Sales for 2013, MWh at Meter

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Streetlighting	Other	TOTAL
Indoor Lighting	53,422	25,359	11,186	10,842	27,048	12,328	6,324	11,618	430	0	58,012	216,568
Outdoor Lighting	5,725	2,136	1,356	1,949	2,686	829	968	3,365	0	7,150	5,627	31,792
Cooling	20,107	10,711	4,808	1,272	7,155	9,994	4,390	6,715	10,741	0	24,115	100,010
Ventilation	14,211	8,437	2,218	6,081	11,866	3,949	3,820	4,190	4,296	0	21,624	80,693
Water Heating	443	160	208	85	755	555	424	1,505	0	0	633	4,768
Refrigeration	716	2,419	29,379	8,363	4,098	1,381	1,070	18,500	0	0	7,838	73,764
Space Heating	3,171	1,283	392	1,886	2,595	949	455	1,199	0	0	5,868	17,796
Office Equipment	15,355	2,035	457	870	2,478	836	524	563	0	0	3,715	26,834
Food Preparation	115	16	8	21	30	21	13	67	0	0	73	363
Miscellaneous	10,855	2,427	758	1,560	2,228	9,221	1,430	1,968	0	0	4,915	35,362
Data Center	23,687	0	0	0	11,630	7,646	0	0	27,496	0	0	70,459
Total	147,807	54,984	50,769	32,928	72,570	47,708	19,419	49,690	42,963	7,150	132,421	658,408
Total Elec Sales (MWh)	**2,561,102**	**952,729**	**879,692**	**570,559**	**1,257,442**	**826,653**	**336,476**	**860,992**	**744,429**	**123,897**	**2,294,501**	**11,408,473**

LONG ISLAND - NATURAL GAS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	6,346,966	5,203,205	515,231	743,446	1,378,893	1,668,390	464,507	883,639	-	4,689,959	383,158	22,277,394
Water Heating	3,006,437	2,517,192	305,676	196,718	747,222	1,845,957	615,913	932,540	-	1,879,085	108,654	12,155,395
Food Service	-	-	-	25,523	71,739	104,192	56,532	-	-	42,994	14,857	315,837
Miscellaneous	-	1,734,794	217,579	36,760	399,935	769,888	267,543	1,319,060	-	233,151	114,771	5,093,481
Cooling	349,798	59,320	33,983	3,550	26,590	91,272	23,551	67,171	-	-	10,525	665,758
Total	9,703,201	9,514,510	1,072,469	1,005,997	2,624,379	4,479,699	1,428,045	3,202,410	-	6,845,187	631,965	40,507,864

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	350,029	286,952	28,415	41,000	76,045	92,010	25,617	48,732	-	258,647	21,131	1,228,578
Water Heating	165,802	138,821	16,858	10,849	41,209	101,803	33,967	51,429	-	103,630	5,992	670,359
Food Service	-	-	-	1,408	3,956	5,746	3,118	-	-	2,371	819	17,418
Miscellaneous	-	95,672	11,999	2,027	22,056	42,459	14,755	72,745	-	12,858	6,329	280,901
Cooling	19,291	3,271	1,874	196	1,466	5,034	1,299	3,704	-	-	580	36,716
Total	535,123	524,717	59,146	55,480	144,732	247,051	78,755	176,610	-	377,506	34,852	2,233,972
Total NG Sales (MMBtu)	**10,238,324**	**10,039,227**	**1,131,615**	**1,061,477**	**2,769,111**	**4,726,750**	**1,506,801**	**3,379,020**	**0**	**7,222,693**	**666,817**	**42,741,836**

LONG ISLAND - PETROFUELS

Existing End Use Sales Forecast for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	1,819,892	1,778,894	189,656	206,877	463,695	608,484	213,602	451,961	-	1,293,750	128,604	7,155,414
Water Heating	645,880	638,928	82,880	43,341	185,962	502,538	137,277	361,834	-	434,865	28,107	3,061,610
Miscellaneous	-	-	-	5,426	17,249	27,357	12,015	-	-	10,881	3,884	76,811
Total	2,465,772	2,417,822	272,535	255,643	666,906	1,138,379	362,894	813,795	-	1,739,495	160,595	10,293,835

New Construction/Renovation Sales for 2013, MMBtu

	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Other	TOTAL
Space Heating	94,987	92,847	9,899	10,798	24,202	31,759	11,149	23,589	-	67,525	6,712	373,467
Water Heating	33,711	33,348	4,326	2,262	9,706	26,229	7,165	18,885	-	22,697	1,467	159,796
Miscellaneous	-	-	-	283	900	1,428	627	-	-	568	203	4,009
Total	128,697	126,195	14,225	13,343	34,808	59,416	18,941	42,475	-	90,790	8,382	537,272
Total Petro Sales (MMBtu)	**2,594,469**	**2,544,017**	**286,760**	**268,986**	**701,714**	**1,197,795**	**381,835**	**856,269**	**0**	**1,830,286**	**168,977**	**10,831,107**

Appendix D: Measure Characterizations

Notes on Measure Characterizations

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

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

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

4. All costs are presented in 2012$

Residential Measures

Primary Fuel End Use	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric Savings (kWh)	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Gross Levelized Cost ($/MMBtu)	Net Levelized Cost ($/MMBtu)	Peak Reduction (kW)	Incremental Cost ($)	Gas Savings (MMBtu)	Fuel Savings (MMBtu)	Data Sources: Measure Life	Data Sources: Savings Data	Data Sources: Costs Data
Lighting	Standard CFLs	Socket Penetration-weighted amount of lamps in home, average lumens, L per watt, average hours of use, for the home. First-year savings shown	The baseline changes over time, representing the evolving distribution of lighting technologies required by code	6	220.8	$0.066	$0.066	n/a	n/a	0.42	$16	-0.32831	-0.16913	2006, 2009, 2010	2004, 2011	2001, 2002, 2003, 2004 2005, 2007, 2008
Lighting	Specialty CFLs	Socket Penetration-weighted amount of lamps in home, average lumens, L per watt, average hours of use, for the home. First-year savings shown	The baseline changes over time, representing the evolving distribution of lighting technologies required by code	6.8	42.4					0.08	$6	-0.06303	-0.03247			
Lighting	LEDs	Socket Penetration-weighted amount of lamps in home, average lumens, L per watt, average hours of use, for the home. First-year savings shown	The baseline changes over time, representing the evolving distribution of lighting technologies required by code	15	76.8					0.15	$84	-0.1142	-0.05883			
Lighting	Controls	Occupancy, photo, and time-based sensors and switches. First-year savings shown	The baseline changes over time, representing the evolving distribution of lighting technologies required by code	15	1.6					0.00	$0	-0.00245	-0.00126			
Lighting	Integrated design	Location, controls, targeted for room and task, including accomodation for daylighting First-year savings shown	no integrated design	20	1.6					0.00	$0	-0.00245	-0.00126			
Hot Water	Low-Flow Package	Reduced flow rate aerators for kitchen and bath faucets and showerheads. Eff avg flow rate 1.15gpm for the household	Effective average flow rate of 1.64 for the household	9.5	2038.0	$0.040	($0.42)	n/a	n/a	0.08	$50	17.65	0.05	2013,	2032, 2033, 2034	2032, 2033, 2034
Hot Water	Drain Water Heat Recovery	60 inch, 70% efficient DWHR unit installed on common stack	none	35	476.0					0.02	$1,000					
Hot Water	Structured Plumbing	Optimized piping length, diameters and on-demand pumping (insulated recirculation loop)	conventional lengths, diameters, no recirculation loop.	35	679.0					0.03	$800					
Hot Water	Gas Water Heater	Gas condensing storage	Code minimum EF, changes over time	13	n/a					n/a	$685					
Hot Water	Gas Water Heater	Gas condensing tankless	Code minimum EF, changes over time	13	n/a					n/a	$605					
Hot Water	Gas Water Heater	Gas Heat Pump hybrid	Code minimum EF, changes over time	13	n/a					n/a	$950					
Hot Water	Electric Water Heater	Heat Pump Water Heater	Code minimum by category tank size, electric resistance	12	2245.0					0.10	$850	n/a	n/a			
Thermal Comfort	ranch/MH with HP transition	ACH: 0.64; Insulation: wall: 11, ceiling: 38, foundation above grade: 15, below grade: 15; heat pump heating	ACH: 1.61; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	437.1	n/a	n/a	$20.49	$16.70	0.94	$7,920	23	14	2019, 2041, 2013	2035, 2036, 2039, 2040, 2025, 2024, 2022, 2021, 2020, 2015	2010, 2019, 2014,
Thermal Comfort	town/row with HP transition	ACH: 0.41; Insulation: wall: 11, ceiling: 49, foundation above grade: 11, below grade: 7; heat pump heating	ACH: 1.07; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	437.1	n/a	n/a	$21.17	$17.40	0.94	$8,244	24	14			
Thermal Comfort	colonial/2-story with HP transition	ACH: 0.46; Insulation: wall: 11, ceiling: 49, foundation above grade: 11, below grade: 7; heat pump heating	ACH: 1.02; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	502.7	n/a	n/a	$17.77	$14.11	1.08	$8,196	28	17			
Thermal Comfort	2 - 4 unit with HP transition	ACH: 0.47; Insulation: wall: 11, ceiling: 49, foundation above grade: 11, below grade: 7; heat pump heating	ACH: 1.08; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	502.7	n/a	n/a	$27.77	$24.24	1.08	$13,246	29	18			

Residential Measures

Primary Fuel End Use	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric Savings (kWh)	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Gross Levelized Cost ($/MMBtu)	Net Levelized Cost ($/MMBtu)	Peak Reduction (kW)	Incremental Cost ($)	Gas Savings (MMBtu)	Fuel Savings (MMBtu)	Data Sources		
														Measure Life	Savings Data	Costs Data
Thermal Comfort	ranch/MH	ACH: 0.64; Insulation: wall: 11, ceiling: 38, foundation above grade: 11, below grade: 7	ACH: 1.61; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	87.4	n/a	n/a	$20.08	$18.67	0.19	$4,170	13	8	2019, 2041, 2013	2035, 2036, 2039, 2040, 2025, 2024, 2022, 2021, 2020, 2015	2010, 2019, 2014,
Thermal Comfort	town/row	ACH: 0.41; Insulation: wall: 11, ceiling: 49, foundation above grade: 11, below grade: 7	ACH: 1.07; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	87.4	n/a	n/a	$21.55	$20.22	0.19	$4,744	13	8			
Thermal Comfort	colonial/2-story	ACH: 0.46; Insulation: wall: 11, ceiling: 49, foundation above grade: 11, below grade: 7	ACH: 1.02; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	100.5	n/a	n/a	$21.27	$19.74	0.22	$4,696	13	8			
Thermal Comfort	2 - 4 unit	ACH: 0.47; Insulation: wall: 11, ceiling: 49, foundation above grade: 11, below grade: 7	ACH: 1.08; Insulation: wall: 11, ceiling: 27, foundation above grade: 3, below grade: 7; statewide average heating system	20	100.5	n/a	n/a	$21.01	$19.72	0.22	$5,496	16	10			
Thermal Comfort	garden apts bldg	ACH: 0.20; Insulation: wall: 13, ceiling: 27	ACH: 0.27; Insulation: wall: 13, ceiling: 27; statewide average heating system	20	150.8	n/a	n/a	$23.06	$20.07	0.32	$3,900	10	6			
Thermal Comfort	misc (e.g., houseboats, small RVs)	ACH: 0.40; Insulation: wall: 11, ceiling: 27	ACH: 1.05; Insulation: wall: 11, ceiling: 27; statewide average heating system	20	0.0	n/a	n/a	$22.53	$22.53	0.00	$900	2	1			
Appliances	combined package	combined package of major electric appliances (refrigerator/freezer, clothes washer); brushless fan motor retrofit for furnaces; programmable thermostats	Typical non-ENERGY STAR models with half measure life remaining	15.6	1545.0	$0.05	$0.06	n/a	n/a	1.80	$2,250	0.23	0.54	2029, 2030, 2013, 2010, 2036	2017, 2018, 2021, 2029, 2031, 2030, 2026, 2037, 2041, 2032	2019, 2029, 2031, 2030

Residential Measures		Penetration % of households					
Primary Fuel End Use	Measure Name	2012	2016	2020	2024	2028	2032
Lighting	Standard CFLs	40%	58%	50%	38%	26%	16%
Lighting	Specialty CFLs	7%	11%	10%	8%	6%	5%
Lighting	LEDs	7%	22%	39%	54%	68%	79%
Lighting	Controls	0.3%	1.0%	2.0%	3.0%	4.0%	5.0%
Lighting	Integrated design	0.1%	0.5%	1.0%	2.0%	3.0%	4.0%
Hot Water	Low-Flow Package	8%	33%	63%	93%	100%	100%
Hot Water	Drain Water Heat Recovery	0%	5%	21%	36%	41%	43%
Hot Water	Structured Plumbing	0%	0%	1%	2%	2%	2%
Hot Water	Gas Water Heater	20%	36%	22%	7%	3%	3%
Hot Water	Gas Water Heater	50%	100%	100%	100%	100%	100%
Hot Water	Gas Water Heater	0%	5%	25%	45%	70%	100%
Hot Water	Electric Water Heater	15%	37%	65%	93%	100%	100%
Thermal Comfort	ranch/MH with HP transition	0.08%	0.08%	0.10%	0.18%	0.45%	1.58%
Thermal Comfort	town/row with HP transition	0.08%	0.08%	0.10%	0.18%	0.45%	1.58%
Thermal Comfort	colonial/2-story with HP transition	0.05%	0.06%	0.07%	0.13%	0.32%	1.11%
Thermal Comfort	2 - 4 unit with HP transition	0.04%	0.04%	0.05%	0.09%	0.23%	0.79%

Residential Measures		Penetration % of households					
Primary Fuel End Use	Measure Name	2012	2016	2020	2024	2028	2032
Thermal Comfort	ranch/MH	0.08%	0.08%	0.10%	0.18%	0.45%	1.58%
Thermal Comfort	town/row	0.08%	0.08%	0.10%	0.18%	0.45%	1.58%
Thermal Comfort	colonial/2-story	0.05%	0.06%	0.07%	0.13%	0.32%	1.11%
Thermal Comfort	2 - 4 unit	0.04%	0.04%	0.05%	0.09%	0.23%	0.79%
Thermal Comfort	garden apts bldg	0.04%	0.04%	0.05%	0.09%	0.23%	0.79%
Thermal Comfort	misc (e.g., houseboats, small RVs)	0.02%	0.02%	0.03%	0.05%	0.14%	0.47%
Appliances	combined package	6.45%	25.81%	25.81%	25.81%	25.81%	25.81%

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Cooling	NC, Reno, Repl	Cool roof	White roofing material or coating, to reflect the sun and reduce air-coinditioning loads	Typical black roof with typical reflectance and absorption	20	31.6%	$0.078	$0.130	$ 0.85					(0.0037)	
Cooling	Ret	Cooling controls	Retrofit high efficiency technologies for multiple types of space cooling controls such as dual enthalpy economizers, low flow fume hoods, etc.	Stock HVAC control practices	9.8	32.5%	$0.050	$0.019	$ 0.42	0.0	0.0	$ -	0%		
Cooling	NC, Reno, Repl	Cooling design	High efficiency design improvements for unitary and chiller systems, based on mix of measures to optimize the total system efficiency. Potentially including controls, economizers, VFDs, VAV, better design, etc.	Unoptimied HVAC equipment design	12.5	25.0%	$0.084	$0.002	$ 0.76	0.0	0.0	$ -	0%	0.0032	
Cooling	Ret	Cooling distribution	Retrofit high efficiency technologies for space cooling distribution system improvements such as efficient chilled water circulator pumps.	Stock HVAC distribution system	20	64.7%	$0.081	$0.049	$ 0.76	0.0	0.0	$ -	0%		
Cooling	Ret	Cooling maintenance	Maintain an existing HVAC system by adjusting refrigerant charge, air flow, and control set-points for maximum efficiency.	Unoptimized HVAC equipment due to lack of maintenance	6	7.5%	$0.042	($0.184)	$ 0.23	0.0	0.0	$ -	0%	0.0130	
Cooling	NC, Reno, Repl	Cooling source equipment Tier II	High efficiency technologies for multiple types of space cooling source equipment such as air-conditioners, chillers, room AC, etc. Efficiency levels exceed Tier I.	Standard efficiency (typically federal standard and/or NYS energy code compliant) space cooling source equipment	19.7	20.5%	$0.100	$0.069	$ 1.35	0.0	0.0	$ -	0%		
Cooling	Ret	Cooling source equipment Tier II	High efficiency technologies for multiple types of space cooling source equipment such as air-conditioners, chillers, room AC, etc. Efficiency levels exceed Tier I.	Stock efficiency (typically ASHRAE 90.1-1999 levels) space cooling source equipment	19.7	29.8%	$0.272	($0.006)	$ 2.52	13.0	11.8	$ 1.93	66%		

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Cooling	NC, Reno, Repl	Data centers virtualization -Cool	Data Center reduced cooling loads associated with electric savings for computer loads.	Typical data center without server virtualization	5	47.9%	$0.036	$0.032	$ 0.18						
Cooling	Ret	Data centers virtualization -Cool	Data Center reduced cooling loads associated with electric savings for computer loads.	Typical data center without server virtualization	5	47.9%	$0.037	$0.033	$ 0.18						
Cooling	Ret	Demand controlled ventilation -Cool	Adjust ventilation rates based on indoor-air quality (typically by monitoring CO2 levels with sensors)	Ventilation system in which the outside air ventilation rate is fixed when the building is occupied	10	10.0%	$0.077	($0.056)	$ 0.66					0.0130	
Cooling	NC, Reno	Duct sealing -Cool	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	25	11.5%	$0.010	($0.012)	$ 0.14						
Cooling	Ret	Duct sealing -Cool	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	25	11.5%	$0.009	($0.013)	$ 0.14						
Cooling	NC, Reno	EMS/Controls -Cool	Energy management system and/or other controls to optimize control of HVAC system. Could include scheduling, optimal start-stop, chiller reset control, dual enthalpy economizers, CO2 sensors, etc.	No building automation	15	17.5%	$0.082	($0.005)	$ 0.93					0.0074	
Cooling	Ret	EMS/Controls -Cool	Energy management system and/or other controls to optimize control of HVAC system. Could include scheduling, optimal start-stop, chiller reset control, dual enthalpy economizers, CO2 sensors, etc.	No building automation	15	17.5%	$0.155	$0.069	$ 1.40					0.0074	
Cooling	NC, Reno, Repl	HE stove hood -Cool	Optimized stove hoods to minimize conditioned make-up air requirements.	Standard stove hoods	20	10.2%	$0.029	$0.021	$ -						
Cooling	Ret	HE stove hood -Cool	Optimized stove hoods to minimize conditioned make-up air requirements.	Standard stove hoods	20	10.2%	$0.024	$0.018	$ -						
Cooling	NC, Reno, Repl	High-eff HP CEE Tier II -Cool	Single or polyphase packaged or split system unitary heat pump meeting an efficiency criteria substantially above CEE Tier II. High efficiency level will reflect the maximum level available from multiple major manufacturers, weighted by size and type of units.	Standard efficiency new unitary heat pump. Baseline efficiency will reflect weighted average by size and type.	15	11.4%	$0.056	$0.043	$ 0.64						

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs					
										Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Data Center	NC, Reno, Repl	Data centers virtualization -IT	Data Center energy savings for information technology (computer loads) at facilities or rooms used to house computer servers and data systems through the use of server virtualization.	Typical data center without server virtualization	5	47.9%	$0.036	$0.032	$ 0.18						
Data Center	Ret	Data centers virtualization -IT	Data Center energy savings for information technology (computer loads) at facilities or rooms used to house computer servers and data systems through the use of server virtualization.	Typical data center without server virtualization	5	47.9%	$0.037	$0.033	$ 0.18						
Elec Total	Reno	Deep Energy Retrofit - Electric	Deep energy retrofit going after deep savings in every building systems, mostly for the renovation market	Energy use of the existing building, before the deep energy retrofit occurs. Assumes energy use of typical existing building.	20	43.0%	$0.026	$0.017	$ 0.36						$0.002
Elec Total	NC	Integrated bldg design - Tier I (2007 baseline) - Elec	Reflects comprehensive, optimized design of new buildings addressing all end-uses and interactions between them on a systems basis. Measures include, but are not limited to, improved air barrier performance, minimum IAQ performance, lighting controls, improved lighting power density, improved mechanical equipment efficiency, and demand controlled ventilation.	New building conforming to ASHARE 90.1-2007	15.3	36.4%	$0.053	$0.045	$ 0.61						
Elec Total	Ret	Retrocommissioning - Elec	Optimizing energy usage of existing buildings and systems using O&M, control calibration, etc.	A typical existing building that hasn't been commissioned	7	9.0%	$0.015	$0.007	$ 0.10						
Food Preparation	NC, Reno	Kitchen Equipment - 2 meal	Scalable savings estimate based on food service volume metrics (meals/day) derived using standardized equipment and commercial foodservice layout specifications from Fishnick for a restaurant that serves 2 meals or less per day	Standard Food Preparation Equipment	11.8	18.2%	$0.043	$0.037	$ 0.41						
Food Preparation	NC, Reno	Kitchen Equipment - 3 mean	Scalable savings estimate based on food service volume metrics (meals/day) derived using standardized equipment and commercial foodservice layout specifications from Fishnick for a restaurant that serves 3 meals per day	Standard Food Preparation Equipment	11.9	17.4%	$0.041	$0.035	$ 0.40						

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Indoor Lighting	NC, Reno, Repl	Accent Lighting	High efficiency technologies for accent lighting applications, including track and other situations requiring directional light	Standard efficiency accent lighting technologies	15	79.8%	$0.041	($0.046)	$ 0.68						$0.118
Indoor Lighting	Ret	Accent Lighting	High efficiency technologies for accent lighting applications, including track and other situations requiring directional light	Standard efficiency accent lighting technologies	15	79.8%	$0.114	($0.033)	$ 1.87	15.0	9.0	$ 1.53	100%		$0.118
Indoor Lighting	NC, Reno, Repl	Ambient Lighting	High efficiency technologies for ambient lighting applications, including linear fluorescent, general service bulbs, high bay lighting fixtures, etc.	Standard efficiency ambient lighting technologies	15.1	43.7%	$0.083	$0.047	$ 1.07						$0.041
Indoor Lighting	Ret	Ambient Lighting	High efficiency technologies for ambient lighting applications, including linear fluorescent, general service bulbs, high bay lighting fixtures, etc.	Standard efficiency ambient lighting technologies	15.1	43.9%	$0.158	$0.048	$ 1.31	8.0	4.8	$ 0.37	50%		$0.053
Indoor Lighting	NC, Reno, Repl	Lighting Controls	Lighting controls technologies including occupancy sensors, daylight dimming, wirless controls, etc.	Light fixtures using manual controls	10	30.0%	$0.022	$0.029	$ 0.13						
Indoor Lighting	Ret	Lighting Controls	Lighting controls technologies including occupancy sensors, daylight dimming, wirless controls, etc.	Light fixtures using manual controls	10	30.0%	$0.036	$0.044	$ 0.34						
Indoor Lighting	NC, Reno, Repl	Task Lighting	High efficiency technologies for low-lumen task lighting applications including undercabinet and desk lights	Standard efficiency task lighting technologies	16.1	80.4%	$0.031	$0.038	$ 0.42						$0.001
Indoor Lighting	Ret	Task Lighting	High efficiency technologies for low-lumen task lighting applications including undercabinet and desk lights	Standard efficiency task lighting technologies	16.1	80.4%	$0.037	$0.043	$ 0.49				0%		$0.001
Office Equipment	MD	HE Plug Loads	Plug Load equipment, including computers, display, copier, fax, printer, power supply, TVs, and set top boxes	Standard Office equipment	4.15	65.8%	$0.015	$0.023	$ 0.07						
Office Equipment	Ret	Office Equipment Control	Low cost measures that can be done as a retrofit to an office building. Includes Power Management, advanced plug strips/timers, monitor brightness settings, and occupant behavior.	Standard Office equipment control and standard power strips	3.22	29.0%	$0.030	$0.038	$ 0.11						
Outdoor Lighting	NC, Reno, Repl	Outdoor Area Lighting	General exterior area lighting such as parking lots, canopy, façade, security, etc.	Standard efficiency exterior area lighting using metal halide and high-pressure sodium technologies	11.6	71.9%	$0.054	$0.028	$ 0.52						$0.028
Outdoor Lighting	Ret	Outdoor Area Lighting	General exterior area lighting such as parking lots, canopy, façade, security, etc.	Standard efficiency exterior area lighting using metal halide and high-pressure sodium technologies	11.6	71.9%	$0.117	$0.056	$ 0.99	11.6	7.0	$ 0.52	75%		$0.028

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Outdoor Lighting	NC, Reno, Repl	Outdoor Lighting Controls	Exterior lighting controls such as photocell dimmers, and outdoor occupancy sensors	Exterior light fixtures using manual controls	10	31.3%	$0.398	$0.397	$ 0.49						
Outdoor Lighting	Ret	Outdoor Lighting Controls	Exterior lighting controls such as photocell dimmers, and outdoor occupancy sensors	Exterior light fixtures using manual controls	10	31.3%	$0.243	$0.243	$ 0.97						
Outdoor Lighting	NC, Reno, Repl	Outdoor Lighting Design	Exterior lighting design includes the use of reduced wattage lamps, better spacing and use of cut-offs and reflectors	Standard exterior lighting practice meeting NY State Building Codes	15	15.0%	$0.044	$0.044	$ 0.10						
Outdoor Lighting	Ret	Outdoor Lighting Design	Exterior lighting design includes the use of reduced wattage lamps, better spacing and use of cut-offs and reflectors	Standard exterior lighting practice meeting NY State Building Codes	15	15.0%	$0.030	$0.030	$ 0.31						
Outdoor Lighting	NC, Reno, Repl	Streetlighting	LED Streetlighting owned by municipalities or other public entities	Standard efficiency streetlighting fixtures using metal halide and high-pressure sodium technologies	11.5	68.8%	$0.059	($0.019)	$ 0.56						$0.088
Outdoor Lighting	Ret	Streetlighting	LED Streetlighting owned by municipalities or other public entities	Standard efficiency streetlighting fixtures using metal halide and high-pressure sodium technologies	11.5	68.8%	$0.161	$0.024	$ 1.36	11.5	6.9	$ 0.79	75%		$0.088
Refrigeration	NC, Reno, Repl	Built-up Refrigeration Systems	All equipment associated with built up refrigeration systems (i.e. supermarkets) such as display cases, compressor racks, refrigerant distribution systems, condensors, fans, etc.	Standard efficiency built-up refrigeration systems	11.5	33.6%	$0.030	$0.007	$ 0.32					0.0024	
Refrigeration	Ret	Built-up Refrigeration Systems	All equipment associated with built up refrigeration systems (i.e. supermarkets) such as display cases, compressor racks, refrigerant distribution systems, condensors, fans, etc.	Standard efficiency built-up refrigeration systems	11.5	26.5%	$0.275	$0.033	$ 1.90	6.6	4.0	$ 1.38	49%	0.0024	
Refrigeration	NC, Reno, Repl	Packaged Refrigeration Systems	All refrigeration technologies that are "factory built". This includes all commercial refrigerators and freezers, ice makers, water coolers and beverage vending machines. In general, packaged systems incorporate both the refrigeration system and the refrigerated compartment in a single package.	Standard efficiency packaged refrigeration units	10.3	27.7%	$0.013	$0.022	$ 0.12						

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Refrigeration	Ret	Packaged Refrigeration Systems	All refrigeration technologies that are "factory built". This includes all commercial refrigerators and freezers, ice makers, water coolers and beverage vending machines. In general, packaged systems incorporate both the refrigeration system and the refrigerated compartment in a single package.	Standard efficiency uncontrolled packaged refrigeration units	10.3	37.5%	$0.033	$0.042	$ 0.31						
Space Heating	NC, Reno, Repl	High-eff HP CEE Tier II - Heat	See corresponding "Cool" measure.	Standard efficiency new unitary heat pump. Baseline efficiency will reflect weighted average by size and type.	15	10.5%	$0.056	$0.043	$ 0.64						
Ventilation	Ret	Demand controlled ventilation -Vent	See corresponding "Cool" measure.	Ventilation system in which the outside air ventilation rate is fixed when the building is occupied	10	10.0%	$0.077	($0.056)	$ 0.66						
Ventilation	NC, Reno	Duct sealing -Vent	See corresponding "Cool" measure.	Leaky and unsealed ducts	25	9.0%	$0.010	($0.012)	$ 0.14						
Ventilation	Ret	Duct sealing -Vent	See corresponding "Cool" measure.	Leaky and unsealed ducts	25	9.0%	$0.009	($0.013)	$ 0.14						
Ventilation	NC, Reno	EMS/Controls -Vent	See corresponding "Cool" measure.	No building automation	15	17.5%	$0.082	($0.005)	$ 0.93						
Ventilation	Ret	EMS/Controls -Vent	See corresponding "Cool" measure.	No building automation	15	17.5%	$0.155	$0.069	$ 1.40						
Ventilation	NC, Reno, Repl	HE stove hood -Vent	See corresponding "Cool" measure.	Standard stove hoods	20	68.0%	$0.029	$0.021	$ 0.46						
Ventilation	Ret	HE stove hood -Vent	See corresponding "Cool" measure.	Standard stove hoods	20	68.0%	$0.024	$0.018	$ 0.46						
Ventilation	Ret	Ventilation motors	Retrofit high efficiency ventilation motors meeting or exceeding NEMA Premium efficiency levels, or similar level. Represents weighted average of types and sizes.	Stock efficiency ventilation system motors	15	5.1%	$0.103	$0.050	$ 0.75	15.0	9.0	$ 0.68	29%		
Ventilation	NC, Reno	Ventilation VFDs	Variable frequency drives for HVAC applications (i.e. fans and pumps)	Stock efficiency HVAC application motors without VFDs installed	15	39.7%	$0.013	$0.013	$ 0.13	0.0	0.0	$ -	0%		
Ventilation	Ret	Ventilation VFDs	Variable frequency drives for HVAC applications (i.e. fans and pumps)	Stock efficiency HVAC application motors without VFDs installed	15	39.7%	$0.011	$0.011	$ 0.13	0.0	0.0	$ -	0%		
Water Heating	NC, Reno	DHW Controls -Elec	Electronic controls that svae energy through reduced water usage or more efficient storage including sink and shower controls, and water heater cycling controls	Manual control	13.1	39.2%	$0.030	$0.026	$ 0.20						

Commercial Electric Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Measure Life (yr)	Electric % Savings	Gross Levelized Cost ($/kWh)	Net Levelized Cost ($/kWh)	Incre-mental Cost ($/kWh)	Early-Retirement Retrofit Inputs					
										Base-line Life	Base-line Age	Baseline Replacement Cost ($/kWh)	Baseline Shift Savings Factor	Fossil Fuel Savings (MMBtu/kWh)	Annual O&M Impact ($/kWh)
Water Heating	Ret	DHW Controls -Elec	Electronic controls that svae energy through reduced water usage or more efficient storage including sink and shower controls, and water heater cycling controls	Manual control	13.1	39.0%	$0.036	$0.032	$ 0.50						
Water Heating	NC, Reno	DHW Distribution Elec	Efficiency measures that reduce losses in electric hot water distribution systems, including high-efficiency appliances, low-flow valves and aerators, and pipe insulation	Standard distribution systems that lack insulation and low flow appliances	12.4	3.1%	$0.018	$0.014	$ 0.25						
Water Heating	Ret	DHW Distribution Elec	Efficiency measures that reduce losses in electric hot water distribution systems, including high-efficiency appliances, low-flow valves and aerators, and pipe insulation	Standard distribution systems that lack insulation and low flow appliances	12.4	10.3%	$0.006	$0.002	$ 0.08						
Water Heating	NC, Reno	DHW Source Equipment Elec	Electric equipment for hot water generation and storage, including tank-type heaters, integrated systems, point of use systems, and heat recovery	Standard efficiency electric water heating equipment	16	61.5%	$0.088	$0.084	$ 1.44						
Water Heating	Ret	DHW Source Equipment Elec	Electric equipment for hot water generation and storage, including tank-type heaters, integrated systems, point of use systems, and heat recovery	Standard efficiency electric water heating equipment	16	46.7%	$0.110	$0.106	$ 1.83						

Commercial Fossil Fuel Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	Fossil Fuel % Savings	Gross Levelized Cost ($/MMBtu)	Net Levelized Cost ($/MMBtu)	Incre-mental Cost ($ per MMBtu saved)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($ per MMBtu saved)	Baseline Shift Savings Factor	Annual Electric Savings (kWh per MMBtu saved)	Annual O&M Impact ($ per MMBtu saved)
Food Preparation	NC, Reno	Kitchen equipment - gas, 2 meal	Scalable savings estimate based on food service volume metrics (meals/day) derived using standardized equipment and commercial foodservice layout specifications from Fishnick for a restaurant that serves 2 meals or less per day	Standard Food Preparation Equipment	11.8	32.7%	$1.73	$1.73	$ 17						
Food Preparation	NC, Reno	Kitchen equipment - gas, 3 meal	Scalable savings estimate based on food service volume metrics (meals/day) derived using standardized equipment and commercial foodservice layout specifications from Fishnick for a restaurant that serves 3 meals per day	Standard Food Preparation Equipment	11.9	29.3%	$1.81	$1.81	$ 18						
Fuel Total	Ret	Retrocommissioning - Fossil Fuel	Optimizing energy usage of existing buildings and systems using O&M, control calibration, etc.	A typical existing building that hasn't been commissioned	7	16.0%	$3.07	$3.07	$ 28						
Space Heating	Reno	Deep Energy Retrofit - Fossil Fuel	Deep energy retrofit going after deep savings in every building systems, mostly for the renovation market	Energy use of the existing building, before the deep energy retrofit occurs. Assumes energy use of typical existing building.	20	43.0%	$6.41	$6.41	$ 105						
Space Heating	NC, Reno	Duct insulation and sealing, gas heat	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	18	11.5%	$3.58	$3.58	$ 41						
Space Heating	Ret	Duct insulation and sealing, gas heat	Seal HVAC ductwork with aerosol-based sealant to reduce air leakage outside the conditioned space and the consequent energy loss.	Leaky and unsealed ducts	18	11.5%	$3.61	$3.61	$ 41						
Space Heating	Ret	Envelope Upgrade	Add add attic insulation,wall insulation, and air sealing to small commercial building envelopes	Typical envelope insulation levels and tightness for existing northeastern small commercial buildings	15	11.6%	$8.34	$0.20	$ 86					107	
Space Heating	Ret	Heating heat recovery	Heat exchanger recovers waste heat from blow down and preheats makeup water to boiler.	Standard efficiency boiler with no blow-down heat recovery unit	20	7.5%	$4.01	$4.01	$ 49						
Space Heating	NC, Reno, Repl	Heating Source -MD	All market driven space heating source equipment such as furnaces, boilers, unit heaters and infrared heaters.	Standard efficiency space heating equipment meeting current federal standards	20	13.2%	$8.15	$8.15	$ 100						

Commercial Fossil Fuel Measures

Primary Fuel End Use	Applicable Markets	Measure Name	Measure Description	Baseline Description	Life (yr)	Fossil Fuel % Savings	Gross Levelized Cost ($/MMBtu)	Net Levelized Cost ($/MMBtu)	Incre-mental Cost ($ per MMBtu saved)	Early-Retirement Retrofit Inputs: Base-line Life	Base-line Age	Baseline Replacement Cost ($ per MMBtu saved)	Baseline Shift Savings Factor	Annual Electric Savings (kWh per MMBtu saved)	Annual O&M Impact ($ per MMBtu saved)
Space Heating	Ret	Heating Source -RET	Space heating equipment that is cost effective in retrofit applications such as condensing gas unit heaters	Standard efficiency space heating equipment meeting 2001 federal standards	20	30.8%	$3.81	$1.99	$ 38	20.0	12.0	$ 35.11	46%		
Space Heating	NC	Integrated bldg design - Tier I (2007 baseline) - Fossil Fuel	Reflects comprehensive, optimized design of new buildings addressing all end-uses and interactions between them on a systems basis. Measures include, but are not limited to, improved air barrier performance, minimum IAQ performance, lighting controls, improved lighting power density, improved mechanical equipment efficiency, and demand controlled ventilation.	New building conforming to ASHARE 90.1-2007	15.3	36.4%	$17.20	$17.20	$ 180						
Space Heating	Ret	RET Heating controls	Space heating controls such as O2 trim controls, and boiler reset controls	Manual controls	16.7	3.4%	$2.30	$2.30	$ 27						
Space Heating	Ret	RET Heating distribution	Pipe insulation and duct sealing	Uninsulated pipes and leaky ducts	10	0.5%	$0.32	$0.32	$ 2						
Water Heating	NC, Reno	DHW Controls -Gas	Electronic controls that svae energy through reduced water usage or more efficient storage including sink and shower controls, and water heater cycling controls	Manual control	13.1	48.6%	$9.39	$9.39	$ 30						
Water Heating	Ret	DHW Controls -Gas	Electronic controls that svae energy through reduced water usage or more efficient storage including sink and shower controls, and water heater cycling controls	Manual control	13.1	48.6%	$12.71	$12.71	$ 74						
Water Heating	NC, Reno	DHW Distribution Gas	Efficiency measures that reduce losses in hot water distribution systems, including high-efficiency appliances, low-flow valves and aerators, and pipe insulation	Standard distribution systems that lack insulation and low flow appliances	10.1	5.5%	$1.50	$1.50	$ 8						
Water Heating	Ret	DHW Distribution Gas	Efficiency measures that reduce losses in hot water distribution systems, including high-efficiency appliances, low-flow valves and aerators, and pipe insulation	Standard distribution systems that lack insulation and low flow appliances	10.1	6.8%	$5.54	$5.54	$ 28						
Water Heating	NC, Reno	DHW Source Equipment - Gas	Gas and oil fired equipment for hot water generation and storage, including tank-type heaters, integrated systems, point of use systems, and heat recovery	Standard efficiency gas and oil fired water heating equipment	14.6	34.0%	$5.99	$5.99	$ 37						
Water Heating	Ret	DHW Source Equipment - Gas	Gas and oil fired equipment for hot water generation and storage, including tank-type heaters, integrated systems, point of use systems, and heat recovery	Standard efficiency gas and oil fired water heating equipment	14.6	16.0%	$4.31	$4.31	$ 28						

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Cooling	NC, Reno, Repl	Cooling Controls	Dual enthalpy economizer	Dual enthalpy economizers with electronic controls to optimize use of outside air to reduce cooling loads.	Standard efficiency economizers, represents a mix of dry-bulb and single enthalpy.	9.8	24.1%	$ 0.57			1	1	3
Cooling	Ret	Cooling Controls	Dual enthalpy economizer	Dual enthalpy economizers with electronic controls to optimize use of outside air to reduce cooling loads.	Existing stock, represents a mix of dry-bulb and fixed dampers.	9.8	32.5%	$ 0.42			1	1	3
Cooling	NC, Reno, Repl	Cooling Controls	Low Flow Fume Hood	High efficiency low-flow fume hoods operate on the principle of an air supply with low turbulence intensity in the face of the hood. This alternative design results in significantly reduced volumes of exhaust air, which means less energy needed to move that air, while still providing sufficient air flow to dilute contaminants in the hood.	Constant volume (CV) and variable air volume (VAV) fume hoods with an average face velocity of >= 90 ft/min	25.0	44.4%	$ 0.46	0.0125		88	88, 89	88, 89
Cooling	NC, Reno	Cooling Design	Opt chiller dist/ctrl sys	High efficiency distribution system for chiller systems, based on mix of measures to optimize the total system efficiency. Potentially including controls, economizers, VFDs, better design, etc.	New construction standard efficiency unitary HVAC distribution system	10.0	20.0%	$ 0.76			22	64, 39	3, 74, 39
Cooling	NC, Reno	Cooling Design	Opt unitary hvac dist/ctrl sys	High efficiency distribution system for unitary systems, based on mix of measures to optimize the total system efficiency. Potentially including controls, economizers, VFDs, VAV, better design, etc. This is mainly a design measure, applicable to NC and large renovation.	New construction standard efficiency unitary HVAC distribution system	15.0	30.0%	$ 0.76	0.0065		40	51,93	3, 74, 39
Cooling	Ret	Cooling Maintenance	HVAC tune-up - Cool	Optimize an existing HVAC system by adjusting refrigerant charge, air flow, and control set-points for maximum efficiency.	HVAC system with unoptimized airflow and refrigerant charge	6.0	7.5%	$ 0.23	0.0130		39	61, 150	78, 79
Cooling	Reno, Repl	Cooling source equipment Tier I	HE Room AC	A 'room air conditioner' is defined as a consumer product, other than a ‘packaged terminal air conditioner,’ which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. Upgrade to EER 10.8, consistent with ENERGY STAR standards	Standard efficiency Room AC unit meeting federal manufacturing standards.	9.0	9.3%	$ 0.36			90	15, 16, 93	17

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Cooling	Ret	Cooling source equipment Tier I	HE Room AC	A 'room air conditioner' is defined as a consumer product, other than a 'packaged terminal air conditioner,' which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. Upgrade to EER 10.8, consistent with ENERGY STAR standards	Old window AC unit (7.5+ years old)	9.0	9.3%	$ 1.58			90	15, 16, 93	17
Cooling	Reno, Repl	Cooling source equipment Tier I	HE Room AC	A 'room air conditioner' is defined as a consumer product, other than a 'packaged terminal air conditioner,' which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. Upgrade to EER 10.8, consistent with ENERGY STAR standards	Standard efficiency Room AC unit meeting federal manufacturing standards.	9.0	9.3%	$ 0.36			90	15, 16, 93	17
Cooling	Ret	Cooling source equipment Tier I	HE Room AC	A 'room air conditioner' is defined as a consumer product, other than a 'packaged terminal air conditioner,' which is powered by a single phase electric current and which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space. Upgrade to EER 10.8, consistent with ENERGY STAR standards	Old window AC unit (7.5+ years old)	9.0	9.3%	$ 1.58			90	15, 16, 93	17
Cooling	NC, Reno, Repl	Cooling source equipment Tier I	High-eff AC CEE Tier I	Packaged or split system unitary air conditioner meeting CEE Tier I efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	New unitary air conditioner meeting relevant energy codes or federal standards. Baseline efficiency reflects weighted average by size and type.	15.0	6.4%	$ 2.04			90	134,102 ,93, 168	135

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Cooling	Ret	Cooling source equipment Tier I	High-eff AC CEE Tier I	Packaged or split system unitary air conditioner meeting CEE Tier I efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	Existing stock efficiency unitary air conditioner. Existing stock efficiency reflects weighted average by size and type.	15.0	19.2%	$ 4.28			90	134,92, 93,102, 168	3, 135
Cooling	NC, Reno, Repl	Cooling source equipment Tier I	High-efficiency chillers Tier I	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier I	Standard efficiency water cooled chiller	25.0	19.9%	$ 1.07			1	102, 105, 93	3, 39
Cooling	Ret	Cooling source equipment Tier I	High-efficiency chillers Tier I	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier I	Standard efficiency water cooled chiller	25.0	28.7%	$ 1.85			1	92, 93, 105	3, 39
Cooling	NC, Reno, Repl	Cooling source equipment Tier II	High-eff AC CEE Tier II	Packaged or split system unitary air conditioner meeting CEE Tier II efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	New unitary air conditioner meeting relevant energy codes or federal standards. Baseline efficiency reflects weighted average by size and type.	15.0	10.2%	$ 2.04			90	134,102 ,93, 168	135
Cooling	Ret	Cooling source equipment Tier II	High-eff AC CEE Tier II	Packaged or split system unitary air conditioner meeting CEE Tier II efficiency criteria (CEE Commercial Unitary AC & HP Specs, Jan 2012). High efficiency level reflects weighted average by size and type of units.	Existing stock efficiency unitary air conditioner. Existing stock efficiency reflects weighted average by size and type.	15.0	22.5%	$ 3.74			90	134,92, 93,168	3,135
Cooling	NC, Reno, Repl	Cooling source equipment Tier II	High-efficiency chillers Tier II	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier II	Standard efficiency water cooled chiller	25.0	30.8%	$ 0.84			1	102, 105, 93	3
Cooling	Ret	Cooling source equipment Tier II	High-efficiency chillers Tier II	High efficiency water cooled chillers (represents weighted average of different types and sizes) - Tier II	Standard efficiency water cooled chiller	25.0	38.4%	$ 1.52			1	92, 93, 105	3
Indoor Lighting	NC, Reno, Repl	Accent Lighting	LED Track Lighting	LED replacements for track lighting	Halogen Par 38	15.0	79.8%	$ 0.68		$0.12	1, 157, 162	1, 156	1, 157
Indoor Lighting	Ret	Accent Lighting	LED Track Lighting	LED replacements for track lighting	Halogen Par 38	15.0	79.8%	$ 1.87		$0.12	1, 157, 162	1, 156	1, 157

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Indoor Lighting	NC, Reno, Repl	Ambient Lighting	LED downlighting	LED replacements for rececssed downlights. Recessed lights are used to concentrate light in a downward direction	Weighted average of 65W BR30 & 50W PAR30 downlight lamps	15.0	67.6%	$ 0.44		$0.10	1, 157, 162	1, 157	46, 157
Indoor Lighting	Ret	Ambient Lighting	LED downlighting	LED replacements for rececssed downlights. Recessed lights are used to concentrate light in a downward direction	Weighted average of 65W BR30 & 50W PAR30 downlight lamps	15.0	67.6%	$ 0.71		$0.10	1, 157, 162	1, 157	46, 157
Indoor Lighting	NC, Reno, Repl	Ambient Lighting	LED High-Low Bay	LED fixture for high and low bay applications. Generally for industrial warehouse applications. Low bay is 10-15 ft.	MH 250 W CWA Pulse Start	15.0	45.7%	$ 0.63		$0.02	1, 158	1, 158	1
Indoor Lighting	Ret	Ambient Lighting	LED High-Low Bay	LED fixture for high and low bay applications. Generally for industrial warehouse applications. Low bay is 10-15 ft.	MH 250 W CWA Pulse Start	15.0	45.7%	$ 1.10		$0.02	1, 158	1, 158	1
Indoor Lighting	NC, Reno, Repl	Ambient Lighting	LED Lamp, Std. & Dec.	LED screw and pin-based lamps that fit into traditional incandescent and CFL sockets. Varieties include PAR, MR, decorative candelabra, and standard A-style lamps.	Weighted average of EC Halogens, and incandescents	7.1	66.7%	$ 0.40		$0.08	1, 62	1, 157	46
Indoor Lighting	Ret	Ambient Lighting	LED Lamp, Std. & Dec.	LED screw and pin-based lamps that fit into traditional incandescent and CFL sockets. Varieties include PAR, MR, decorative candelabra, and standard A-style lamps.	Weighted average of EC Halogens, and incandescents	7.1	66.7%	$ 0.42		$0.11	1, 62	1, 157	46, 1
Indoor Lighting	NC, Reno, Repl	Ambient Lighting	LED Linear Lamps	LED Linear Lamps fit into linear fluorescent fixtures	4' T8 linear fluorescent	16.1	38.1%	$ 1.42		$0.06	128, 162	128	128
Indoor Lighting	Ret	Ambient Lighting	LED Linear Lamps	LED Linear Lamps fit into linear fluorescent fixtures	4' T8 linear fluorescent	16.1	38.1%	$ 1.51		$0.06	128, 162	128	128
Indoor Lighting	NC, Reno, Repl	Ambient Lighting	LED Recessed Fixture	LED Recessed Fixtures replace linear fluorescent fixtures	average of T8 and HPT8 4' fixtures	16.1	37.2%	$ 1.25		$0.03	1, 62, 158	1, 158	46, 1
Indoor Lighting	Ret	Ambient Lighting	LED Recessed Fixture	LED Recessed Fixtures replace linear fluorescent fixtures	average of T8 and HPT8 4' fixtures	16.1	37.2%	$ 1.54		$0.03	1, 62, 158	1, 158	46, 1
Indoor Lighting	NC, Reno, Repl	Lighting Controls	Daylight dimming	Automatic dimming in response to daylight, lumen depreciation and task needs to maintain light levels. For NC, optimization of natural light through shell measures is included under integrated building design.	Manual control	20.0	30.0%	$ 1.07			20	93, 1	1

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources		
											Measure Life Sources	Savings Data Sources	Costs Data Sources
Indoor Lighting	Ret	Lighting Controls	Daylight dimming	Automatic dimming in response to daylight, lumen depreciation and task needs to maintain light levels. For NC, optimization of natural light through shell measures is included under integrated building design.	Manual control	20.0	30.0%	$ 1.55			20	93, 1	1
Indoor Lighting	NC, Reno, Repl	Lighting Controls	Occupancy on/off	On/off lighting control based on space occupancy	Manual control	10.0	30.0%	$ 0.13			1	93, 1	48, 60
Indoor Lighting	Ret	Lighting Controls	Occupancy on/off	On/off lighting control based on space occupancy	Manual control	10.0	30.0%	$ 0.34			1	93, 1	48, 60
Indoor Lighting	NC, Reno, Repl	Task Lighting	LED task lighting	LED task lighting is used to increase light levels in work spaces above ambient levels. Replaces Halogen and Fluorescent technology	Average of 50W Hal, 13W CFL and Linear T5	16.1	80.4%	$ 0.42		$0.00	126, 162	124, 155	1, 124, 155
Indoor Lighting	Ret	Task Lighting	LED task lighting	LED task lighting is used to increase light levels in work spaces above ambient levels. Replaces Halogen and Fluorescent technology	Average of 50W Hal, 13W CFL and Linear T5	16.1	80.4%	$ 0.49		$0.00	126, 162	124, 155	1, 124, 155
Miscellaneous	Ret	Cooling distribution	ECM Circulator Pump	Install a variable speed circulation pump instead of a constant speed pump	Circulator pump using a low efficiency shaded pole motor installed on the primary loop of a multiloop system, which runs constantly during the cooling season	20.0	64.7%	$ 0.76			1	1	1
Outdoor Lighting	NC, Reno, Repl	Outdoor Area Lighting	LED minor exterior area lighting	LED general area lighting on the outside of commercial buildings. This includes walkway, security, signage, and façade lighting	175W MH	13.7	72.1%	$ 0.78		$0.04	162	127	127
Outdoor Lighting	Ret	Outdoor Area Lighting	LED minor exterior area lighting	LED general area lighting on the outside of commercial buildings. This includes walkway, security, signage, and façade lighting	CFLs, Halogen, and linear t5	13.7	72.1%	$ 1.13		$0.04	162	127	127
Outdoor Lighting	NC, Reno	Outdoor Area Lighting	LED Parking/Roadway Fixtures	LED outdoor lighting for parking areas and general area lighting (not utility-owned). This includes cobra heads, other more decorative street lights and canopy liginting.	Weighted average of 400W MH, 250W MH and 250W HPS, lamps and housing/fixtures	11.4	71.9%	$ 0.49		$0.03	162	46, 162	1
Outdoor Lighting	Ret	Outdoor Area Lighting	LED Parking/Roadway Fixtures	LED outdoor lighting for parking areas and general area lighting (not utility-owned). This includes cobra heads, other more decorative street lights and canopy liginting.	Weighted average of 400W MH, 250W MH and 250W HPS lamps	11.4	71.9%	$ 0.97		$0.03	162	46, 162	1

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources		
											Measure Life Sources	Savings Data Sources	Costs Data Sources
Outdoor Lighting	NC, Reno, Repl	Outdoor Lighting Controls	Exterior Occupancy Sensors	Occupancy sensors controlling outdoor lighting	Uncontrolled exterior light fuxture	10.0	41.0%	$ 0.73			1	1	1
Outdoor Lighting	Ret	Outdoor Lighting Controls	Exterior Occupancy Sensors	Occupancy sensors controlling outdoor lighting	Uncontrolled exterior light fuxture	10.0	41.0%	$ 1.30			1	1	1
Outdoor Lighting	NC, Reno, Repl	Outdoor Lighting Controls	Outdoor Photocell Dimming	With regard to streetlights, photocells allow for part-night lighting in locations away from housing and where lighting has been provided for road safety. In other exterior lighting applications photocells allow for dimming and/or turning off lights based on time or levels of natural light	Uncontrolled exterior light fuxture	10.0	40.4%	$ 0.41			1	153	154
Outdoor Lighting	Ret	Outdoor Lighting Controls	Outdoor Photocell Dimming	With regard to streetlights, photocells allow for part-night lighting in locations away from housing and where lighting has been provided for road safety. In other exterior lighting applications photocells allow for dimming and/or turning off lights based on time or levels of natural light	Uncontrolled exterior light fuxture	10.0	40.4%	$ 0.85			1	153	154
Outdoor Lighting	NC, Reno	Outdoor Lighting Design	Improved ext lighting design	Reduced light levels and better outdoor lighting design. Includes reduced wattage lamps, better spacing, and use of cut-offs and reflectors to better control light and minimize glare	Standard exterior lighting practice	15.0	15.0%	$ 0.10			39	1, 30	30
Outdoor Lighting	Ret	Outdoor Lighting Design	Improved ext lighting design	Reduced light levels and better outdoor lighting design. Includes reduced wattage lamps, better spacing, and use of cut-offs and reflectors to better control light and minimize glare	Standard exterior lighting practice	15.0	15.0%	$ 0.31			39	1, 30	30
Outdoor Lighting	NC, Reno, Repl	Streetlighting	LED Municipal Streetlighting	LED streeet lighting owned by utilities	Combination of 250W MH and 250W HPS cobra heads	11.5	68.8%	$ 0.56		$0.09	19	1, 162	1, 46
Outdoor Lighting	Ret	Streetlighting	LED Municipal Streetlighting	LED streeet lighting owned by utilities	Combination of 250W MH and 250W HPS cobra heads	11.5	68.8%	$ 1.36		$0.09	19	1, 162	1, 46
Refrigeration	NC, Reno, Repl	Built-up Refrigeration	High-eff refrigeration	High-efficiency built-up refrigeration systems for grocery and refrigerated warehouses. This potentially includes HE compressors, better design and controls, HE motors and VFDs.	Standard efficiency built-up refrigeration systems	10.0	23.3%	$ 0.44	0.0036		18, 34	34, 62	34
Refrigeration	Ret	Built-up Refrigeration	High-eff refrigeration	High-efficiency built-up refrigeration systems for grocery and refrigerated warehouses. This potentially includes HE compressors, better design and controls, HE motors and VFDs.	Existing stock efficiency built-up refrigeration systems	10.0	31.4%	$ 2.74	0.0036		18, 34	34, 62	34

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Refrigeration	NC, Reno, Repl	Built-up Refrigeration	High-efficiency small walk-in	High-efficiency small walk-in cooler with self-contained refrigeration system	Standard efficiency walk-in refrigeration system	13.0	54.0%	$ 0.10			1	34, 62	34
Refrigeration	Ret	Built-up Refrigeration	Walk-in refrig retrofit package	High efficiency walk-in refrigeraton system retrofit improvements (includes economizer, humidistat, evaporator fan control, etc.)	Standard efficiency existing stock walk-in refrigeration systems	16.0	16.8%	$ 0.26			34, 38	49	49
Refrigeration	NC, Reno, Repl	Packaged Refrigeration	Energy Star vending machine	High-efficiency refrigerated vending machines. Includes better lighting, controls and refrigeration.	Standard efficiency new vending machine purchases.	14.0	42.1%	$ -			34, 35, 26, 94	94	47
Refrigeration	NC, Reno, Repl	Packaged Refrigeration	HE Ice Makers	High efficiency new ice machines	Standard efficiency new ice machines	8.0	9.0%	$ 0.09			98, 97	97	97
Refrigeration	NC, Reno, Repl	Packaged Refrigeration	High-eff reach-in refrig, freezers	High-efficiency stand-alone reach-in refrigeration & freezer units for grocery, convenience stores, restaurants and cafeterias. Efficiency improvements include better door heater control, better lighting, HE compressors, greater insulation.	Standard efficiency new reach-in refrigeration units.	9.0	26.0%	$ 0.25			20, 34, 35	93	97
Refrigeration	Ret	Refrigeration Controls	Vending miser	Vending miser or equivalent control to reduce lighting and refrigeration energy during low use periods	No control	10.0	37.5%	$ 0.31			1	93	85
Ventilation	Ret	Ventilation Motors	Premium efficiency motors	High efficiency single and polyphase motors meeting or exceeding NEMA Premium efficiency levels, or similar level. Represents weighted average of types and sizes.	Standard existing stock efficiency motors. Representative motor based on weighted average of types and sizes.	15.0	5.1%	$ 0.75			1	173,65	173, 73, 1
Ventilation	NC, Reno, Repl	Ventilation VFDs	Variable Frequency Drive (VFD)	Variable frequency drive on applicable fans and pumps	No control or manual control with Inlet/outlet dampers or throttle valves	15.0	39.7%	$ 0.13			1, 18	1, 65	1, 48, 82
Ventilation	Ret	Ventilation VFDs	Variable Frequency Drive (VFD)	Variable frequency drive on applicable fans and pumps	No control or manual control with Inlet/outlet dampers or throttle valves	15.0	39.7%	$ 0.13			1, 18	65, 93	1, 48, 82

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Water Heating	NC, Reno	DHW Controls	Electronic sink controls	Electronic sensonrs turn on sink when person holds hands under faucet and turn off when hands are removed	Manual control	13.0	0.5%	$ 0.09			60	60, 119	60, 119
Water Heating	Ret	DHW Controls	Electronic sink controls	Electronic sensonrs turn on sink when person holds hands under faucet and turn off when hands are removed	Manual control	13.0	0.5%	$ 0.23			60	60, 119	60, 119
Water Heating	NC, Reno	DHW Distribution	Drain water heat recovery	The process of using outgoing warm drain water to preheat incoming cold fresh water	Hot water system without drain water heat recovery	20.0	16.7%	$ 0.12			107	107	107
Water Heating	NC, Reno	DHW Distribution	Electric DHW pipe insulation	Electric Domestic Hot Water pipe insulation	Uninsulated cold and hot pipe to and from the hot water heater.	15.0	0.4%	$ 0.14			31, 32	43	116
Water Heating	Ret	DHW Distribution	Electric DHW pipe insulation	Electric Domestic Hot Water pipe insulation	Uninsulated cold and hot pipe to and from the hot water heater.	15.0	0.4%	$ 0.14			31, 32	43	116
Water heating	NC, Reno	DHW Distribution	Electronic shower control	Electronic shower controls use built in time clocks to limit automatically shut off water usage after a set time. This encourages shorter showers and reduced water usage.	Manual control	15.0	25.7%	$ 0.01			119	60, 119	60, 119
Water heating	Ret	DHW Distribution	Electronic shower control	Electronic shower controls use built in time clocks to limit automatically shut off water usage after a set time. This encourages shorter showers and reduced water usage.	Manual control	15.0	25.7%	$ 0.03			119	60, 119	60, 119
Water Heating	Ret	DHW Distribution	Faucet aerator	1.5 gpm faucet	2.2 gpm faucet	10.0	1.3%	$ 0.08			91	91, 1, 116	91, 116
Water Heating	NC, Reno, Repl	DHW Distribution	HE clothes washer	High-efficiency commercial coin-op washers	Standard efficiency washer, gas DHW, electric dryer	11.0	19.9%	$ 1.11	0.0063		33	33, 62, 94	33
Water Heating	Ret	DHW Distribution	HE clothes washer	High-efficiency commercial coin-op washers	Standard efficiency washer, gas DHW, electric dryer	11.0	19.9%	$ 3.22	0.0063		33	33, 62, 94	33
Water Heating	Ret	DHW Distribution	Low-flow showerhead	1.25 gpm showerhead	3.25 gpm showerhead	10.0	0.1%	$ 0.01			91	91, 1, 116	91, 116
Water Heating	Ret	DHW Source Equipment	Booster water heat for dishwashing	Temperature booster water heater for commercial dishwashing, also must lower the temperature of the storage water heater	Maintaining 180F in storage tank for commercial dishwashing	10.0	12.5%	$ 2.21			30	45	45

Commercial Electric Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Electric % Savings	Incre-mental Cost ($ per kWh saved)	Annual Fossil Fuel Savings (MMBtu per kWh saved)	Annual O&M Impact ($ per kWh saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Water Heating	Ret	DHW Source Equipment	Electric water heater tank insulation	Electric water heater tank wrap insulation	Hot water tank without a tank wrap.	10.0	0.1%	$ 0.33			91	43	91
Water Heating	Ret	DHW Source Equipment	HE tank-type electric water heater	Energy Star rated high-efficiency residential-sized tank type electric water heater	Standard efficiency residential-sized tank type electric water heater	13.0	10.3%	$ 0.76			28, 29	91, 1, 116	60
Water Heating	NC, Reno, Ret	DHW Source Equipment	Point of use water heat	Electric water heating at point of use with no storage capacity	Standard centrally located electric storage water heater	10.0	41.9%	$ 2.92			30	45, 62	91
Water Heating	Ret	DHW Source Equipment	Point of use water heat	Electric water heating at point of use with no storage capacity	Standard centrally located electric storage water heater	10.0	41.9%	$ 2.92			30	45	91
Water Heating	NC, Reno, Repl	DHW Source Equipment Elec	Heat pump H2O heat from refrig - WH	Heat pump water heating using waste heat recovery from refrigeration systems (water heating component)	Air cooled refrigeration, traditional gas or electric water heating (note some electric water heating savings result as well)	14.0	43.0%	$ 0.35			20	64, 20	20

Commercial Fossil Fuel Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Fossil Fuel % Savings	Incre-mental Cost ($ per MMBtu saved)	Annual Electric Savings (kWh per MMBtu saved)	Annual O&M Impact ($ per MMBtu saved)	Data Sources		
											Measure Life Sources	Savings Data Sources	Costs Data Sources
Space Heating	Ret	Heating Heat Recovery	Blow-down heat recovery	Heat exchanger recovers waste heat from blow down and pre-heats makeup water to boiler	11,700 Mbtu/hr Boiler at 75% AFUE with no blow-down heat recovery unit	20.0	7.5%	$ 49			91	91	91
Space Heating	Ret	Heating Source Controls	Boiler Reset Controls	A electronic device that automatically controls the boiler water temperatire based on the outdoor air temperature	Boiler without reset control	20.0	5.0%	$ 28			138	138	138
Space Heating	Ret	Heating Source Controls	Boiler trim control	Mechanically remove excess oxygen from combustion chamber to improve combustion efficiency (assume 1% improvement for 10% excess air reduction, 2% for 20% excess air reduction)	Boiler without mechanical intake air controls	20.0	2.0%	$ 61			91	91	91
Space Heating	Ret	Heating Source Controls	Programmable set-back thermostat	Programmable thermostat allows user to automatically cycle space heating equipment on and off to desired set point throughout the day using pre-programmed timers	Assume space heating equipment size of 1,000 Mbtu/h at 75% AFUE	12.0	3.2%	$ 12			93	116	91
Space Heating	Ret	Heating Source Equipment	Condensing Gas Unit Heater	High-efficiency Power vented unit heaters have a sealed flue which reduces losses when the heater is not firing (91% AFUE)	Gravity Driven Unit Heater (63% AFUE)	20.0	30.8%	$ 43			138	140	140
Space Heating	NC, Reno, Repl	Heating Source Equipment	High-efficiency boiler	Higher Efficiency gas or oil fired boiler, AFUE 85% or greater	Standard efficiency gas fired boiler, AFUE 80%	25.0	11.1%	$ 142			116	116	91
Space Heating	NC, Reno, Repl	Heating Source Equipment	High-efficiency furnace	Higher Efficiency (typically condensing) gas fired Furnace	Standard efficiency furnace (non-condensing for gas)	15.0	15.2%	$ 60			93	93	93
Water Heating	NC, Reno	DHW Controls	Electronic sink controls	Electronic sensonrs turn on sink when person holds hands under faucet and turn off when hands are removed	Manual control	13.0	0.5%	$ 27			60	60, 119	60, 119
Water Heating	Ret	DHW Controls	Electronic sink controls	Electronic sensonrs turn on sink when person holds hands under faucet and turn off when hands are removed	Manual control	13.0	0.5%	$ 68			60	60, 119	60, 119
Water Heating	Reno, Repl	DHW Distribution	Drain water heat recovery	The process of using outgoing warm drain water to preheat incoming cold fresh water	Hot water system without drain water heat recovery	20.0	16.7%	$ 27			107	107	107

Commercial Fossil Fuel Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Fossil Fuel % Savings	Incre-mental Cost ($ per MMBtu saved)	Annual Electric Savings (kWh per MMBtu saved)	Annual O&M Impact ($ per MMBtu saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Water Heating	NC, Reno	DHW Distribution	Electronic shower control	Electronic shower controls use built in time clocks to limit automatically shut off water usage after a set time. This encourages shorter showers and reduced water usage.	Manual control	15.0	43.4%	$ 3			119	60, 119	60, 119
Water Heating	Ret	DHW Distribution	Electronic shower control	Electronic shower controls use built in time clocks to limit automatically shut off water usage after a set time. This encourages shorter showers and reduced water usage.	Manual control	15.0	43.4%	$ 5			119	60, 119	60, 119
Water Heating	Ret	DHW Distribution	Faucet aerator	1.5 gpm faucet	Standard faucet (average rated at 2.2 GPM)	5.0	0.1%	$ 17			93	91, 1, 116	116
Water Heating	Ret	DHW Distribution	Gas boost H2O heater on HE dishwasher	Gas fired boost heater for intake hot water pipe on HE commercial dishwasher	Commercial Dishwasher with a tank temp set to deliver santizing water (180° F) without a boost heater	20.0	38.0%	$ 3			117	97	97
Water Heating	Ret	DHW Distribution	Gas boost H2O heater on HE dishwasher	Gas fired boost heater for intake hot water pipe on HE commercial dishwasher	Commercial Dishwasher with a tank temp set to deliver santizing water (180° F) without a boost heater	20.0	38.0%	$ 3			117	97	97
Water Heating	Ret	DHW Distribution	Hot water pipe insulation	Wrapping hot water send and return pipes in Insulation	Stand-alone gas-fired water heater (thermal efficiency .8) without outlet pipe insulation	10.0	0.5%	$ 3			116	91, 1, 116	116
Water Heating	NC, Reno	DHW Distribution	Hot water pipe insulation	Wrapping hot water send and return pipes in Insulation	Stand-alone gas-fired water heater (thermal efficiency .8) without outlet pipe insulation	10.0	0.5%	$ 3			116	91, 1, 1116	116
Water Heating	Ret	DHW Distribution	Hot water pipe insulation	Wrapping hot water send and return pipes in Insulation	Stand-alone gas-fired water heater (thermal efficiency .8) without outlet pipe insulation	10.0	0.5%	$ 3			116	91, 1, 116	116
Water Heating	Ret	DHW Distribution	Low-flow showerhead	1.25 gpm showerhead	Standard shower head (average rated at 3.25 GPM)	5.0	1.6%	$ 3			116	91, 1, 116	116
Water Heating	Ret	DHW Distribution	Pre-rinse spray valves	Reduces flow rate for commercial food service dish pre-rinse sprayers	Pre-rinse spray valvue at 3.2 gpm (1.5 hours/per day; 360 day/year. Water temperature rise 70F; gas heater thermal efficiency at .8)	5.0	3.6%	$ 0			91	91	91
Water Heating	Ret	DHW Distribution	Water heater tank insulation	Wrapping a stand-alone water heater in insulating blanket	Stand-alone gas-fired water heater (thermal efficiency .8) without tank insulation	10.0	0.9%	$ 8			116	91, 1, 116	116

Commercial Fossil Fuel Component Measures

Primary Fuel End Use	Applicable Markets	Associated Aggregate Measure	Component Measure Name	Measure Description	Baseline Description	Life (yr)	Fossil Fuel % Savings	Incre-mental Cost ($ per MMBtu saved)	Annual Electric Savings (kWh per MMBtu saved)	Annual O&M Impact ($ per MMBtu saved)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Water Heating	NC, Reno	DHW Process	Commercial clothes washers	High efficiency commercial clothes washers save both kWh and MMBtu. 2.84 cu. ft. machine that meats CEE Tier II (1.60 MEF).	Regular efficiency commercial clothes washer hooked up to Gas-fired hot water (assumes 2.84 cu. ft. machine) at NAECA required efficiency of 1.04 MEF	12.0	32.0%	$ 33			91	91	91
Water Heating	Ret	DHW Process	Commercial clothes washers	High efficiency commercial clothes washers save both kWh and MMBtu. 2.84 cu. ft. machine that meats CEE Tier II (1.60 MEF).	Regular efficiency commercial clothes washer hooked up to Gas-fired hot water (assumes 2.84 cu. ft. machine) at NAECA required efficiency of 1.04 MEF	12.0	32.0%	$ 33			91	91	91
Water Heating	NC, Reno	DHW Source Equipment	Gas tank-type water heater	Gas fired high efficiency stand-alone tank-type water heater	Stand-alone gas-fired tank type water heater with a thermal efficiency of .8	13.0	12.0%	$ 15			93	116	91
Water Heating	Ret	DHW Source Equipment	Gas tank-type water heater	Gas fired high efficiency stand-alone tank-type water heater	Stand-alone gas-fired tank type water heater with a thermal efficiency of .8	13.0	21.0%	$ 27			93	116	91
Water Heating	NC, Reno	DHW Source Equipment	Indirect water heater for gas space heat	Indirect water heaters utilize a heat exchanger on the existing HE boiler or furnace to heat intake water for a stand-alone hot water tank	Stand-alone gas-fired tank type water heater with a thermal efficiency of .8	15.0	8.4%	$ 25			116	116, 91	116
Water Heating	Ret	DHW Source Equipment	Indirect water heater for gas space heat	Indirect water heaters utilize a heat exchanger on the existing HE boiler or furnace to heat intake water for a stand-alone hot water tank	Stand-alone gas-fired tank type water heater with a thermal efficiency of .8	15.0	8.4%	$ 25			116	116, 91	116
Water Heating	NC, Reno	DHW Source Equipment	Point of use water heat	Electric water heating at point of use with no storage capacity	Standard centrally located electric storage water heater	10.0	40.1%	$ 8			87, 91	97, 91	97, 91, 119

Industrial Electric Measures

Primary Fuel End Use	Measure Name	Measure Description	Applicable Markets	Life (yr)	Electric % Savings	Peak kW per MWh Saved	Incre-mental Cost ($ per kWh saved)	Gross Levelized Cost ($/kWh)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
Process	Sensors and controls	A variety of process control systems available for virtually any industrial process.	All	15	3%	0.00015	$0.100	$0.010	1001, 30		
Process	Energy Management systems	energymanagement, planning, monitoring, and implementing optimal control strategie	All	10	7%	0.00015	$0.627	$0.083	1001, 30		
Process	Energy Information Systems	Hardware-based systems that provide real-time information on energy usage to facility managers locally or over the internet, often receiving real-time pricing or load shedding requests.	All	10	1%	0.00015	$0.251	$0.033	1001, 30		
Miscellaneous	Efficient Transformers (Tier 2)	Energy efficient ransformers save a fraction of every kWh delivered to the plant.	All	30	2%	0.00015	$1.070	$0.074	1001, 30		
Process	Duct/Pipe Insulation	Savings are from reduction in heat loss from non-insulated surfaces that are above or below ambientconditions.	All	7	20%	0.00015	$0.300	$0.053	1001, 30		
Process	Heat recovery food industry - low temperature	recovering heat by using exhaust gas directly or through a heat exchanger.	All	10	1%	0.00015	$2.424	$0.322	1001, 30		
Process	Cooling and storage	Opportunities include system design, component design (e.g. adjustable speed drives), as well as improved operation and maintenance practices.	All	15	20%	0.00015	$3.498	$0.348	1001, 30		
Miscellaneous	electric supply system improvements	fix issues of phase unbalance, voltage variations, and poor supply waveforms	All	5	3%	0.00015	$0.042	$0.010	1001, 30		
Process	Microwave processing	Microwave processing has a number of advantages such as precise control of the heating process, improved yield, higher production rate and improved product quality.	All	10	3%	0.00015	$1.255	$0.166	1001, 30		
Process	RF heating and drying	Radio Frequency drying offers faster heating times, even heating gradients, limited overheating, selective heating, fast startup/shutdown, and no combustion byproducts.	All	10	1%	0.00015	$1.255	$0.166	1001, 30		
Lighting	Efficient lighting design -- Office	Advanced lighting design techniques that incorporate daylighting, lighting controls, and task lighting	All	7.5	44%	0.00015	$0.117	$0.019	1001, 30		
Lighting	Efficient lighting design -- Manuf	Advanced lighting design techniques that incorporate daylighting, lighting controls, and task lighting	All	7.5	23%	0.00015	$0.137	$0.023	1001, 30		
Lighting	Efficient lighting design -- Warehouse	Advanced lighting design techniques that incorporate daylighting, lighting controls, and task lighting	All	7.5	86%	0.00015	$0.137	$0.023	1001, 30		
Lighting	Efficient lighting fixtures and lamps -- Office	advanced lamp, ballast, fixture, and light pipe technologies can significantly reduce lighting energy consumption	All	12	17%	0.00015	$3.683	$0.427	1001, 30		
Lighting	Efficient lighting fixtures and lamps -- Manuf	advanced lamp, ballast, fixture, and light pipe technologies can significantly reduce lighting energy consumption	All	13.5	40%	0.00015	$0.935	$0.100	1001, 30		
Lighting	Efficient lighting fixtures and lamps -- Warehouse	advanced lamp, ballast, fixture, and light pipe technologies can significantly reduce lighting energy consumption	All	14.5	46%	0.00015	$0.971	$0.099	1001, 30		
Process	Advanced motor designs	Advanced motor designs such as switch reluctance and written-pole motors have the potential to increase motor efficiency by 15-20% or more.	All	20	6%	0.00015	$0.386	$0.032	1001, 30		
Process	motor management	Motor management includes, among other things, improving rewind practice for motors	All	20	1%	0.00015	$0.180	$0.015	1001, 30		
Process	Advanced lubricants	Adv. Lubricants retain their lubricating properties longer, allowing the relubrication interval to be extended two to five times	All	1	3%	0.00015	$0.026	$0.028	1001, 30		

Industrial Electric Measures

Primary Fuel End Use	Measure Name	Measure Description	Applicable Markets	Life (yr)	Electric % Savings	Peak kW per MWh Saved	Incre-mental Cost ($ per kWh saved)	Gross Levelized Cost ($/kWh)	Data Sources		
									Measure Life Sources	Savings Data Sources	Costs Data Sources
Process	Motor system optimization	Systems performance optimization focuses on optimizing the flows in motor-driven systems, principally fan and pump systems, to meet end-use requirements	All	10	1%	0.00015	$0.073	$0.010	1001, 30		
Process	Compressed air system management	At the system level, savings opportunities can be grouped into three general categories: leaks, inappropriate uses of compressed air, and system pressure level.	All	10	17%	0.00015	$0.083	$0.011	1001, 30		
Process	Air Compressor Systems Advanced Controls	Controls are one of the most important factors in determining the overall energy efficiency of a compressed air system	All	10	4%	0.00015	$0.141	$0.019	1001, 30		
Process	Pump efficiency improvement	Use of whole system design to minimize energy use and properly size pumps	All	10	20%	0.00015	$0.131	$0.017	1001, 30		
Process	Fan system efficiency	Address system requirements, control fan speed, improve fan compnents, and improve O&M practices.	All	10	6%	0.00015	$0.335	$0.044	1001, 30		
Process	Efficient refrigeration systems	For the industrial sector, refrigeration storage applications appear feasible for chemicals, food, pharmaceuticals and plastics industries.	All	15	10%	0.00015	$0.026	$0.003	1001, 30		
Process	Advanced Curing Technologies	UV, IR, and E-beam technologies are all used for curing metal coatings (such as printing on aluminum cans) and paper products.	All	15	15%	0.00015	$0.984	$0.098	1001, 30		
Process	Electric IR heating and drying	Electric IR heating is used for curing coatings and for other applications in materials fabrication, such as drying	All	17.5	15%	0.00015	$2.907	$0.263	1001, 30		
Process	E-beam sterilization	Electronic beams can be used to sterilize medical equipment or pasturize food products without using large amounts of electric or gas heating	All	15	10%	0.00015	$0.012	$0.001	1001, 30		
Process	industrial heat pumps	By taking waste heat from an industrial process and increasing its temperature, heat pumps produce useful low-cost energy, and considerably reduce emissions	All	15	10%	0.00015	$1.244	$0.124	1001, 30		

Industrial Electric Measures		Elegible End Uses																
Primary Fuel End Use	Measure Name	Pumps	Fans and Blowers	Compres-sed Air	Material Handling	Material Processing	Refriger-ation	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Electro-Chemical Proc	Other	Sources	Elegible Savings
Process	Sensors and controls	6%	4%	5%			8%		1%	1%	6%	5%					1001, 30	36%
Process	Energy Management systems												13%	8%			1001, 30	21%
Process	Energy Information Systems	6%	4%	5%	15%	16%	8%	1%	1%	1%	6%	5%	13%	8%	9%	3%	1001, 30	100%
Miscellaneous	Efficient Transformers (Tier 2)	6%	4%	5%	15%	16%	8%	1%	1%	1%	6%	5%	13%	8%	9%	3%	1001, 30	100%
Process	Duct/Pipe Insulation						8%				6%		13%				1001, 30	27%
Process	Heat recovery food industry - low temperature										6%						1001, 30	6%
Process	Cooling and storage						8%										1001, 30	8%
Miscellaneous	electric supply system improvements	6%	4%	5%	15%	16%	8%	1%	1%	1%	6%	5%	13%	8%	9%	3%	1001, 30	100%
Process	Microwave processing								1%	1%	6%	5%					1001, 30	13%
Process	RF heating and drying								1%		6%						1001, 30	6%
Lighting	Efficient lighting design -- Office													8%			1001, 30	8%
Lighting	Efficient lighting design -- Manuf													8%			1001, 30	8%
Lighting	Efficient lighting design -- Warehouse													8%			1001, 30	8%
Lighting	Efficient lighting fixtures and lamps -- Office													8%			1001, 30	8%
Lighting	Efficient lighting fixtures and lamps -- Manuf													8%			1001, 30	8%
Lighting	Efficient lighting fixtures and lamps -- Warehouse													8%			1001, 30	8%
Process	Advanced motor designs	6%	4%	5%	15%	16%	8%	1%									1001, 30	54%
Process	motor management	6%	4%	5%	15%	16%	8%	1%									1001, 30	54%
Process	Advanced lubricants	6%	4%	5%	15%	16%	8%	1%									1001, 30	54%

Industrial Electric Measures		Elegible End Uses																
Primary Fuel End Use	Measure Name	Pumps	Fans and Blowers	Compres-sed Air	Material Handling	Material Processing	Refriger-ation	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Electro-Chemical Proc	Other	Sources	Elegible Savings
Process	Motor system optimization	6%	4%										13%				1001, 30	23%
Process	Compressed air system management			5%													1001, 30	5%
Process	Air Compressor Systems Advanced Controls			5%													1001, 30	5%
Process	Pump efficiency improvement	6%															1001, 30	6%
Process	Fan system efficiency		4%										13%				1001, 30	17%
Process	Efficient refrigeration systems						8%										1001, 30	8%
Process	Advanced Curing Technologies								1%								1001, 30	1%
Process	Electric IR heating and drying									1%	6%						1001, 30	7%
Process	E-beam sterilization								1%								1001, 30	1%
Process	industrial heat pumps								1%	1%	6%	5%					1001, 30	13%

Industrial Fossil Fuel Measures

Primary Fuel	Primary Fuel End Use	Measure Name	Measure Description	Applicable Markets	Life (yr)	Fossil Fuel % Savings	Incre-mental Cost ($ per MMBtu saved)	Gross Levelized Cost ($/MMBtu)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
G	Boiler	Improved process control	Fine tune boiler operations and controls.	All	15	3%	$ 12.3	$ 1.2	1002, 1003		
G	Boiler	Maintain boilers	Proper and timely boiler maintenance procedures.	All	2	10%	$ 2.4	$ 1.3	1002, 1003		
G	Boiler	Flue gas heat recovery/economizer	Use waste heat from boiler to preheat boiler intake water or for space heating	All	15	2%	$ 17.4	$ 1.7	1002, 1003		
G	Boiler	Blowdown steam heat recovery	Use waste heat from boiler to preheat boiler intake water or for space heating	All	15	1%	$ 15.3	$ 1.5	1002, 1003		
G	Boiler	Upgrade burner efficiency	Install more effcient burners on boilers	All	20	1%	$ 50.0	$ 4.2	1002, 1003		
G	Boiler	Water treatment	Treating boiler water to reduce mineral buildup which reduces heat transfer efficiency	All	10	1%	$ 6.3	$ 0.8	1002, 1003		
G	Boiler	Load control	Install controls to properly stage boiler systems	All	15	4%	$ 13.6	$ 1.4	1002, 1003		
G	Boiler	Improved insulation	Installing and maintaining insulation on piping or reduce losses	All	15	8%	$ 6.6	$ 0.7	1002, 1003		
G	Boiler	Steam trap maintenance	Properly maintain steam traps and install sensors to detect steam trap malfunction for immediate repair	All	2	13%	$ 0.8	$ 0.5	1002, 1003		
G	Boiler	Automatic steam trap monitoring	track performance of steam traps & replace broken units	All	15	5%	$ 3.4	$ 0.3	1002, 1003		
G	Boiler	Leak repair	fixing leaks in steam lines	All	2	4%	$ 1.1	$ 0.6	1002, 1003		
G	Boiler	Condensate return	Returning the hot condensate that occurs within a steam system to the boiler can save energy and reduce the need to treat boiler feed water.	All	15	10%	$ 9.6	$ 1.0	1002, 1003		
G	HVAC	Improve ceiling insulation	Installing and maintaining ceiling insulation to reduce HVAC demand	All	20	24%	$ 77.1	$ 6.5	1002, 1003		
G	HVAC	Install HE(95%) cond furnace/boiler	High efficinecy boilers for HVAC	All	20	18%	$ 37.9	$ 3.2	1002, 1003		
G	HVAC	Stack heat exchanger	Recover waste heat from HVAC system	All	20	5%	$ 18.4	$ 1.5	1002, 1003		
G	HVAC	Duct insulation	Installing and maintaining insulation on ductwork or reduce losses	All	20	2%	$ 7.0	$ 0.6	1002, 1003		
G	HVAC	EMS install	Covers installing new energy management systems	All	20	10%	$ 31.8	$ 2.7	1002, 1003		
G	HVAC	EMS optimization	Covers optimizing existing energy management systems	All	5	1%	$ 0.6	$ 0.1	1002, 1003		
G	Process	Process Controls & Management	Fine tune boiler operations and controls.	All	8	5%	$ 5.0	$ 0.8	1002, 1003		
G	Process	Heat Recovery	Recovering and reusing waste heat from manufacturing process for other processes or space heat	All	20	20%	$ 82.9	$ 6.9	1002, 1003		
G	Process	Efficient burners	An efficient burner provides the proper air-to-fuel mixture throughout the full range of firing rates,	All	10	18%	$ 14.3	$ 1.9	1002, 1003		
G	Process	Process integration	the exploitation of potential synergies that are inherent in any systems that have multiple heating and cooling demands	All	15	17%	$ 78.3	$ 7.8	1002, 1003		
G	Process	Efficient drying	The most efficient dryers are those that recapture otherwise lost waste heat, usually direct dryers	All	20	17%	$ 61.6	$ 5.2	1002, 1003		
G	Process	Closed hood	Enclosing the paper machine reduces thermal energy demands since a smaller volume of air is heated.	All	15	5%	$ 34.8	$ 3.5	1002, 1003		
G	Process	Extended nip press	Extended nip presses use a large concave shoe instead of one of the rotating cylinders to dry paper more effectively	All	20	16%	$ 83.3	$ 7.0	1002, 1003		
G	Process	Improved separation processes	includes combined reaction and distillation (e.g., reactive distillation), ion exchange and bioseparation, and hybrid processes	All	20	10%	$ 26.3	$ 2.2	1002, 1003		
G	Process	Thermal oxidizers	Regenerative thermal oxidizers can be used to recover some of the heat generated during VOC incineration	All	15	60%	$ 208.9	$ 20.8	1002, 1003		
G	Process	Flare gas controls and recovery	Reduction of flaring can be achieved by improved recovery systems, including installing recovery compressors and collection and storage tanks.	All	15	50%	$ 78.3	$ 7.8	1002, 1003		
G	Process	Fouling control	reduces deposit buildup on heat transfer equipmemnt through process control, temperature control, and regular maintenance and cleaning	All	5	7%	$ 3.5	$ 0.8	1002, 1003		

Industrial Fossil Fuel Measures

Primary Fuel	Primary Fuel End Use	Measure Name	Measure Description	Applicable Markets	Life (yr)	Fossil Fuel % Savings	Incre-mental Cost ($ per MMBtu saved)	Gross Levelized Cost ($/MMBtu)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
G	Process	Efficient furnaces	furnace efficiency can be improved by improving heat transfer characteristics, enhancing flame luminosity, installing recuperators or air-preheaters, and improved process controls	All	20	6%	$ 13.9	$ 1.2	1002, 1003		
G	Process	Oxyfuel	Oxy-fuel furnaces provide an oxygen-rich combustion environment, which improves energy efficiency while reducing NOx emissions.	All	20	20%	$ 63.1	$ 5.3	1002, 1003		
G	Process	Batch cullet preheating	In a cullet preheater, the waste heat of the fuel-fired furnace is used to preheat the incoming cullet batch	All	15	16%	$ 27.9	$ 2.8	1002, 1003		
G	Process	Preventative maintenance	Examples in steel making include timely closing of furnace doors to reduce heat leakage and reducing material waste in the shaping steps	All	5	2%	$ 1.2	$ 0.3	1002, 1003		
G	Process	Combustion controls	Combustion controls aim to improve combustion efficiency by ensuring the proper air-to-fuel ratio is used, which generally requires establishing the proper amount of excess air.	All	8	8%	$ 5.3	$ 0.8	1002, 1003		
G	Process	Optimize furnace operations	addresses the losses that are associated with the combustion of fuel and the transfer of the energy from this fuel to the material within a furnace.	All	10	10%	$ 9.5	$ 1.3	1002, 1003		
G	Process	Insulation/reduce heat losses	includes improved insulation of furnace walls, reduction or elimination of air infiltration, repair and maintenance of furnace seals, and improved insulation of related piping and ductwork.	All	15	5%	$ 29.8	$ 3.0	1002, 1003		
P	Boiler	Improved process control	Fine tune boiler operations and controls.	All	15	3%	$ 22.7	$ 2.3	1002, 1003		
P	Boiler	Maintain boilers	Proper and timely boiler maintenance procedures.	All	2	10%	$ 0.4	$ 0.3	1002, 1003		
P	Boiler	Flue gas heat recovery/economizer	Use waste heat from boiler to preheat boiler intake water or for space heating	All	15	2%	$ 64.4	$ 6.4	1002, 1003		
P	Boiler	Blowdown steam heat recovery	Use waste heat from boiler to preheat boiler intake water or for space heating	All	15	1%	$ 56.5	$ 5.7	1002, 1003		
P	Boiler	Upgrade burner efficiency	Install more effcient burners on boilers	All	20	1%	$ 50.4	$ 3.8	1002, 1003		
P	Boiler	Water treatment	Treating boiler water to reduce mineral buildup which reduces heat transfer efficiency	All	10	1%	$ 12.7	$ 1.9	1002, 1003		
P	Boiler	Load control	Install controls to properly stage boiler systems	All	15	4%	$ 25.2	$ 2.5	1002, 1003		
P	Boiler	Improved insulation	Installing and maintaining insulation on piping or reduce losses	All	15	8%	$ 131.1	$ 13.1	1002, 1003		
P	Boiler	Steam trap maintenance	Properly maintain steam traps and install sensors to detect steam trap malfunction for immediate repair	All	2	13%	$ 16.8	$ 12.6	1002, 1003		
P	Boiler	Automatic steam trap monitoring	track performance of steam traps & replace broken units	All	15	5%	$ 75.0	$ 7.5	1002, 1003		
P	Boiler	Leak repair	fixing leaks in steam lines	All	2	4%	$ 2.2	$ 1.6	1002, 1003		
P	Boiler	Condensate return	Returning the hot condensate that occurs within a steam system to the boiler can save energy and reduce the need to treat boiler feed water.	All	15	10%	$ 18.7	$ 1.9	1002, 1003		
P	HVAC	Improve ceiling insulation	Installing and maintaining ceiling insulation to reduce HVAC demand	All	20	24%	$ 158.5	$ 11.9	1002, 1003		
P	HVAC	Stack heat exchanger	Recover waste heat from HVAC system	All	20	5%	$ 34.1	$ 2.6	1002, 1003		
P	HVAC	Duct insulation	Installing and maintaining insulation on ductwork or reduce losses	All	20	2%	$ 12.3	$ 0.9	1002, 1003		
P	Process	Process Controls & Management	Fine tune boiler operations and controls.	All	8	5%	$ 9.4	$ 1.8	1002, 1003		
P	Process	Heat Recovery	Recovering and reusing waste heat from manufacturing process for other processes or space heat	All	20	20%	$ 170.3	$ 12.8	1002, 1003		
P	Process	Efficient burners	An efficient burner provides the proper air-to-fuel mixture throughout the full range of firing rates, without constant adjustment.	All	10	18%	$ 27.8	$ 2.8	1002, 1003		

Industrial Fossil Fuel Measures

Primary Fuel	Primary Fuel End Use	Measure Name	Measure Description	Applicable Markets	Life (yr)	Fossil Fuel % Savings	Incre-mental Cost ($ per MMBtu saved)	Gross Levelized Cost ($/MMBtu)	Data Sources: Measure Life Sources	Data Sources: Savings Data Sources	Data Sources: Costs Data Sources
P	Process	Process integration	the exploitation of potential synergies that are inherent in any systems that have multiple heating and cooling demands	All	15	17%	$ 152.3	$ 15.2	1002, 1003		
P	Process	Efficient drying	The most efficient dryers are those that recapture otherwise lost waste heat, usually direct dryers	All	20	17%	$ 107.7	$ 8.1	1002, 1003		
P	Process	Improved separation processes	includes combined reaction and distillation (e.g., reactive distillation), ion exchange and bioseparation, and hybrid processes	All	20	10%	$ 46.0	$ 3.5	1002, 1003		
P	Process	Efficient furnaces	furnace efficiency can be improved by improving heat transfer characteristics, enhancing flame luminosity, installing recuperators or air-preheaters, and improved process controls	All	20	6%	$ 26.5	$ 1.3	1002, 1003		
P	Process	Preventative maintenance	Examples in steel making include timely closing of furnace doors to reduce heat leakage and reducing material waste in the shaping steps	All	5	2%	$ 2.1	$ 0.6	1002, 1003		
P	Process	Optimize furnace operations	addresses the losses that are associated with the combustion of fuel and the transfer of the energy from this fuel to the material within a furnace.	All	10	10%	$ 16.7	$ 2.5	1002, 1003		
P	Process	Insulation/reduce heat losses	includes improved insulation of furnace walls, reduction or elimination of air infiltration, repair and maintenance of furnace seals, and improved insulation of related piping and ductwork.	All	15	5%	$ 52.1	$ 5.2	1002, 1003		

Industrial Fossil Fuel Measures			Savings by NAICS code																				
Primary Fuel	Primary Fuel End Use	Measure Name	311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
G	Boiler	Improved process control	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
G	Boiler	Maintain boilers	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
G	Boiler	Flue gas heat recovery/economizer	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
G	Boiler	Blowdown steam heat recovery	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
G	Boiler	Upgrade burner efficiency	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
G	Boiler	Water treatment	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
G	Boiler	Load control	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
G	Boiler	Improved insulation	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
G	Boiler	Steam trap maintenance	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
G	Boiler	Automatic steam trap monitoring	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
G	Boiler	Leak repair	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
G	Boiler	Condensate return	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
G	HVAC	Improve ceiling insulation	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
G	HVAC	Install HE(95%) cond furnace/boiler	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
G	HVAC	Stack heat exchanger	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
G	HVAC	Duct insulation	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
G	HVAC	EMS install	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
G	HVAC	EMS optimization	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
G	Process	Process Controls & Management	8%	8%	5%	5%	5%	5%	5%	3%	5%	6%	4%	5%	7%	6%	0%	5%	5%	5%	8%	5%	5%
G	Process	Heat Recovery	10%	10%	25%	25%	25%	25%	25%	0%	0%	0%	0%	25%	0%	5%	0%	20%	20%	20%	20%	25%	20%
G	Process	Efficient burners	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%	20%	20%	0%	0%	0%	0%	0%	0%
G	Process	Process integration	25%	25%	0%	0%	0%	0%	0%	15%	0%	13%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Efficient drying	13%	13%	0%	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Closed hood	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Extended nip press	0%	0%	0%	0%	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Improved separation processes	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Thermal oxidizers	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Flare gas controls and recovery	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Fouling control	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Industrial Fossil Fuel Measures

Primary Fuel	Primary Fuel End Use	Measure Name	Savings by NAICS code																				
			311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
G	Process	Efficient furnaces	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Oxyfuel	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Batch cullet preheating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	16%	0%	0%	0%	0%	0%	0%	0%	0%
G	Process	Preventative maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
G	Process	Combustion controls	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%
G	Process	Optimize furnace operations	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%
G	Process	Insulation/reduce heat losses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%
P	Boiler	Improved process control	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
P	Boiler	Maintain boilers	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
P	Boiler	Flue gas heat recovery/economizer	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
P	Boiler	Blowdown steam heat recovery	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
P	Boiler	Upgrade burner efficiency	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
P	Boiler	Water treatment	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
P	Boiler	Load control	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
P	Boiler	Improved insulation	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
P	Boiler	Steam trap maintenance	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
P	Boiler	Automatic steam trap monitoring	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
P	Boiler	Leak repair	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
P	Boiler	Condensate return	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
P	HVAC	Improve ceiling insulation	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%	24%
P	HVAC	Stack heat exchanger	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
P	HVAC	Duct insulation	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
P	Process	Process Controls & Management	8%	8%	5%	5%	5%	5%	5%	3%	5%	6%	4%	5%	7%	6%	0%	5%	5%	5%	8%	5%	5%
P	Process	Heat Recovery	10%	10%	25%	25%	25%	25%	25%	0%	0%	0%	0%	25%	0%	5%	0%	20%	20%	20%	20%	25%	20%
P	Process	Efficient burners	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	15%	20%	20%	0%	0%	0%	0%	0%	0%

Industrial Fossil Fuel Measures

Primary Fuel	Primary Fuel End Use	Measure Name	Savings by NAICS code																				
			311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
P	Process	Process integration	25%	25%	0%	0%	0%	0%	0%	15%	0%	13%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
P	Process	Efficient drying	13%	13%	0%	0%	0%	0%	0%	0%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
P	Process	Improved separation processes	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
P	Process	Efficient furnaces	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
P	Process	Preventative maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
P	Process	Optimize furnace operations	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%
P	Process	Insulation/reduce heat losses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%	0%	0%	0%

Appendix E: Measure Market Factors

Residential Market Factors

Savings Allocation by End-Use Bundle - Achievable Scenario

	Electricity					Natural Gas					Petroleum				
	Lighting Bundle	*Hot Water Bundle*	*Appliance Package and Plug Loads*	*Heating and Cooling Equipment*	*Heating and Cooling Shell*	*Lighting Bundle*	*Hot Water Bundle*	*Appliance Package and Plug Loads*	*Heating and Cooling Equipment*	*Heating and Cooling Shell*	*Lighting Bundle*	*Hot Water Bundle*	*Appliance Package and Plug Loads*	*Heating and Cooling Equipment*	*Heating and Cooling Shell*
Total	**39%**	**11%**	**30%**	**19%**	**1%**	**-16%**	**53%**	**0%**	**48%**	**14%**	**-16%**	**48%**	**1%**	**53%**	**15%**
2013	31%	19%	33%	17%	0%	-13%	59%	1%	52%	2%	-13%	56%	1%	54%	2%
2014	31%	19%	33%	17%	0%	-13%	62%	1%	49%	1%	-13%	59%	1%	52%	2%
2015	33%	16%	34%	17%	0%	-15%	60%	1%	53%	2%	-15%	56%	1%	57%	2%
2016	37%	14%	33%	16%	0%	-19%	61%	1%	55%	2%	-19%	57%	1%	60%	2%
2017	39%	13%	33%	15%	0%	-20%	62%	1%	55%	2%	-20%	57%	1%	60%	2%
2018	39%	12%	33%	16%	0%	-20%	61%	1%	56%	2%	-20%	56%	1%	61%	3%
2019	40%	11%	32%	17%	0%	-19%	60%	1%	56%	3%	-20%	54%	1%	62%	3%
2020	39%	11%	32%	18%	0%	-17%	58%	1%	55%	3%	-18%	53%	1%	61%	4%
2021	39%	11%	31%	18%	0%	-17%	58%	1%	55%	4%	-17%	52%	1%	60%	4%
2022	39%	11%	31%	19%	0%	-16%	57%	0%	54%	5%	-17%	51%	1%	59%	5%
2023	39%	11%	31%	19%	0%	-15%	57%	0%	52%	6%	-16%	52%	1%	57%	7%
2024	39%	11%	30%	20%	1%	-15%	57%	0%	50%	8%	-16%	52%	1%	55%	8%
2025	38%	11%	30%	20%	1%	-14%	56%	0%	48%	10%	-15%	51%	1%	53%	11%
2026	39%	10%	29%	20%	1%	-15%	54%	0%	47%	14%	-16%	49%	1%	52%	15%
2027	40%	10%	29%	21%	1%	-15%	51%	0%	45%	18%	-15%	46%	0%	50%	19%
2028	40%	9%	28%	21%	2%	-15%	47%	0%	44%	23%	-16%	43%	0%	48%	25%
2029	41%	8%	28%	21%	2%	-15%	44%	0%	42%	28%	-16%	39%	0%	46%	30%
2030	41%	8%	27%	21%	2%	-15%	40%	0%	41%	33%	-15%	36%	0%	44%	35%

Commercial Market Factors

	Applicability Factors												
Measure Name	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Streetlighting	Other	Sources
Ambient Lighting	98%	94%	98%	96%	96%	92%	58%	82%	0%	100%	0%	96%	39
Task Lighting	1%	2%	1%	1%	2%	2%	36%	14%	0%	0%	0%	3%	166
Accent Lighting	1%	4%	2%	3%	2%	6%	4%	19%	0%	0%	0%	1%	166
Lighting Controls	85%	87%	53%	71%	89%	99%	89%	92%	0%	89%	0%	73%	164
Streetlighting	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	39
Outdoor Area Lighting	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	39
Outdoor Lighting Design	90%	90%	90%	90%	90%	90%	90%	90%	0%	90%	0%	90%	163
Outdoor Lighting Controls	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	39
High-eff HP CEE Tier II -Cool	2%	2%	2%	2%	2%	2%	2%	2%	0%	2%	0%	2%	164
High-eff HP CEE Tier II -Heat	13%	13%	13%	13%	13%	13%	13%	13%	0%	13%	0%	13%	164
EMS/Controls -Cool	55%	55%	55%	55%	55%	55%	55%	55%	0%	55%	0%	55%	79
EMS/Controls -Vent	55%	55%	55%	55%	55%	55%	55%	55%	0%	55%	0%	55%	79
Demand controlled ventilation -Cool	55%	55%	55%	55%	55%	55%	55%	55%	0%	55%	0%	55%	79
Demand controlled ventilation -Vent	55%	55%	55%	55%	55%	55%	55%	55%	0%	55%	0%	55%	79
Duct sealing -Cool	50%	46%	46%	45%	59%	28%	41%	29%	0%	0%	0%	51%	39
Duct sealing -Vent	50%	46%	46%	45%	59%	28%	41%	29%	0%	0%	0%	51%	39
HE stove hood -Cool	0%	0%	0%	0%	0%	0%	0%	35%	0%	0%	0%	0%	39
HE stove hood -Vent	0%	0%	0%	0%	0%	0%	0%	35%	0%	0%	0%	0%	39
Cooling source equipment Tier II	95%	95%	95%	95%	95%	95%	95%	95%	0%	95%	0%	95%	39
Cooling controls	60%	60%	60%	60%	60%	60%	60%	60%	0%	60%	0%	60%	39
Cooling distribution	3%	3%	3%	3%	3%	3%	3%	3%	0%	3%	0%	3%	39
Cooling maintenance	50%	46%	46%	45%	59%	28%	41%	29%	0%	0%	0%	51%	39
Cooling design	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	0%	95%	39
Ventilation motors	55%	55%	55%	55%	55%	55%	55%	55%	0%	55%	0%	55%	163
Ventilation VFDs	65%	65%	65%	65%	65%	65%	65%	65%	0%	65%	0%	65%	163
DHW Source Equipment Elec	90%	90%	90%	90%	90%	90%	90%	90%	0%	90%	0%	90%	39
DHW Distribution Elec	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	39
DHW Controls -Elec	70%	70%	70%	70%	70%	70%	70%	70%	0%	70%	0%	70%	39
Built-up Refrigeration Systems	13%	11%	69%	0%	29%	31%	12%	48%	0%	100%	0%	43%	164
Packaged Refrigeration Systems	87%	89%	31%	100%	71%	69%	88%	52%	0%	0%	0%	57%	164
HE Plug Loads	20%	20%	20%	20%	20%	20%	20%	20%	0%	20%	0%	20%	39
Office Equipment Control	75%	75%	75%	75%	75%	75%	75%	75%	0%	75%	75%	75%	39
Retrocommissioning -Elec	66%	66%	66%	66%	66%	66%	66%	66%	0%	66%	0%	66%	163
Integrated bldg design - Tier I (2007 b	20%	20%	20%	20%	20%	20%	20%	20%	0%	20%	0%	20%	39
Deep Energy Retrofit - Electric	80%	80%	80%	80%	80%	80%	80%	80%	0%	80%	0%	80%	39
Kitchen Equipment - 2 meal	1%	1%	5%	0%	5%	7%	15%	34%	0%	15%	0%	5%	164
Kitchen Equipment - 3 meal	1%	1%	5%	0%	5%	7%	15%	34%	0%	15%	0%	5%	164
Data centers virtualization -IT	30%	0%	0%	0%	30%	30%	0%	0%	30%	0%	0%	30%	39
Data centers virtualization -Cool	30%	0%	0%	0%	30%	30%	0%	0%	30%	0%	0%	30%	39
Cool roof	50%	50%	50%	50%	50%	50%	50%	50%	0%	50%	0%	50%	39
Duct insulation and sealing, gas heat	48%	48%	48%	48%	48%	48%	48%	48%	0%	48%	0%	48%	39
DHW Source Equipment -Fossil Fuel	90%	90%	90%	90%	90%	90%	90%	90%	0%	90%	0%	90%	39
DHW Distribution -Fossil Fuel	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	39
DHW Controls -Fossil Fuel	5%	5%	5%	5%	25%	25%	5%	0%	0%	5%	0%	5%	39
Retrocommissioning -Fossil Fuel	66%	66%	66%	66%	66%	66%	66%	66%	0%	66%	0%	66%	163
Integrated bldg design - Tier I (2007 b	20%	20%	20%	20%	20%	20%	20%	20%	0%	20%	0%	20%	39
Deep Energy Retrofit - Fossil Fuel	80%	80%	80%	80%	80%	80%	80%	80%	0%	80%	0%	80%	39
Envelope Upgrade	20%	20%	20%	5%	10%	10%	10%	20%	0%	10%	0%	15%	39
Kitchen equipment - Fossil fuel, 2 mea	1%	1%	5%	0%	5%	7%	15%	34%	0%	15%	0%	5%	164
Kitchen equipment - Fossil Fuel, 3 me	1%	1%	5%	0%	5%	7%	15%	34%	0%	15%	0%	5%	164
Heating Source -MD	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	39
Heating Source -RET	0%	0%	0%	52%	0%	0%	0%	0%	0%	0%	0%	0%	39
RET Heating distribution	85%	85%	85%	85%	85%	85%	85%	85%	0%	85%	0%	85%	129
RET Heating controls	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	129
Heating heat recovery	4%	4%	4%	4%	4%	4%	4%	4%	0%	4%	0%	4%	39

Commercial Market Factors

	Feasibility Factors												
Measure Name	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Streetlighting	Other	Sources
Ambient Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	0%	0%	95%	164
Task Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	0%	0%	95%	164
Accent Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	0%	0%	95%	164
Lighting Controls	20%	75%	75%	90%	60%	20%	75%	0%	0%	0%	0%	20%	164
Streetlighting	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	95%	0%	39
Outdoor Area Lighting	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Outdoor Lighting Design	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Outdoor Lighting Controls	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
High-eff HP CEE Tier II -Cool	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
High-eff HP CEE Tier II -Heat	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
EMS/Controls -Cool	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
EMS/Controls -Vent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
Demand controlled ventilation -Cool	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	60%	100%	39
Demand controlled ventilation -Vent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
Duct sealing -Cool	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	164
Duct sealing -Vent	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	164
HE stove hood -Cool	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
HE stove hood -Vent	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
Cooling source equipment Tier II	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Cooling controls	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Cooling distribution	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Cooling maintenance	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Cooling design	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Ventilation motors	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Ventilation VFDs	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
DHW Source Equipment Elec	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
DHW Distribution Elec	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
DHW Controls -Elec	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Built-up Refrigeration Systems	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
Packaged Refrigeration Systems	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	39
HE Plug Loads	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Office Equipment Control	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Retrocommissioning -Elec	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	163
Integrated bldg design - Tier I (2007 b	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
Deep Energy Retrofit - Electric	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Kitchen Equipment - 2 meal	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Kitchen Equipment - 3 meal	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Data centers virtualization -IT	50%	50%	50%	50%	50%	50%	50%	50%	50%	99%	100%	50%	39
Data centers virtualization -Cool	80%	80%	80%	80%	80%	80%	80%	80%	80%	99%	100%	80%	39
Cool roof	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	39
Duct insulation and sealing, gas heat	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
DHW Source Equipment -Fossil Fuel	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
DHW Distribution -Fossil Fuel	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
DHW Controls -Fossil Fuel	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Retrocommissioning -Fossil Fuel	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	163
Integrated bldg design - Tier I (2007 b	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	39
Deep Energy Retrofit - Fossil Fuel	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Envelope Upgrade	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Kitchen equipment - Fossil fuel, 2 mea	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Kitchen equipment - Fossil Fuel, 3 me	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Heating Source -MD	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	0%	90%	39
Heating Source -RET	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	0%	50%	39
RET Heating distribution	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	0%	50%	39
RET Heating controls	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	0%	50%	39
Heating heat recovery	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	100%	50%	39

Commercial Market Factors

	Retrofit Not Complete												
Measure Name	Office	Retail	Grocery	Warehouse	Education	Health	Lodging	Restaurant	Data Center	Multifamily	Streetlighting	Other	Sources
Ambient Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Task Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Accent Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Lighting Controls	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	39
Streetlighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Outdoor Area Lighting	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Outdoor Lighting Design	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Outdoor Lighting Controls	57%	57%	57%	57%	57%	57%	57%	57%	57%	57%	57%	57%	39
High-eff HP CEE Tier II -Cool	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	165
High-eff HP CEE Tier II -Heat	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	165
EMS/Controls -Cool	25%	50%	15%	95%	25%	15%	100%	75%	25%	25%	0%	50%	164
EMS/Controls -Vent	25%	50%	15%	95%	25%	15%	100%	75%	25%	25%	0%	50%	164
Demand controlled ventilation -Cool	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	164
Demand controlled ventilation -Vent	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	164
Duct sealing -Cool	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	39
Duct sealing -Vent	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	39
HE stove hood -Cool	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	39
HE stove hood -Vent	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	39
Cooling source equipment Tier II	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Cooling controls	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	39
Cooling distribution	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Cooling maintenance	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	39
Cooling design	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
Ventilation motors	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	94%	164
Ventilation VFDs	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	164
DHW Source Equipment Elec	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
DHW Distribution Elec	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	39
DHW Controls -Elec	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Built-up Refrigeration Systems	75%	75%	75%	75%	75%	75%	42%	0%	75%	75%	75%	75%	39
Packaged Refrigeration Systems	85%	85%	85%	85%	85%	85%	52%	10%	85%	85%	85%	85%	39
HE Plug Loads	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	39
Office Equipment Control	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	39
Retrocommissioning -Elec	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	39
Integrated bldg design - Tier I (2007 b	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	39
Deep Energy Retrofit - Electric	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	39
Kitchen Equipment - 2 meal	100%	100%	100%	100%	100%	100%	56%	0%	100%	100%	100%	100%	39
Kitchen Equipment - 3 meal	100%	100%	100%	100%	100%	100%	56%	0%	100%	100%	100%	100%	39
Data centers virtualization -IT	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	39
Data centers virtualization -Cool	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	39
Cool roof	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Duct insulation and sealing, gas heat	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	0%	0%	39
DHW Source Equipment -Fossil Fuel	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
DHW Distribution -Fossil Fuel	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	39
DHW Controls -Fossil Fuel	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39
Retrocommissioning -Fossil Fuel	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	163
Integrated bldg design - Tier I (2007 b	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	39
Deep Energy Retrofit - Fossil Fuel	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	39
Envelope Upgrade	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
Kitchen equipment - Fossil fuel, 2 mea	100%	100%	100%	100%	100%	100%	56%	0%	100%	100%	100%	100%	39
Kitchen equipment - Fossil Fuel, 3 me	100%	100%	100%	100%	100%	100%	56%	0%	100%	100%	100%	100%	39
Heating Source -MD	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	39
Heating Source -RET	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
RET Heating distribution	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	39
RET Heating controls	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	39
Heating heat recovery	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	39

Industrial Market Factors

Electric Measures	Applicability Factor
Sensors and controls	30%
Energy Management systems	80%
Energy Information Systems	98%
Efficient Transformers (Tier 2)	100%
Duct/Pipe Insulation	80%
Heat recovery food industry - low temperature	50%
Cooling and storage	25%
electric supply system improvements	100%
Microwave processing	50%
RF heating and drying	50%
Efficient lighting design -- Office	15%
Efficient lighting design -- Manuf	70%
Efficient lighting design -- Warehouse	15%
Efficient lighting fixtures and lamps -- Office	15%
Efficient lighting fixtures and lamps -- Manuf	70%
Efficient lighting fixtures and lamps -- Warehouse	15%
Advanced motor designs	75%
motor management	100%
Advanced lubricants	23%
Motor system optimization	100%
Compressed air system management	100%
Air Compressor Systems Advanced Controls	23%
Pump efficiency improvement	100%
Fan system efficiency	100%
Efficient refrigeration systems	50%
Advanced Curing Technologies	50%
Electric IR heating and drying	50%
E-beam sterilization	50%
industrial heat pumps	15%

Industrial Market Factors

Natural Gas Measures	Total Applicability by NAICS codee																				
	311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
Improved process control	35%	35%	36%	24%	24%	30%	19%	42%	12%	15%	21%	30%	3%	9%	7%	11%	11%	23%	19%	7%	20%
Maintain boilers	12%	12%	12%	8%	8%	10%	6%	14%	4%	5%	7%	10%	1%	3%	3%	4%	4%	8%	6%	2%	7%
Flue gas heat recovery/economizer	30%	30%	30%	20%	20%	25%	16%	35%	10%	13%	18%	26%	2%	7%	6%	10%	10%	20%	16%	6%	17%
Blowdown steam heat recovery	25%	25%	25%	17%	17%	21%	13%	29%	9%	11%	15%	21%	2%	6%	5%	8%	8%	16%	13%	5%	14%
Upgrade burner efficiency	24%	24%	24%	16%	16%	20%	13%	28%	8%	10%	15%	20%	2%	6%	5%	8%	8%	16%	13%	5%	14%
Water treatment	60%	60%	61%	41%	41%	50%	32%	71%	21%	26%	36%	51%	4%	14%	13%	19%	19%	40%	32%	12%	34%
Load control	60%	60%	61%	41%	41%	50%	32%	71%	21%	26%	36%	51%	4%	14%	13%	19%	19%	40%	32%	12%	34%
Improved insulation	60%	60%	61%	41%	41%	50%	32%	71%	21%	26%	36%	51%	4%	14%	13%	19%	19%	40%	32%	12%	34%
Steam trap maintenance	30%	30%	30%	20%	20%	25%	16%	35%	10%	13%	18%	26%	2%	7%	6%	10%	10%	20%	16%	6%	17%
Automatic steam trap monitoring	30%	30%	30%	20%	20%	25%	16%	35%	10%	13%	18%	26%	2%	7%	6%	10%	10%	20%	16%	6%	17%
Leak repair	7%	7%	7%	5%	5%	6%	4%	8%	3%	3%	4%	6%	1%	2%	2%	2%	2%	5%	4%	1%	4%
Condensate return	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%	1%	1%	0%	0%	0%	0%	0%	1%	1%	0%	1%
Improve ceiling insulation	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
Install HE(95%) cond furnace/boiler	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
Stack heat exchanger	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Duct insulation	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
EMS install	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
EMS optimization	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
Process Controls & Management	18%	18%	26%	33%	33%	20%	40%	15%	33%	58%	23%	21%	60%	57%	0%	23%	23%	25%	27%	22%	23%
Heat Recovery	9%	9%	16%	20%	20%	13%	25%	0%	0%	0%	0%	12%	0%	29%	0%	14%	14%	15%	17%	14%	14%
Efficient burners	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	53%	43%	24%	0%	0%	0%	0%	0%	0%
Process integration	15%	15%	0%	0%	0%	0%	0%	6%	0%	32%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Efficient drying	9%	9%	0%	0%	0%	0%	0%	0%	21%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Closed hood	0%	0%	0%	0%	0%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Extended nip press	0%	0%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Improved separation processes	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Thermal oxidizers	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Flare gas controls and recovery	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fouling control	0%	0%	0%	0%	0%	0%	0%	0%	0%	45%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Efficient furnaces	0%	0%	0%	0%	0%	0%	0%	0%	0%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Oxyfuel	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	32%	0%	0%	0%	0%	0%	0%	0%	0%
Batch cullet preheating	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%	0%	0%
Preventative maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	65%	0%	0%	0%	0%	0%	0%	0%
Combustion controls	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	47%	0%	0%	0%	0%	0%	0%
Optimize furnace operations	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%
Insulation/reduce heat losses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	47%	0%	0%	0%	0%	0%	0%

Industrial Market Factors

Petroleum Fuel Measures	Total Applicability by NAICS codee																				
	311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
Improved process control	35%	35%	36%	24%	24%	30%	19%	42%	12%	15%	21%	30%	3%	9%	7%	11%	11%	23%	19%	7%	20%
Maintain boilers	12%	12%	12%	8%	8%	10%	6%	14%	4%	5%	7%	10%	1%	3%	3%	4%	4%	8%	6%	2%	7%
Flue gas heat recovery/economizer	30%	30%	30%	20%	20%	25%	16%	35%	10%	13%	18%	26%	2%	7%	6%	10%	10%	20%	16%	6%	17%
Blowdown steam heat recovery	25%	25%	25%	17%	17%	21%	13%	29%	9%	11%	15%	21%	2%	6%	5%	8%	8%	16%	13%	5%	14%
Upgrade burner efficiency	24%	24%	24%	16%	16%	20%	13%	28%	8%	10%	15%	20%	2%	6%	5%	8%	8%	16%	13%	5%	14%
Water treatment	60%	60%	61%	41%	41%	50%	32%	71%	21%	26%	36%	51%	4%	14%	13%	19%	19%	40%	32%	12%	34%
Load control	60%	60%	61%	41%	41%	50%	32%	71%	21%	26%	36%	51%	4%	14%	13%	19%	19%	40%	32%	12%	34%
Improved insulation	60%	60%	61%	41%	41%	50%	32%	71%	21%	26%	36%	51%	4%	14%	13%	19%	19%	40%	32%	12%	34%
Steam trap maintenance	30%	30%	30%	20%	20%	25%	16%	35%	10%	13%	18%	26%	2%	7%	6%	10%	10%	20%	16%	6%	17%
Automatic steam trap monitoring	30%	30%	30%	20%	20%	25%	16%	35%	10%	13%	18%	26%	2%	7%	6%	10%	10%	20%	16%	6%	17%
Leak repair	7%	7%	7%	5%	5%	6%	4%	8%	3%	3%	4%	6%	1%	2%	2%	2%	2%	5%	4%	1%	4%
Condensate return	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%	1%	1%	0%	0%	0%	0%	0%	1%	1%	0%	1%
Improve ceiling insulation	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
Stack heat exchanger	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Duct insulation	1%	1%	0%	3%	3%	4%	1%	0%	3%	0%	0%	2%	1%	1%	3%	7%	7%	3%	4%	5%	5%
Process Controls & Management	18%	18%	26%	33%	33%	20%	40%	15%	33%	58%	23%	21%	60%	57%	0%	23%	23%	25%	27%	22%	23%
Heat Recovery	9%	9%	16%	20%	20%	13%	25%	0%	0%	0%	0%	12%	0%	29%	0%	14%	14%	15%	17%	14%	14%
Efficient burners	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	53%	43%	24%	0%	0%	0%	0%	0%	0%
Process integration	15%	15%	0%	0%	0%	0%	0%	6%	0%	32%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Efficient drying	9%	9%	0%	0%	0%	0%	0%	0%	21%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Improved separation processes	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Efficient furnaces	0%	0%	0%	0%	0%	0%	0%	0%	0%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Preventative maintenance	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	65%	0%	0%	0%	0%	0%	0%	0%
Optimize furnace operations	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%
Insulation/reduce heat losses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	47%	0%	0%	0%	0%	0%	0%

Appendix F: Measure Penetrations

Residential Measure Penetrations

Achievable Scenario

	Electricity				Natural Gas				Petroleum			
	Lighting Bundle	Hot Water Bundle	Appliance Package and Plug Loads	Thermal Comfort (Heating, Cooling & controls)	Lighting Bundle	Hot Water Bundle	Appliance Package and Plug Loads	Thermal Comfort (Heating, Cooling & controls)	Lighting Bundle	Hot Water Bundle	Appliance Package and Plug Loads	Thermal Comfort (Heating, Cooling & controls)
2013	2%	3%	1%	0%	-	1%	-	0%	-	3%	-	1%
2014	5%	6%	2%	1%	-	2%	-	1%	-	7%	-	1%
2015	8%	8%	2%	1%	-	3%	-	1%	-	10%	-	2%
2016	14%	10%	3%	2%	-	4%	-	1%	-	13%	-	3%
2017	18%	11%	4%	2%	-	5%	-	1%	-	17%	-	3%
2018	22%	12%	5%	2%	-	6%	-	2%	-	19%	-	4%
2019	24%	13%	5%	3%	-	7%	-	2%	-	22%	-	5%
2020	26%	14%	6%	3%	-	8%	-	2%	-	25%	-	5%
2021	31%	14%	6%	4%	-	9%	-	2%	-	28%	-	6%
2022	36%	15%	6%	4%	-	10%	-	3%	-	32%	-	7%
2023	41%	16%	6%	5%	-	11%	-	3%	-	35%	-	7%
2024	50%	16%	6%	5%	-	12%	-	3%	-	39%	-	8%
2025	52%	17%	7%	5%	-	13%	-	3%	-	42%	-	9%
2026	58%	17%	7%	6%	-	14%	-	4%	-	44%	-	10%
2027	62%	17%	7%	6%	-	14%	-	4%	-	46%	-	11%
2028	68%	17%	7%	7%	-	14%	-	5%	-	47%	-	12%
2029	74%	18%	8%	7%	-	14%	-	5%	-	48%	-	14%
2030	78%	18%	8%	8%	-	14%	-	6%	-	49%	-	16%

Commercial Measure Penetration

Achievable Scenario

Measure Name	Market Driven						Retrofit					
	2013	2015	2018	2020	2025	2030	2013	2015	2018	2020	2025	2030
Accent Lighting	3%	6%	16%	22%	23%	23%	1%	1%	2%	2%	2%	2%
Ambient Lighting	8%	10%	14%	16%	16%	16%	1%	1%	2%	2%	2%	2%
Built-up Refrigeration Systems	3%	6%	18%	25%	26%	26%	1%	1%	2%	2%	2%	2%
Cool roof	0%	1%	4%	9%	12%	12%	---	---	---	---	---	---
Cooling controls	---	---	---	---	---	---	0%	1%	2%	2%	2%	2%
Cooling design	0%	1%	4%	8%	11%	11%	---	---	---	---	---	---
Cooling distribution	---	---	---	---	---	---	0%	1%	2%	2%	2%	2%
Cooling maintenance	---	---	---	---	---	---	1%	2%	4%	4%	4%	4%
Cooling source equipment Tier I	0%	1%	3%	6%	8%	8%	1%	1%	1%	1%	1%	1%
Cooling source equipment Tier II	0%	1%	2%	4%	6%	6%	1%	2%	2%	2%	2%	2%
Data centers virtualization -Cool	1%	3%	17%	26%	27%	27%	1%	2%	4%	4%	4%	4%
Data centers virtualization -IT	1%	3%	17%	26%	27%	27%	1%	2%	4%	4%	4%	4%
Deep Energy Retrofit - Electric	0%	0%	2%	4%	9%	10%	---	---	---	---	---	---
Deep Energy Retrofit - Gas	0%	0%	1%	2%	4%	4%	---	---	---	---	---	---
Demand controlled ventilation -Cool	---	---	---	---	---	---	1%	3%	2%	3%	3%	3%
Demand controlled ventilation -Vent	---	---	---	---	---	---	1%	2%	2%	2%	2%	2%
DHW Controls -Elec	1%	3%	10%	14%	14%	14%	0%	1%	1%	2%	2%	2%
DHW Controls -Gas	1%	2%	7%	11%	11%	11%	0%	0%	1%	1%	1%	1%
DHW Distribution Elec	0%	1%	6%	13%	18%	18%	1%	2%	4%	5%	5%	5%
DHW Distribution Gas	1%	2%	10%	20%	27%	27%	0%	1%	1%	2%	2%	2%
DHW Source Equipment Elec	0%	1%	6%	8%	9%	9%	0%	1%	1%	1%	1%	1%
DHW Source Equipment -Gas	1%	2%	8%	12%	12%	12%	1%	1%	2%	2%	2%	2%
Duct insulation and sealing - Gas	1%	1%	5%	9%	12%	12%	1%	1%	2%	2%	2%	2%
Duct sealing -Cool	1%	3%	10%	20%	25%	25%	1%	2%	3%	4%	4%	4%
Duct sealing -Vent	1%	3%	12%	22%	29%	29%	1%	3%	4%	5%	5%	5%
EMS/Controls -Cool	1%	2%	5%	9%	11%	11%	0%	1%	1%	1%	1%	1%
EMS/Controls -Vent	1%	2%	5%	8%	10%	10%	0%	1%	1%	1%	1%	1%
Envelope Upgrade	---	---	---	---	---	---	1%	1%	2%	2%	2%	2%
HE Plug Loads	1%	5%	23%	35%	36%	36%	---	---	---	---	---	---
HE stove hood -Cool	0%	0%	1%	1%	2%	2%	0%	0%	0%	0%	0%	0%
HE stove hood -Vent	0%	1%	5%	10%	13%	13%	0%	1%	2%	3%	3%	3%
Heating heat recovery	---	---	---	---	---	---	2%	2%	2%	2%	2%	2%
Heating Source -MD	5%	5%	8%	9%	9%	9%	---	---	---	---	---	---
Heating Source -RET	---	---	---	---	---	---	2%	3%	2%	2%	2%	2%
High-eff HP CEE Tier I -Cool	0%	1%	5%	8%	9%	9%	---	---	---	---	---	---
High-eff HP CEE Tier I -Heat	0%	1%	5%	8%	9%	9%	---	---	---	---	---	---
High-eff HP CEE Tier II -Cool	1%	1%	5%	9%	11%	11%	---	---	---	---	---	---
High-eff HP CEE Tier II -Heat	1%	1%	4%	8%	11%	11%	---	---	---	---	---	---
Integrated bldg design - Elec	2%	5%	14%	18%	18%	18%	---	---	---	---	---	---
Integrated bldg design - Gas	1%	3%	7%	9%	9%	9%	---	---	---	---	---	---
Kitchen Equipment - 2 meal	0%	1%	2%	5%	11%	11%	---	---	---	---	---	---
Kitchen Equipment - 3 meal	0%	1%	2%	5%	11%	11%	---	---	---	---	---	---
Kitchen equipment - gas, 2 meal	1%	2%	5%	10%	17%	17%	---	---	---	---	---	---
Kitchen equipment - gas, 3 meal	1%	2%	5%	9%	16%	17%	---	---	---	---	---	---
Lighting Controls	2%	3%	10%	17%	23%	23%	1%	1%	2%	2%	2%	2%
Office Equipment Control	---	---	---	---	---	---	1%	2%	4%	4%	4%	4%
Outdoor Area Lighting	1%	2%	11%	17%	18%	18%	0%	1%	2%	2%	2%	2%
Outdoor Lighting Controls	0%	1%	3%	6%	8%	8%	0%	1%	1%	1%	1%	1%
Outdoor Lighting Design	1%	2%	6%	11%	14%	14%	1%	1%	2%	2%	2%	2%
Packaged Refrigeration Systems	2%	5%	23%	34%	35%	35%	1%	1%	2%	3%	3%	3%
RET Heating controls	---	---	---	---	---	---	3%	3%	3%	3%	3%	3%
RET Heating distribution	---	---	---	---	---	---	5%	7%	5%	7%	7%	7%
Retrocommissioning -Elec	---	---	---	---	---	---	2%	3%	4%	6%	6%	6%
Retrocommissioning -Gas	---	---	---	---	---	---	1%	2%	2%	3%	3%	3%
Streetlighting	6%	13%	24%	30%	30%	30%	1%	2%	2%	2%	2%	2%
Task Lighting	2%	3%	8%	13%	17%	17%	0%	1%	2%	2%	2%	2%
Ventilation motors	---	---	---	---	---	---	0%	1%	2%	2%	2%	2%
Ventilation VFDs	3%	5%	13%	22%	27%	27%	1%	2%	4%	4%	4%	4%

Industrial Measure Penetrations

Achievable Scenario

Measure Name	2013	2015	2018	2020	2025	2030
Advanced Curing Technologies	2%	6%	16%	5%	4%	4%
Advanced lubricants	2%	21%	7%	4%	4%	4%
Advanced motor designs	0%	15%	5%	4%	4%	4%
Air Compressor Systems Advanced Controls	1%	18%	6%	4%	4%	4%
Automatic steam trap monitoring -Fuel	3%	17%	6%	4%	4%	4%
Automatic steam trap monitoring -NG	4%	9%	19%	8%	4%	4%
Batch cullet preheating -NG	3%	10%	14%	6%	2%	2%
Blowdown steam heat recovery -Fuel	4%	19%	6%	3%	3%	3%
Blowdown steam heat recovery -NG	4%	10%	16%	5%	3%	3%
Closed hood -NG	3%	12%	11%	4%	3%	3%
Combustion controls -NG	4%	14%	13%	5%	4%	4%
Compressed air system management	2%	19%	6%	4%	4%	4%
Condensate return -Fuel	4%	21%	6%	3%	3%	3%
Condensate return -NG	4%	16%	11%	5%	3%	3%
Cooling and storage	2%	6%	16%	5%	4%	4%
Duct insulation -Fuel	1%	19%	5%	4%	4%	4%
Duct insulation -NG	0%	12%	13%	7%	3%	3%
Duct/Pipe Insulation	1%	20%	6%	3%	3%	3%
E-beam sterilization	3%	4%	24%	11%	4%	4%
Efficient burners -Fuel	2%	4%	22%	11%	3%	3%
Efficient burners -NG	2%	8%	15%	7%	3%	3%
Efficient drying -Fuel	0%	3%	18%	11%	3%	3%
Efficient drying -NG	0%	8%	9%	5%	3%	3%
Efficient furnaces -Fuel	0%	4%	21%	11%	2%	2%
Efficient furnaces -NG	0%	8%	12%	5%	2%	2%
Efficient lighting design -- Manuf	3%	10%	21%	6%	3%	3%
Efficient lighting design -- Office	4%	25%	6%	3%	3%	3%
Efficient lighting design -- Warehouse	3%	23%	7%	4%	4%	4%
Efficient lighting fixtures and lamps -- Manuf	3%	9%	19%	5%	3%	3%
Efficient lighting fixtures and lamps -- Office	3%	20%	6%	3%	3%	3%
Efficient lighting fixtures and lamps -- Warehouse	3%	21%	6%	3%	3%	3%
Efficient refrigeration systems	3%	8%	19%	6%	4%	4%
Efficient Transformers (Tier 2)	0%	5%	11%	5%	3%	3%
Electric IR heating and drying	0%	5%	12%	5%	4%	3%
electric supply system improvements	3%	9%	18%	5%	3%	3%
EMS install -NG	0%	8%	11%	5%	3%	3%
EMS optimization -NG	3%	12%	17%	6%	5%	5%
Energy Information Systems	1%	6%	15%	5%	3%	3%
Energy Management systems	1%	3%	20%	10%	3%	3%
Extended nip press -NG	0%	7%	11%	5%	3%	3%
Fan system efficiency	1%	6%	15%	6%	4%	4%
Flare gas controls and recovery -NG	3%	8%	14%	5%	3%	3%
Flue gas heat recovery/economizer -Fuel	4%	20%	7%	4%	4%	4%
Flue gas heat recovery/economizer -NG	4%	12%	16%	7%	4%	4%
Fouling control -NG	4%	9%	20%	8%	3%	3%
Heat recovery food industry - low temperature	1%	3%	17%	9%	3%	3%
Heat Recovery -Fuel	0%	3%	19%	12%	4%	4%
Heat Recovery -NG	0%	7%	12%	7%	4%	4%
Improve ceiling insulation -Fuel	0%	6%	14%	6%	4%	4%
Improve ceiling insulation -NG	0%	9%	10%	6%	4%	4%

Measure Name	2013	2015	2018	2020	2025	2030
Improved insulation -Fuel	4%	20%	6%	3%	3%	3%
Improved insulation -NG	4%	13%	19%	5%	3%	3%
Improved process control -Fuel	4%	9%	20%	5%	3%	3%
Improved process control -NG	4%	7%	20%	6%	3%	3%
Improved separation processes -Fuel	0%	4%	20%	11%	3%	3%
Improved separation processes -NG	0%	8%	9%	5%	3%	3%
industrial heat pumps	3%	8%	18%	4%	3%	3%
Install HE(95%) cond furnace/boiler -NG	0%	10%	10%	6%	3%	3%
Insulation/reduce heat losses -Fuel	4%	5%	28%	11%	3%	3%
Insulation/reduce heat losses -NG	4%	12%	16%	7%	3%	3%
Leak repair -Fuel	2%	21%	8%	4%	4%	4%
Leak repair -NG	2%	11%	22%	8%	4%	4%
Load control -Fuel	3%	8%	19%	6%	4%	4%
Load control -NG	3%	8%	16%	7%	4%	4%
Maintain boilers -Fuel	2%	21%	9%	5%	5%	5%
Maintain boilers -NG	2%	14%	18%	7%	5%	5%
Microwave processing	1%	3%	17%	9%	4%	4%
motor management	0%	16%	5%	4%	4%	4%
Motor system optimization	1%	8%	18%	7%	4%	4%
Optimize furnace operations -Fuel	2%	4%	23%	12%	4%	4%
Optimize furnace operations -NG	1%	7%	16%	8%	4%	4%
Oxyfuel -NG	0%	8%	13%	6%	3%	3%
Preventative maintenance -Fuel	4%	6%	30%	12%	4%	4%
Preventative maintenance -NG	4%	17%	16%	7%	4%	4%
Process Controls & Management -Fuel	3%	5%	26%	11%	4%	4%
Process Controls & Management -NG	3%	8%	21%	10%	4%	4%
Process integration -Fuel	3%	4%	23%	9%	3%	3%
Process integration -NG	3%	12%	9%	4%	3%	3%
Pump efficiency improvement	1%	7%	17%	6%	4%	4%
RF heating and drying	1%	3%	17%	9%	4%	4%
Sensors and controls	3%	19%	8%	5%	5%	5%
Stack heat exchanger -Fuel	0%	15%	4%	3%	3%	3%
Stack heat exchanger -NG	0%	8%	11%	4%	3%	3%
Steam trap maintenance -Fuel	2%	20%	7%	3%	3%	3%
Steam trap maintenance -NG	2%	10%	27%	10%	3%	3%
Thermal oxidizers -NG	3%	6%	16%	5%	2%	2%
Upgrade burner efficiency -Fuel	0%	6%	15%	7%	4%	4%
Upgrade burner efficiency -NG	0%	5%	14%	7%	4%	4%
Water treatment -Fuel	2%	16%	5%	4%	4%	4%
Water treatment -NG	2%	8%	16%	8%	4%	4%

Appendix G: Measure Levelized Cost of Energy

The tables on the following pages present the gross and net levelized cost of energy (LCOE) for each measure.

Gross LCOE is simply the measure's incremental cost divided by its lifetime savings (kWh or MMBtu). The lifetime savings are discounted to the install year using the real discount rate (5.5%), reflecting the "time value" of savings (i.e., the same discounting as used to present-value future costs and benefits for calculating measure cost-effectiveness).

The shortcoming of the gross LCOE is that a measure may have savings (or increased usage) other than for the primary fuel, but these are ignored. For example, an electric measure typically saves energy (kWh) and reduces peak demand (kW), but the gross $/kWh LCOE ignores the capacity (kW) benefit, while including the full incremental cost. Similarly, a thermal shell measure has both fossil fuel (MMBtu) and electric (kWh) savings. The gross $/MMBtu LCOE ignores the kWh savings.

Net LCOE adjusts the measure's incremental cost by its benefits other than for the primary fuel in the denominator (kWh or MMBtu). For example, a thermal shell measure saves primarily fossil fuel, but also has electric energy (kWh) and capacity (kW) benefits due to reduced cooling loads. The benefits are subtracted from the incremental cost in the numerator. In some cases the adjustment to the incremental cost results in a negative cost, when the benefits other than for the fuel in the denominator are greater than the incremental cost. As for the gross LCOE, the fuel savings in the denominator are discounted to the install year using the real discount rate.

Residential Measure Levelized Cost Results

Measure Name	2013				2020				2030			
	Gross		Net		Gross		Net		Gross		Net	
	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu
Appliance Package and Plug Loads	$0.00	-	$0.01	-	$0.00	-	$0.01	-	$0.00	-	$0.01	-
Bundled Hot Water End Use Residential Measures, MF	-	$11.73	-	$(7.05)	-	$44.44	-	$1.53	-	$69.84	-	$17.12
Bundled Hot Water End Use Residential Measures, SF	-	$11.86	-	$(8.11)	-	$44.45	-	$0.56	-	$69.93	-	$17.18
Cooling system and advanced controls bundle	$0.00	-	$0.13	-	$0.00	-	$0.13	-	$0.00	-	$0.13	-
Heating system and advanced controls bundle	-	$0.00	-	$(7.71)	-	$0.00	-	$(8.31)	-	$0.00	-	$(18.22)
Lighting, Multifamily	$0.00	-	$0.05	-	$0.00	-	$0.04	-	$0.00	-	$0.04	-
Lighting, Single Family	$0.00	-	$0.05	-	$0.00	-	$0.04	-	$0.00	-	$0.03	-
Thermal comfort, 2 - 4 unit	-	$0.09	-	$17.79	-	$0.02	-	$17.70	-	$0.00	-	$17.56
Thermal comfort, 2 - 4 unit w/HP transition	-	$0.83	-	$19.95	-	$0.19	-	$19.73	-	$0.01	-	$19.41
Thermal comfort, colonial/2-story	-	$0.08	-	$17.33	-	$0.02	-	$17.25	-	$0.00	-	$17.15
Thermal comfort, colonial/2-story w/HP transition	-	$0.63	-	$11.95	-	$0.14	-	$11.76	-	$0.01	-	$11.53
Thermal comfort, garden apts bldg	-	$0.10	-	$16.66	-	$0.02	-	$16.45	-	$0.00	-	$16.12
Thermal comfort, misc (e.g., houseboats, small RVs)	-	$0.27	-	$20.08	-	$0.06	-	$20.08	-	$0.00	-	$20.08
Thermal comfort, ranch/MH	-	$0.08	-	$16.39	-	$0.02	-	$16.32	-	$0.00	-	$16.23
Thermal comfort, ranch/MH w/HP transition	-	$0.73	-	$14.22	-	$0.16	-	$14.03	-	$0.01	-	$13.79
Thermal comfort, town/row	-	$0.05	-	$17.78	-	$0.01	-	$17.72	-	$0.00	-	$17.63
Thermal comfort, town/row w/HP transition	-	$0.45	-	$14.86	-	$0.10	-	$14.67	-	$0.00	-	$14.43

Commercial Measure Levelized Cost Results

Measure Name	2013				2020				2030			
	Gross		Net		Gross		Net		Gross		Net	
	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu
Accent Lighting	$4.72	-	$(0.04)	-	$0.92	-	$(0.10)	-	$0.91	-	$(0.10)	-
Ambient Lighting	$3.14	-	$0.03	-	$0.93	-	$(0.02)	-	$0.90	-	$(0.02)	-
Built-up Refrigeration Systems	$5.88	-	$0.02	-	$1.23	-	$0.01	-	$1.10	-	$0.01	-
Cool roof	$2.15	-	$0.02	-	$0.16	-	$0.02	-	$0.16	-	$0.02	-
Cooling controls	$3.95	-	$(0.01)	-	$1.36	-	$(0.01)	-	$1.21	-	$(0.01)	-
Cooling design	$3.80	-	$(0.03)	-	$0.47	-	$(0.03)	-	$0.37	-	$(0.03)	-
Cooling distribution	$2.61	-	$(0.00)	-	$1.41	-	$(0.00)	-	$1.25	-	$(0.00)	-
Cooling maintenance	$1.35	-	$(0.16)	-	$0.73	-	$(0.17)	-	$0.65	-	$(0.19)	-
Cooling source equipment Tier I	$8.99	-	$0.05	-	$5.18	-	$0.05	-	$6.47	-	$0.05	-
Cooling source equipment Tier II	$9.09	-	$0.06	-	$6.42	-	$0.05	-	$8.95	-	$0.05	-
Data centers virtualization -Cool	$0.84	-	$0.03	-	$0.29	-	$0.03	-	$0.26	-	$0.03	-
Data centers virtualization -IT	$0.82	-	$0.03	-	$0.19	-	$0.03	-	$0.14	-	$0.03	-
Deep Energy Retrofit - Electric	$0.79	-	$0.01	-	$0.42	-	$0.01	-	$0.48	-	$0.01	-
Deep Energy Retrofit - Gas	-	$347.02	-	$8.29	-	$231.89	-	$8.29	-	$300.07	-	$8.29
Demand controlled ventilation -Cool	$5.15	-	$(0.13)	-	$6.28	-	$(0.14)	-	$5.58	-	$(0.15)	-
Demand controlled ventilation -Vent	$4.32	-	$0.05	-	$3.99	-	$0.05	-	$3.36	-	$0.05	-
DHW Controls -Elec	$0.99	-	$0.04	-	$0.98	-	$0.03	-	$0.97	-	$0.03	-
DHW Controls -Gas	-	$121.83	-	$6.26	-	$128.85	-	$5.24	-	$97.60	-	$5.33
DHW Distribution Elec	$0.16	-	$0.00	-	$0.20	-	$0.01	-	$0.16	-	$0.01	-
DHW Distribution Gas	-	$70.24	-	$3.40	-	$66.56	-	$2.98	-	$63.70	-	$3.03
DHW Source Equipment Elec	$0.55	-	$0.08	-	$0.34	-	$0.08	-	$0.33	-	$0.08	-
DHW Source Equipment -Gas	-	$53.88	-	$4.25	-	$52.96	-	$4.46	-	$44.56	-	$4.44
Duct insulation and sealing, gas heat	-	$63.50	-	$3.04	-	$74.21	-	$3.03	-	$84.15	-	$3.01
Duct sealing -Cool	$0.15	-	$(0.05)	-	$0.21	-	$(0.05)	-	$0.21	-	$(0.05)	-
Duct sealing -Vent	$0.12	-	$0.00	-	$0.13	-	$0.00	-	$0.12	-	$0.00	-
EMS/Controls -Cool	$2.51	-	$(0.04)	-	$2.88	-	$(0.06)	-	$2.86	-	$(0.06)	-
EMS/Controls -Vent	$2.07	-	$0.07	-	$1.83	-	$0.07	-	$1.70	-	$0.07	-
Envelope Upgrade	-	$187.26	-	$(0.67)	-	$209.49	-	$(1.60)	-	$212.81	-	$(3.16)
HE Plug Loads	$0.38	-	$0.01	-	$0.05	-	$0.01	-	$0.05	-	$0.01	-
HE stove hood -Cool	-	-	$(0.05)	-	-	-	$(0.05)	-	-	-	$(0.05)	-
HE stove hood -Vent	$0.55	-	$0.02	-	$0.58	-	$0.02	-	$0.78	-	$0.02	-
Heating heat recovery	-	$80.86	-	$3.38	-	$101.80	-	$3.38	-	$103.45	-	$3.37
Heating Source -MD	-	$32.13	-	$6.66	-	$31.86	-	$6.54	-	$36.43	-	$6.38
Heating Source -RET	-	$59.10	-	$1.92	-	$97.91	-	$1.92	-	$97.95	-	$1.92
High-eff HP CEE Tier II -Cool	$2.28	-	$0.01	-	$0.36	-	$0.01	-	$0.33	-	$0.01	-
High-eff HP CEE Tier II -Heat	$2.27	-	$0.06	-	$0.37	-	$0.06	-	$0.37	-	$0.06	-
Integrated bldg design - Tier I (2007 baseline) -Elec	$3.28	-	$0.03	-	$0.34	-	$0.03	-	$0.32	-	$0.03	-
Integrated bldg design - Tier I (2007 baseline) -Gas	-	$1,251.91	-	$14.56	-	$165.97	-	$14.55	-	$174.96	-	$14.55
Kitchen Equipment - 2 meal	$1.06	-	$0.04	-	$0.37	-	$0.04	-	$0.25	-	$0.04	-
Kitchen Equipment - 3 meal	$1.01	-	$0.03	-	$0.35	-	$0.03	-	$0.24	-	$0.03	-
Kitchen equipment - gas, 2 meal	-	$36.73	-	$1.77	-	$11.93	-	$1.77	-	$5.77	-	$1.77
Kitchen equipment - gas, 3 meal	-	$38.98	-	$1.85	-	$12.67	-	$1.86	-	$6.13	-	$1.85
Lighting Controls	$0.90	-	$0.03	-	$0.66	-	$0.02	-	$0.51	-	$0.02	-

Measure Name	2013				2020				2030			
	Gross		Net		Gross		Net		Gross		Net	
	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu
Office Equipment Control	$0.68	-	$0.03	-	$0.70	-	$0.03	-	$0.62	-	$0.03	-
Outdoor Area Lighting	$0.72	-	$0.03	-	$0.27	-	$(0.00)	-	$0.19	-	$(0.00)	-
Outdoor Lighting Controls	$0.36	-	$0.06	-	$0.15	-	$0.04	-	$0.10	-	$0.03	-
Outdoor Lighting Design	$0.37	-	$0.02	-	$0.50	-	$0.02	-	$0.40	-	$0.02	-
Packaged Refrigeration Systems	$0.54	-	$0.02	-	$0.49	-	$0.02	-	$0.41	-	$0.02	-
RET Heating controls	-	$42.67	-	$2.05	-	$47.66	-	$2.05	-	$48.33	-	$2.05
RET Heating distribution	-	$3.65	-	$0.26	-	$4.07	-	$0.26	-	$4.47	-	$0.26
Retrocommissioning -Elec	$0.20	-	$0.00	-	$0.20	-	$0.00	-	$0.17	-	$0.00	-
Retrocommissioning -Gas	-	$94.33	-	$4.21	-	$103.91	-	$4.21	-	$103.64	-	$4.21
Streetlighting	$2.31	-	$0.01	-	$2.81	-	$(0.00)	-	$1.41	-	$(0.00)	-
Task Lighting	$0.86	-	$0.03	-	$0.61	-	$0.01	-	$0.57	-	$0.01	-
Ventilation motors	$2.57	-	$0.03	-	$3.13	-	$0.03	-	$2.78	-	$0.03	-
Ventilation VFDs	$0.23	-	$0.01	-	$0.21	-	$0.01	-	$0.18	-	$0.01	-

Industrial Measure Levelized Cost Results

Measure Name	2013				2020				2030			
	Gross		Net		Gross		Net		Gross		Net	
	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu
Advanced Curing Technologies	$3.71	-	$0.07	-	$9.44	-	$0.47	-	$13.51	-	$0.47	-
Advanced lubricants	$1.61	-	$0.02	-	$0.70	-	$0.02	-	$0.70	-	$0.02	-
Advanced motor designs	$8.97	-	$0.02	-	$0.86	-	$0.02	-	$0.86	-	$0.02	-
Air Compressor Systems Advanced Controls	$1.12	-	$0.01	-	$0.55	-	$0.01	-	$0.55	-	$0.01	-
Automatic steam trap monitoring -Fuel	-	$100.48	-	$3.40	-	$20.02	-	$0.71	-	$20.02	-	$0.71
Automatic steam trap monitoring -NG	-	$9.57	-	$0.35	-	$6.80	-	$0.33	-	$8.55	-	$0.33
Batch cullet preheating -NG	-	$32.07	-	$1.08	-	$33.79	-	$2.73	-	$116.44	-	$2.73
Blowdown steam heat recovery -Fuel	-	$67.82	-	$2.56	-	$105.16	-	$3.18	-	$105.16	-	$3.18
Blowdown steam heat recovery -NG	-	$43.61	-	$1.56	-	$40.81	-	$1.50	-	$50.89	-	$1.50
Closed hood -NG	-	$108.45	-	$3.41	-	$82.50	-	$3.41	-	$124.28	-	$3.41
Combustion controls -NG	-	$29.11	-	$1.02	-	$15.23	-	$0.82	-	$22.32	-	$0.82
Compressed air system management	$0.63	-	$0.00	-	$0.42	-	$0.01	-	$0.42	-	$0.01	-
Condensate return -Fuel	-	$21.55	-	$0.85	-	$60.22	-	$1.99	-	$60.22	-	$1.99
Condensate return -NG	-	$26.17	-	$0.97	-	$27.31	-	$0.94	-	$30.27	-	$0.94
Duct insulation -Fuel	-	$188.83	-	$0.97	-	$33.87	-	$1.25	-	$33.87	-	$1.25
Duct insulation -NG	-	$126.91	-	$0.63	-	$13.74	-	$0.58	-	$16.42	-	$0.58
Duct/Pipe Insulation	$3.11	-	$0.04	-	$1.65	-	$0.04	-	$1.65	-	$0.04	-
E-beam sterilization	$0.04	-	$(0.01)	-	$0.01	-	$(0.01)	-	$0.03	-	$(0.01)	-
Efficient burners -Fuel	-	$491.93	-	$7.75	-	$35.80	-	$3.89	-	$117.98	-	$3.89
Efficient burners -NG	-	$65.11	-	$1.09	-	$18.28	-	$1.86	-	$53.37	-	$1.86
Efficient drying -Fuel	-	$992.08	-	$3.65	-	$99.11	-	$10.94	-	$328.71	-	$10.94
Efficient drying -NG	-	$1,858.89	-	$6.33	-	$57.22	-	$5.07	-	$166.22	-	$5.07
Efficient furnaces -Fuel	-	$436.23	-	$1.85	-	$21.92	-	$2.47	-	$100.97	-	$2.47
Efficient furnaces -NG	-	$292.67	-	$1.17	-	$12.47	-	$1.14	-	$50.00	-	$1.14
Efficient lighting design -- Manuf	$0.61	-	$0.01	-	$0.21	-	$0.00	-	$0.35	-	$0.00	-
Efficient lighting design -- Office	$0.48	-	$0.01	-	$0.33	-	$0.00	-	$0.34	-	$0.00	-
Efficient lighting design -- Warehouse	$0.61	-	$0.01	-	$0.33	-	$0.00	-	$0.33	-	$0.00	-
Efficient lighting fixtures and lamps -- Manuf	$2.90	-	$0.08	-	$1.01	-	$0.04	-	$1.63	-	$0.04	-
Efficient lighting fixtures and lamps -- Warehouse	$2.88	-	$0.08	-	$1.57	-	$0.04	-	$1.57	-	$0.04	-
Efficient refrigeration systems	$0.08	-	$(0.01)	-	$0.04	-	$(0.01)	-	$0.06	-	$(0.01)	-
Efficient Transformers (Tier 2)	$25.34	-	$0.06	-	$2.29	-	$0.10	-	$3.59	-	$0.10	-
electric supply system improvements	$0.32	-	$0.00	-	$0.18	-	$0.00	-	$0.28	-	$0.00	-
EMS install -NG	-	$809.39	-	$2.83	-	$49.16	-	$2.62	-	$77.66	-	$2.62
EMS optimization -NG	-	$4.56	-	$0.15	-	$2.19	-	$0.14	-	$3.05	-	$0.14
Energy Information Systems	$2.46	-	$0.02	-	$0.94	-	$0.04	-	$1.49	-	$0.04	-
Energy Management systems	$6.34	-	$0.06	-	$1.46	-	$0.13	-	$4.65	-	$0.13	-
Extended nip press -NG	-	$2,013.39	-	$6.85	-	$199.35	-	$7.63	-	$290.69	-	$7.63
Fan system efficiency	$3.33	-	$0.03	-	$0.77	-	$0.04	-	$1.14	-	$0.04	-
Flare gas controls and recovery -NG	-	$256.84	-	$7.87	-	$244.03	-	$8.52	-	$331.59	-	$8.52
Flue gas heat recovery/economizer -Fuel	-	$78.09	-	$2.92	-	$82.16	-	$3.63	-	$82.16	-	$3.63
Flue gas heat recovery/economizer -NG	-	$50.24	-	$1.77	-	$34.57	-	$1.70	-	$41.83	-	$1.70
Fouling control -NG	-	$23.15	-	$0.83	-	$8.53	-	$0.81	-	$26.47	-	$0.81
Heat Recovery -Fuel	-	$3,315.84	-	$11.50	-	$141.83	-	$16.37	-	$430.79	-	$16.37
Heat Recovery -NG	-	$2,373.46	-	$8.05	-	$119.21	-	$7.58	-	$204.91	-	$7.58

Measure Name	2013				2020				2030			
	Gross		Net		Gross		Net		Gross		Net	
	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu	$/kWh	$/MMBtu
Improve ceiling insulation -Fuel	-	$3,582.95	-	$12.39	-	$248.77	-	$15.24	-	$382.13	-	$15.24
Improve ceiling insulation -NG	-	$2,017.51	-	$6.87	-	$126.31	-	$7.06	-	$185.28	-	$7.06
Improved insulation -Fuel	-	$144.09	-	$5.96	-	$43.06	-	$1.37	-	$43.06	-	$1.37
Improved insulation -NG	-	$14.88	-	$0.67	-	$15.99	-	$0.64	-	$18.02	-	$0.64
Improved process control -Fuel	-	$26.26	-	$1.04	-	$48.89	-	$2.56	-	$80.58	-	$2.56
Improved process control -NG	-	$34.35	-	$1.25	-	$23.00	-	$1.20	-	$41.18	-	$1.20
Improved separation processes -Fuel	-	$321.75	-	$1.28	-	$41.69	-	$4.68	-	$155.10	-	$4.68
Improved separation processes -NG	-	$626.26	-	$2.21	-	$25.20	-	$2.17	-	$81.23	-	$2.17
Install HE(95%) cond furnace/boiler -NG	-	$890.79	-	$3.37	-	$79.49	-	$3.12	-	$92.18	-	$3.12
Insulation/reduce heat losses -Fuel	-	$145.42	-	$5.61	-	$57.36	-	$6.21	-	$211.44	-	$6.21
Insulation/reduce heat losses -NG	-	$97.50	-	$3.61	-	$31.13	-	$2.92	-	$104.15	-	$2.92
Leak repair -Fuel	-	$28.05	-	$0.54	-	$27.77	-	$1.15	-	$27.77	-	$1.15
Leak repair -NG	-	$31.22	-	$0.60	-	$11.12	-	$0.57	-	$13.18	-	$0.57
Load control -Fuel	-	$35.07	-	$1.15	-	$45.23	-	$2.84	-	$64.05	-	$2.84
Load control -NG	-	$46.25	-	$1.39	-	$22.90	-	$1.34	-	$33.01	-	$1.34
Maintain boilers -Fuel	-	$6.33	-	$0.11	-	$51.61	-	$2.60	-	$51.61	-	$2.60
Maintain boilers -NG	-	$77.55	-	$1.34	-	$22.67	-	$1.28	-	$26.18	-	$1.28
motor management	$3.67	-	$0.00	-	$0.40	-	$0.01	-	$0.40	-	$0.01	-
Motor system optimization	$0.60	-	$(0.00)	-	$0.14	-	$0.00	-	$0.21	-	$0.00	-
Optimize furnace operations -Fuel	-	$151.60	-	$2.39	-	$21.76	-	$2.59	-	$68.49	-	$2.59
Optimize furnace operations -NG	-	$103.33	-	$1.54	-	$12.01	-	$1.24	-	$34.86	-	$1.24
Oxyfuel -NG	-	$538.54	-	$2.06	-	$98.86	-	$5.20	-	$184.17	-	$5.20
Preventative maintenance -Fuel	-	$13.69	-	$0.54	-	$4.67	-	$0.57	-	$14.60	-	$0.57
Preventative maintenance -NG	-	$5.79	-	$0.23	-	$5.97	-	$0.28	-	$7.11	-	$0.28
Process Controls & Management -Fuel	-	$52.03	-	$1.71	-	$14.16	-	$1.60	-	$36.95	-	$1.60
Process Controls & Management -NG	-	$18.51	-	$0.61	-	$7.13	-	$0.77	-	$17.81	-	$0.77
Process integration -Fuel	-	$201.73	-	$6.51	-	$198.31	-	$18.13	-	$651.77	-	$18.13
Process integration -NG	-	$258.71	-	$7.93	-	$324.58	-	$8.52	-	$324.58	-	$8.52
Pump efficiency improvement	$1.23	-	$0.01	-	$0.24	-	$0.01	-	$0.36	-	$0.01	-
Sensors and controls	$0.30	-	$0.00	-	$0.20	-	$0.00	-	$0.20	-	$0.00	-
Stack heat exchanger -Fuel	-	$641.08	-	$2.65	-	$109.92	-	$3.27	-	$109.92	-	$3.27
Stack heat exchanger -NG	-	$420.94	-	$1.64	-	$45.70	-	$1.52	-	$52.33	-	$1.52
Steam trap maintenance -Fuel	-	$207.14	-	$4.16	-	$27.47	-	$0.90	-	$27.47	-	$0.90
Steam trap maintenance -NG	-	$22.64	-	$0.47	-	$8.14	-	$0.44	-	$12.22	-	$0.44
Upgrade burner efficiency -Fuel	-	$495.35	-	$1.92	-	$135.69	-	$8.89	-	$208.14	-	$8.89
Upgrade burner efficiency -NG	-	$1,241.98	-	$4.27	-	$68.59	-	$4.12	-	$109.97	-	$4.12
Water treatment -Fuel	-	$47.81	-	$0.77	-	$45.69	-	$1.73	-	$45.69	-	$1.73
Water treatment -NG	-	$54.97	-	$0.86	-	$16.97	-	$0.82	-	$21.78	-	$0.82

Appendix H: Measure Benefit-Cost Ratios

Residential Measure Total Resource Benefit Cost Ratios

Benefits and Costs represent totals across zones

Measure Name	Measure BCR by Year		
	2013	2020	2030
Appliance Package and Plug Loads	2.86	3.08	3.38
Bundled Hot Water End Use Residential Measures, MF	9.36	2.63	0.89
Bundled Hot Water End Use Residential Measures, SF	9.53	2.67	0.85
Cooling system and advanced controls bundle	0.85	0.88	0.93
Heating system and advanced controls bundle	4.74	4.97	3.78
Lighting, Multifamily	1.21	1.58	2.18
Lighting, Single Family	1.12	1.55	2.12
Thermal comfort, 2 - 4 unit	0.94	0.99	1.03
Thermal comfort, 2 - 4 unit w/HP transition	0.86	0.90	0.94
Thermal comfort, colonial/2-story	0.94	0.99	1.04
Thermal comfort, colonial/2-story w/HP transition	1.27	1.34	1.40
Thermal comfort, garden apts bldg	0.99	1.05	1.10
Thermal comfort, misc (e.g., houseboats, small RVs)	0.81	0.85	0.89
Thermal comfort, ranch/MH	0.99	1.04	1.09
Thermal comfort, ranch/MH w/HP transition	1.11	1.17	1.22
Thermal comfort, town/row	0.92	0.97	1.01
Thermal comfort, town/row w/HP transition	1.07	1.13	1.18

Commercial Measure Total Resource Benefit Cost Ratios

Benefits and Costs represent totals across zones, markets and building types

Measure Name	Measure BCR by Year		
	2013	2020	2030
Accent Lighting	1.95	5.45	5.72
Ambient Lighting	1.37	2.78	2.98
Built-up Refrigeration Systems	1.33	2.01	2.19
Cool roof	3.39	3.52	4.02
Cooling controls	3.51	3.65	4.17
Cooling design	3.10	3.29	3.70
Cooling distribution	3.02	3.22	3.57
Cooling maintenance	7.82	8.21	9.03
Cooling source equipment Tier I	1.31	1.42	1.56
Cooling source equipment Tier II	1.25	1.37	1.50
Data centers virtualization -Cool	2.87	2.99	3.45
Data centers virtualization -IT	2.06	2.28	2.62
Deep Energy Retrofit - Electric	3.93	4.34	4.83
Deep Energy Retrofit - Gas	1.47	1.55	1.53
Demand controlled ventilation -Cool	4.32	4.57	5.07
Demand controlled ventilation -Vent	1.30	1.42	1.64
DHW Controls -Elec	1.86	2.25	2.60
DHW Controls -Gas	2.25	2.75	2.79
DHW Distribution Elec	6.06	6.15	7.18
DHW Distribution Gas	3.68	4.50	4.61
DHW Source Equipment Elec	1.04	1.11	1.31
DHW Source Equipment -Gas	2.98	3.04	3.12
Duct insulation and sealing, gas heat	4.26	4.45	4.43
Duct sealing -Cool	15.51	16.46	18.30
Duct sealing -Vent	9.32	10.25	11.47
EMS/Controls -Cool	2.55	2.88	3.16
EMS/Controls -Vent	1.00	1.15	1.30
Envelope Upgrade	2.65	2.83	3.02
HE Plug Loads	3.35	3.49	3.84
HE stove hood -Cool	0.00	0.00	0.00
HE stove hood -Vent	2.86	2.92	3.18
Heating heat recovery	4.01	4.13	4.04
Heating Source -MD	2.09	2.22	2.22
Heating Source -RET	3.69	3.81	3.83
High-eff HP CEE Tier II -Cool	2.57	2.70	3.04
High-eff HP CEE Tier II -Heat	1.16	1.32	1.48
Integrated bldg design - Tier I (2007 baseline) -Elec	2.10	2.26	2.59
Integrated bldg design - Tier I (2007 baseline) -Gas	0.84	0.89	0.89
Kitchen Equipment - 2 meal	1.89	2.08	2.41
Kitchen Equipment - 3 meal	1.99	2.18	2.53
Kitchen equipment - gas, 2 meal	6.84	6.99	6.57
Kitchen equipment - gas, 3 meal	6.55	6.69	6.28
Lighting Controls	1.97	2.88	3.56
Office Equipment Control	2.04	2.14	2.37
Outdoor Area Lighting	1.44	3.27	3.58

Measure Name	Measure BCR by Year		
	2013	2020	2030
Outdoor Lighting Controls	1.19	1.79	2.82
Outdoor Lighting Design	2.82	3.47	3.73
Packaged Refrigeration Systems	2.25	2.72	3.01
RET Heating controls	6.38	6.62	6.54
RET Heating distribution	47.35	49.63	50.49
Retrocommissioning -Elec	6.58	7.09	8.20
Retrocommissioning -Gas	2.75	2.89	2.99
Streetlighting	1.29	1.58	1.65
Task Lighting	2.04	3.71	4.10
Ventilation motors	1.85	1.91	2.14
Ventilation VFDs	6.24	6.86	7.90

Industrial Measure Total Resource Benefit Cost Ratios

Benefits and Costs represent totals across zones

Measure Name	Measure BCR by Year		
	2013	2020	2030
Advanced Curing Technologies	1.12	0.21	0.24
Advanced lubricants	2.97	3.15	3.54
Advanced motor designs	2.90	2.71	3.02
Air Compressor Systems Advanced Controls	4.79	4.35	5.05
Automatic steam trap monitoring -Fuel	8.01	41.18	43.41
Automatic steam trap monitoring -NG	20.47	24.69	25.70
Batch cullet preheating -NG	6.55	2.79	3.16
Blowdown steam heat recovery -Fuel	10.62	9.19	9.69
Blowdown steam heat recovery -NG	4.57	5.53	5.74
Closed hood -NG	2.08	2.26	2.53
Combustion controls -NG	6.64	9.06	10.35
Compressed air system management	8.13	5.55	6.43
Condensate return -Fuel	31.90	14.68	15.47
Condensate return -NG	7.29	8.50	9.19
Duct insulation -Fuel	28.70	23.60	24.66
Duct insulation -NG	11.61	14.26	14.87
Duct/Pipe Insulation	1.67	1.82	2.11
E-beam sterilization	73.52	80.50	91.71
Efficient burners -Fuel	3.43	7.42	7.92
Efficient burners -NG	6.30	3.96	4.61
Efficient drying -Fuel	7.58	2.70	2.82
Efficient drying -NG	1.15	1.51	1.70
Efficient furnaces -Fuel	14.95	11.96	12.50
Efficient furnaces -NG	6.21	6.67	7.56
Efficient lighting design -- Manuf	3.97	7.37	8.57
Efficient lighting design -- Office	4.68	8.67	10.09
Efficient lighting design -- Warehouse	3.97	7.37	8.57
Efficient lighting fixtures and lamps -- Manuf	1.13	1.98	2.35
Efficient lighting fixtures and lamps -- Warehouse	1.15	2.02	2.38
Efficient refrigeration systems	35.10	38.44	43.79
Efficient Transformers (Tier 2)	1.31	0.84	0.91
electric supply system improvements	8.81	9.52	10.99
EMS install -NG	2.57	3.03	3.30
EMS optimization -NG	44.40	52.82	60.44
Energy Information Systems	2.68	1.72	2.00
Energy Management systems	1.32	0.67	0.79
Extended nip press -NG	1.37	1.34	1.46
Fan system efficiency	2.01	1.86	2.16
Flare gas controls and recovery -NG	1.16	1.18	1.30
Flue gas heat recovery/economizer -Fuel	9.32	8.07	8.50
Flue gas heat recovery/economizer -NG	4.01	4.80	5.04
Fouling control -NG	8.03	8.95	10.37
Heat Recovery -Fuel	2.41	1.81	1.89
Heat Recovery -NG	1.16	1.33	1.47
Improve ceiling insulation -Fuel	2.24	1.94	2.03
Improve ceiling insulation -NG	1.37	1.43	1.58
Improved insulation -Fuel	4.57	21.43	22.59
Improved insulation -NG	10.65	12.55	13.40
Improved process control -Fuel	26.24	11.45	12.07
Improved process control -NG	5.69	6.68	7.17

Measure Name	Measure BCR by Year		
	2013	2020	2030
Improved separation processes -Fuel	21.64	6.32	6.60
Improved separation processes -NG	3.29	3.51	3.99
Install HE(95%) cond furnace/boiler -NG	2.16	2.64	2.76
Insulation/reduce heat losses -Fuel	4.85	4.71	4.97
Insulation/reduce heat losses -NG	1.97	2.61	2.96
Leak repair -Fuel	45.25	24.23	26.29
Leak repair -NG	11.12	12.98	14.30
Load control -Fuel	23.63	10.30	10.86
Load control -NG	5.12	5.86	6.46
Maintain boilers -Fuel	217.16	10.76	11.67
Maintain boilers -NG	4.94	5.77	6.35
motor management	6.24	6.52	7.27
Motor system optimization	9.22	9.56	11.09
Optimize furnace operations -Fuel	11.15	11.12	11.88
Optimize furnace operations -NG	4.48	6.02	6.92
Oxyfuel -NG	3.53	1.56	1.66
Preventative maintenance -Fuel	47.27	49.72	53.76
Preventative maintenance -NG	29.16	27.90	30.22
Process Controls & Management -Fuel	15.41	17.85	19.17
Process Controls & Management -NG	11.18	9.65	11.03
Process integration -Fuel	4.18	1.61	1.70
Process integration -NG	1.15	1.18	1.30
Pump efficiency improvement	5.13	5.60	6.50
Sensors and controls	9.23	8.91	10.16
Stack heat exchanger -Fuel	10.46	9.02	9.43
Stack heat exchanger -NG	4.44	5.44	5.68
Steam trap maintenance -Fuel	5.82	31.00	33.63
Steam trap maintenance -NG	14.23	17.50	18.26
Upgrade burner efficiency -Fuel	14.41	3.32	3.47
Upgrade burner efficiency -NG	1.70	1.95	2.10
Water treatment -Fuel	34.46	16.69	17.83
Water treatment -NG	8.00	9.80	10.33

Appendix I: Measure Electric Energy Load Shapes

Load Shape Name	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	T&D Capacity
RENEWABLE ENERGY LOADSHAPES							
Solar Hot Water	15.0%	40.0%	10.0%	5.0%	25.0%	5.0%	0.2300
Photovoltaics	14.0%	37.0%	9.0%	6.0%	28.0%	6.0%	0.4100
Biogas	4.0%	39.0%	7.0%	6.0%	38.0%	6.0%	0.9820
Biomass	4.5%	38.4%	7.5%	5.9%	37.8%	5.9%	0.9820
Wind - Onshore	7.0%	12.0%	9.0%	21.0%	27.0%	24.0%	0.1900
Wind - Offshore	15.0%	7.0%	13.0%	24.0%	18.0%	23.0%	0.1900
Hydro	4.0%	32.0%	6.0%	7.0%	44.0%	7.0%	0.3600
Total Electricity	4.7%	26.7%	6.1%	8.6%	44.5%	9.4%	0.5899
RESIDENTIAL EFFICIENCY LOADSHAPES							0.0000
Combined Heating & Cooling	10.9%	23.0%	7.7%	7.8%	41.0%	9.5%	0.9727
Combined Appliances & Misc	5.2%	35.6%	8.5%	7.5%	36.4%	6.9%	0.5234
Hot Water	3.7%	33.4%	7.0%	7.3%	40.7%	7.8%	0.4525
Lighting	2.0%	33.3%	9.2%	7.6%	39.0%	8.9%	0.1440
Thermal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0000
INDUSTRIAL EFFICIENCY LOADSHAPES							0.0000
Industrial_InLight	7.9%	37.2%	10.1%	7.0%	31.8%	6.0%	0.9059
Ind_HVAC	8.6%	27.5%	10.7%	7.1%	37.8%	8.3%	0.6322
Industrial_Process	6.0%	37.0%	7.4%	7.5%	36.5%	5.6%	1.0000
Industrial_Refrig	5.1%	38.1%	7.8%	6.2%	37.0%	5.8%	0.9162
Industrial_ElecTotl	6.9%	38.7%	9.4%	5.9%	33.4%	5.5%	0.9326
COMMERCIAL LOADSHAPES							0.0000
Office_ElecCook	10.2%	31.3%	9.4%	10.9%	30.4%	7.8%	0.8532
Retail_ElecCook	8.7%	32.9%	9.2%	10.0%	32.3%	7.0%	0.9548
Restaurant_ElecCook	7.7%	34.4%	8.6%	9.7%	33.8%	5.8%	0.9040
Grocery_ElecCook	5.0%	37.9%	7.7%	6.1%	37.3%	6.0%	0.7636
Warehouse_ElecCook	10.1%	31.6%	9.1%	10.3%	30.8%	8.0%	0.8310
Education_ElecCook	4.9%	35.3%	5.1%	9.0%	37.5%	8.2%	0.3685
Health_ElecCook	6.3%	37.3%	6.8%	6.9%	37.1%	5.6%	0.8263
Lodging_ElecCook	6.3%	35.9%	8.3%	8.0%	35.8%	5.8%	0.9292
Other_ElecCook	7.4%	34.6%	8.0%	8.9%	34.4%	6.8%	0.8038
Office_Cool_NYC	31.4%	37.0%	29.5%	0.0%	2.2%	0.0%	1.0000
Retail_Cool_NYC	24.9%	44.8%	25.3%	0.3%	4.6%	0.0%	0.9830
Restaurant_Cool_NYC	17.7%	56.1%	22.9%	0.0%	3.3%	0.0%	0.9859
Grocery_Cool_NYC	15.2%	58.1%	21.1%	0.1%	5.6%	0.0%	0.9793
Warehouse_Cool_NYC	23.1%	47.6%	29.3%	0.0%	0.0%	0.0%	1.0000
Education_Cool_NYC	26.2%	42.7%	27.1%	0.0%	4.0%	0.0%	1.0000
Health_Cool_NYC	13.1%	54.4%	19.5%	1.0%	10.8%	1.2%	0.9460
Lodging_Cool_NYC	19.9%	54.0%	25.1%	0.0%	1.0%	0.0%	0.9758
Other_Cool_NYC	21.4%	49.3%	25.0%	0.2%	3.9%	0.2%	0.9837
Office_ElecHeat_NYC	0.0%	0.0%	0.0%	23.9%	55.1%	20.9%	0.0000
Retail_ElecHeat_NYC	0.0%	0.7%	0.0%	14.0%	66.5%	18.8%	0.0000
Restaurant_ElecHeat_NYC	0.0%	3.3%	0.0%	11.1%	70.3%	15.3%	0.0000
Grocery_ElecHeat_NYC	0.0%	1.5%	0.0%	10.3%	72.4%	15.9%	0.0000
Warehouse_ElecHeat_NYC	0.0%	2.6%	0.0%	12.9%	69.8%	14.7%	0.0000
Education_ElecHeat_NYC	0.0%	0.4%	0.0%	15.4%	66.8%	17.3%	0.0000
Health_ElecHeat_NYC	0.8%	4.9%	2.5%	10.9%	66.2%	14.7%	0.1030
Lodging_ElecHeat_NYC	0.0%	0.4%	0.0%	11.1%	71.7%	16.8%	0.0000
Other_ElecHeat_NYC	0.1%	1.7%	0.3%	13.7%	67.3%	16.8%	0.0129
Office_ElecDHW	4.4%	35.0%	6.6%	7.2%	40.2%	6.6%	0.7241
Retail_ElecDHW	6.0%	32.7%	7.5%	9.8%	37.0%	7.0%	0.7193
Restaurant_ElecDHW	6.7%	31.9%	7.6%	11.2%	36.0%	6.6%	0.6630
Grocery_ElecDHW	5.3%	33.6%	7.2%	8.9%	38.2%	6.7%	0.6912
Warehouse_ElecDHW	7.0%	31.9%	7.4%	10.4%	35.8%	7.5%	0.7009
Education_ElecDHW	7.6%	30.5%	9.1%	10.6%	33.3%	8.9%	0.5646
Health_ElecDHW	5.1%	34.6%	6.3%	7.8%	39.7%	6.4%	0.6488
Lodging_ElecDHW	4.7%	34.2%	7.1%	7.7%	39.3%	6.9%	0.7266
Other_ElecDHW	5.9%	33.0%	7.4%	9.2%	37.5%	7.1%	0.6798
Office_InLight	9.0%	32.2%	9.6%	10.3%	31.5%	7.5%	0.9148
Retail_InLight	7.3%	34.7%	8.7%	8.6%	34.2%	6.5%	1.0000
Restaurant_InLight	6.9%	35.0%	8.7%	8.7%	34.6%	6.1%	1.0000
Grocery_InLight	5.5%	37.2%	8.0%	7.0%	36.6%	5.8%	0.9814
Warehouse_InLight	8.3%	34.1%	8.3%	9.0%	33.4%	6.9%	0.9135
Education_InLight	4.1%	36.3%	4.3%	8.1%	39.3%	7.9%	0.4450
Health_InLight	5.3%	37.6%	7.5%	6.4%	37.4%	5.8%	0.9604

Load Shape Name	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	T&D Capacity
Lodging_InLight	4.5%	37.5%	8.4%	6.0%	37.3%	6.2%	0.7424
Other_InLight	6.4%	35.6%	7.9%	8.0%	35.5%	6.6%	0.8697
Office_ElecMisc	7.5%	34.8%	8.3%	8.5%	34.2%	6.6%	0.9393
Retail_ElecMisc	6.6%	35.8%	8.3%	7.9%	35.3%	6.2%	0.9958
Restaurant_ElecMisc	6.1%	36.2%	8.2%	7.7%	35.8%	5.9%	1.0000
Grocery_ElecMisc	5.0%	38.2%	7.3%	6.3%	37.8%	5.5%	0.9991
Warehouse_ElecMisc	8.1%	34.2%	8.4%	9.1%	33.6%	6.6%	0.9755
Education_ElecMisc	3.3%	37.0%	4.3%	7.2%	40.1%	8.1%	0.3753
Health_ElecMisc	5.3%	37.7%	7.4%	6.3%	37.5%	5.9%	0.9231
Lodging_ElecMisc	5.2%	37.3%	7.9%	6.8%	37.1%	5.7%	0.9026
Other_ElecMisc	5.9%	36.4%	7.5%	7.5%	36.4%	6.3%	0.8888
Office_Office	6.1%	36.6%	7.8%	7.2%	36.2%	6.0%	0.9686
Retail_Office	5.5%	37.2%	7.7%	6.8%	36.9%	5.9%	0.9947
Restaurant_Office	5.3%	37.4%	7.8%	6.7%	37.0%	5.8%	1.0000
Grocery_Office	5.0%	38.0%	7.5%	6.3%	37.7%	5.6%	0.9998
Warehouse_Office	5.9%	37.0%	7.7%	6.8%	36.5%	6.1%	0.9354
Education_Office	2.7%	37.9%	3.5%	6.9%	41.6%	7.3%	0.3870
Health_Office	5.1%	37.9%	7.4%	6.2%	37.7%	5.7%	0.9719
Lodging_Office	4.7%	38.2%	7.5%	6.0%	37.9%	5.7%	0.9804
Other_Office	5.0%	37.5%	7.1%	6.6%	37.7%	6.0%	0.9047
Office_Refrig	4.7%	38.3%	7.4%	5.8%	38.0%	5.8%	0.9561
Retail_Refrig	4.7%	38.2%	7.5%	6.0%	37.9%	5.7%	0.9953
Restaurant_Refrig	4.8%	38.1%	7.5%	6.1%	37.8%	5.6%	0.9943
Grocery_Refrig	5.2%	39.6%	7.8%	5.6%	36.6%	5.3%	0.9687
Warehouse_Refrig	5.1%	37.9%	7.5%	6.3%	37.5%	5.7%	1.0000
Education_Refrig	4.8%	38.4%	7.2%	5.9%	38.1%	5.6%	0.9725
Health_Refrig	4.8%	38.4%	7.2%	5.9%	38.1%	5.6%	0.9725
Lodging_Refrig	4.7%	38.2%	7.5%	6.0%	37.9%	5.7%	0.9988
Other_Refrig	4.9%	38.4%	7.5%	5.9%	37.7%	5.6%	0.9837
Office_Vent	6.1%	16.9%	6.1%	8.0%	54.9%	8.0%	0.9773
Retail_Vent	5.0%	30.7%	6.4%	6.5%	44.9%	6.5%	0.9734
Restaurant_Vent	4.3%	38.1%	7.2%	5.7%	39.1%	5.7%	0.9528
Grocery_Vent	4.4%	38.6%	7.3%	5.6%	38.5%	5.6%	0.9938
Warehouse_Vent	4.3%	38.4%	7.2%	5.6%	38.7%	5.6%	0.9794
Education_Vent	4.1%	23.5%	4.3%	7.7%	52.8%	7.7%	0.6777
Health_Vent	4.3%	39.0%	7.2%	5.5%	38.3%	5.5%	0.7727
Lodging_Vent	4.4%	38.6%	7.3%	5.6%	38.5%	5.6%	0.9944
Other_Vent	4.6%	33.0%	6.6%	6.3%	43.2%	6.3%	0.9152
Office_VentVFD	2.4%	63.2%	9.1%	2.8%	19.7%	2.8%	0.2775
Retail_VentVFD	3.4%	53.3%	10.2%	3.6%	26.0%	3.6%	0.3047
Restaurant_VentVFD	4.9%	42.8%	8.2%	4.7%	34.6%	4.7%	1.0000
Grocery_VentVFD	4.5%	39.4%	7.4%	5.4%	37.9%	5.4%	1.0000
Warehouse_VentVFD	4.7%	40.7%	7.8%	5.1%	36.5%	5.1%	1.0000
Education_VentVFD	5.7%	54.9%	11.0%	3.2%	22.1%	3.2%	0.5773
Health_VentVFD	4.5%	38.2%	7.4%	5.7%	38.7%	5.7%	1.0000
Lodging_VentVFD	4.5%	39.3%	7.4%	5.4%	37.9%	5.4%	1.0000
Other_VentVFD	4.3%	46.5%	8.6%	4.5%	31.7%	4.5%	0.7699
Office_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Retail_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Restaurant_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Grocery_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Warehouse_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Education_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Health_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Lodging_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Other_OutLight	0.4%	39.3%	6.2%	4.3%	43.9%	5.7%	0.0500
Office_ElecTotl_NYC	11.9%	32.4%	12.3%	7.3%	30.1%	5.8%	0.7806
Retail_ElecTotl_NYC	11.0%	36.7%	12.5%	5.8%	29.1%	4.8%	0.8259
Restaurant_ElecTotl_NYC	7.1%	40.1%	10.1%	5.8%	32.0%	4.9%	0.8612
Grocery_ElecTotl_NYC	6.1%	40.9%	9.1%	5.3%	33.7%	4.9%	0.9073
Warehouse_ElecTotl_NYC	7.4%	36.6%	9.1%	7.1%	33.8%	6.0%	0.8506
Education_ElecTotl_NYC	7.1%	34.3%	7.8%	6.6%	37.6%	6.6%	0.5150
Health_ElecTotl_NYC	7.4%	42.6%	11.0%	4.7%	29.9%	4.4%	0.8157
Lodging_ElecTotl_NYC	8.3%	42.2%	12.3%	4.3%	28.5%	4.4%	0.7084
Other_ElecTotl_NYC	8.3%	38.2%	10.5%	5.9%	31.9%	5.2%	0.0500
Office_ElecTotl_LI	11.6%	32.2%	12.1%	7.5%	30.6%	6.0%	0.8130
Retail_ElecTotl_LI	11.0%	36.2%	12.5%	5.9%	29.5%	4.8%	0.8111
Restaurant_ElecTotl_LI	7.0%	39.6%	10.1%	5.9%	32.4%	5.0%	0.8805
Grocery_ElecTotl_LI	6.1%	40.6%	9.1%	5.3%	33.9%	4.9%	0.9074
Warehouse_ElecTotl_LI	7.4%	36.4%	9.1%	7.1%	34.0%	6.0%	0.8414

Load Shape Name	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	T&D Capacity
Education_ElecTotl_LI	7.0%	34.0%	7.7%	6.7%	37.9%	6.7%	0.5287
Health_ElecTotl_LI	7.3%	41.2%	10.6%	4.9%	31.2%	4.7%	0.8296
Lodging_ElecTotl_LI	8.2%	41.0%	12.0%	4.5%	29.6%	4.6%	0.7189
Other_ElecTotl_LI	8.2%	37.7%	10.4%	6.0%	32.4%	5.3%	0.7913
Office_Cool_LI	32.6%	35.9%	30.6%	0.0%	0.9%	0.0%	0.9953
Retail_Cool_LI	25.9%	43.4%	26.2%	0.2%	4.3%	0.0%	0.9965
Restaurant_Cool_LI	18.7%	54.8%	24.2%	0.0%	2.3%	0.0%	1.0000
Grocery_Cool_LI	16.0%	57.2%	22.0%	0.0%	4.8%	0.0%	0.9983
Warehouse_Cool_LI	24.5%	44.9%	30.6%	0.0%	0.0%	0.0%	1.0000
Education_Cool_LI	27.5%	41.3%	28.7%	0.0%	2.4%	0.0%	0.9943
Health_Cool_LI	14.4%	52.2%	20.5%	0.9%	10.6%	1.4%	0.9824
Lodging_Cool_LI	21.6%	51.5%	26.5%	0.0%	0.4%	0.0%	1.0000
Other_Cool_LI	22.7%	47.6%	26.2%	0.1%	3.2%	0.2%	0.9958
Office_ElecHeat_LI	0.0%	0.1%	0.0%	23.1%	56.8%	20.0%	0.0000
Retail_ElecHeat_LI	0.0%	1.6%	0.0%	13.4%	66.9%	18.2%	0.0000
Restaurant_ElecHeat_LI	0.0%	5.2%	0.0%	10.6%	69.5%	14.6%	0.0000
Grocery_ElecHeat_LI	0.0%	3.2%	0.0%	9.5%	72.1%	15.2%	0.0000
Warehouse_ElecHeat_LI	0.0%	4.4%	0.0%	12.4%	69.1%	14.2%	0.0000
Education_ElecHeat_LI	0.0%	0.8%	0.0%	14.6%	68.1%	16.4%	0.0000
Health_ElecHeat_LI	0.0%	3.8%	0.2%	10.7%	70.4%	14.8%	0.0465
Lodging_ElecHeat_LI	0.0%	1.0%	0.0%	10.1%	72.7%	16.2%	0.0000
Other_ElecHeat_LI	0.0%	2.5%	0.0%	13.0%	68.2%	16.2%	0.0058
Office_ElecTotl_UP	11.7%	31.7%	12.0%	7.6%	31.0%	6.0%	0.7231
Retail_ElecTotl_UP	10.9%	35.4%	12.0%	6.1%	30.5%	5.0%	0.7930
Restaurant_ElecTotl_UP	7.1%	38.9%	9.8%	6.0%	33.0%	5.1%	0.8085
Grocery_ElecTotl_UP	6.1%	40.2%	9.0%	5.4%	34.3%	5.0%	0.8923
Warehouse_ElecTotl_UP	7.3%	36.0%	8.8%	7.3%	34.5%	6.1%	0.8162
Education_ElecTotl_UP	7.0%	33.4%	7.6%	6.8%	38.4%	6.8%	0.5057
Health_ElecTotl_UP	7.7%	40.1%	10.2%	5.0%	32.2%	4.8%	0.7696
Lodging_ElecTotl_UP	8.2%	39.6%	11.5%	4.8%	31.1%	4.8%	0.6630
Other_ElecTotl_UP	8.2%	36.9%	10.1%	6.1%	33.1%	5.5%	0.7464
Office_Cool_UP	34.6%	33.3%	31.1%	0.0%	1.0%	0.0%	1.0000
Retail_Cool_UP	28.7%	40.8%	27.0%	0.0%	3.6%	0.0%	1.0000
Restaurant_Cool_UP	21.1%	52.0%	24.6%	0.0%	2.4%	0.0%	1.0000
Grocery_Cool_UP	17.9%	55.3%	22.8%	0.0%	4.1%	0.0%	1.0000
Warehouse_Cool_UP	28.2%	40.3%	31.4%	0.0%	0.0%	0.0%	1.0000
Education_Cool_UP	29.8%	37.5%	30.3%	0.0%	2.4%	0.0%	1.0000
Health_Cool_UP	16.2%	48.1%	19.4%	1.2%	13.5%	1.6%	0.9910
Lodging_Cool_UP	25.2%	46.8%	27.5%	0.0%	0.5%	0.0%	0.9908
Other_Cool_UP	25.2%	44.3%	26.8%	0.1%	3.4%	0.2%	0.9977
Office_ElecHeat_UP	0.0%	0.6%	0.0%	21.2%	60.6%	17.6%	0.0000
Retail_ElecHeat_UP	0.0%	3.2%	0.0%	13.7%	66.0%	17.1%	0.0000
Restaurant_ElecHeat_UP	0.0%	7.1%	0.0%	11.3%	67.5%	14.2%	0.0000
Grocery_ElecHeat_UP	0.0%	4.5%	0.0%	11.2%	69.2%	15.0%	0.0000
Warehouse_ElecHeat_UP	0.0%	6.5%	0.0%	12.4%	67.4%	13.7%	0.0000
Education_ElecHeat_UP	0.0%	1.9%	0.0%	13.8%	68.5%	15.7%	0.0000
Health_ElecHeat_UP	0.1%	5.8%	0.2%	11.5%	67.9%	14.4%	0.0495
Lodging_ElecHeat_UP	0.0%	2.8%	0.0%	11.5%	70.0%	15.7%	0.0000
Other_ElecHeat_UP	0.0%	4.0%	0.0%	13.3%	67.2%	15.4%	0.0062
Office_ElecTotl_HV	12%	32%	12%	8%	31%	6%	0.7231
Retail_ElecTotl_HV	11%	35%	12%	6%	31%	5%	0.7930
Restaurant_ElecTotl_HV	7%	39%	10%	6%	33%	5%	0.8085
Grocery_ElecTotl_HV	6%	40%	9%	5%	34%	5%	0.8923
Warehouse_ElecTotl_HV	7%	36%	9%	7%	34%	6%	0.8162
Education_ElecTotl_HV	7%	33%	8%	7%	38%	7%	0.5057
Health_ElecTotl_HV	8%	40%	10%	5%	32%	5%	0.7696
Lodging_ElecTotl_HV	8%	40%	12%	5%	31%	5%	0.6630
Other_ElecTotl_HV	8%	37%	10%	6%	33%	5%	0.7464
Office_Cool_HV	35%	33%	31%	0%	1%	0%	1.0000
Retail_Cool_HV	29%	41%	27%	0%	4%	0%	1.0000
Restaurant_Cool_HV	21%	52%	25%	0%	2%	0%	1.0000
Grocery_Cool_HV	18%	55%	23%	0%	4%	0%	1.0000
Warehouse_Cool_HV	28%	40%	31%	0%	0%	0%	1.0000
Education_Cool_HV	30%	38%	30%	0%	2%	0%	1.0000
Health_Cool_HV	16%	48%	19%	1%	14%	2%	0.9910
Lodging_Cool_HV	25%	47%	28%	0%	0%	0%	0.9908
Other_Cool_HV	25%	44%	27%	0%	3%	0%	0.9977
Office_ElecHeat_HV	0%	1%	0%	21%	61%	18%	0.0000
Retail_ElecHeat_HV	0%	3%	0%	14%	66%	17%	0.0000
Restaurant_ElecHeat_HV	0%	7%	0%	11%	67%	14%	0.0000

Load Shape Name	Summer On-peak	Summer Off-peak	Summer Shoulder	Winter On-peak	Winter Off-peak	Winter Shoulder	T&D Capacity
Grocery_ElecHeat_HV	0%	5%	0%	11%	69%	15%	0.0000
Warehouse_ElecHeat_HV	0%	6%	0%	12%	67%	14%	0.0000
Education_ElecHeat_HV	0%	2%	0%	14%	69%	16%	0.0000
Health_ElecHeat_HV	0%	6%	0%	12%	68%	14%	0.0495
Lodging_ElecHeat_HV	0%	3%	0%	11%	70%	16%	0.0000
Other_ElecHeat_HV	0%	4%	0%	13%	67%	15%	0.0062
Continuous	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Streetlighting	0.0%	44.4%	6.0%	0.0%	43.7%	5.9%	0.0000
Office_Economizer_UP	20.5%	34.1%	20.8%	2.3%	20.0%	2.3%	0.5000
Retail_Economizer_UP	17.5%	37.8%	18.8%	2.3%	21.3%	2.3%	0.5000
Restaurant_Economizer_UP	13.7%	43.4%	17.6%	2.3%	20.7%	2.3%	0.5000
Grocery_Economizer_UP	12.1%	45.1%	16.7%	2.3%	21.5%	2.3%	0.5000
Warehouse_Economizer_UP	17.3%	37.6%	21.0%	2.3%	19.5%	2.3%	0.5000
Education_Economizer_UP	18.1%	36.2%	20.4%	2.3%	20.7%	2.3%	0.5000
Health_Economizer_UP	11.3%	41.5%	15.0%	2.9%	26.3%	3.1%	0.4955
Lodging_Economizer_UP	15.8%	40.8%	19.1%	2.3%	19.8%	2.3%	0.4954
Other_Economizer_UP	15.8%	39.6%	18.7%	2.4%	21.2%	2.4%	0.4989
Office_Economizer_LI	19.5%	35.4%	20.6%	2.3%	19.9%	2.3%	0.4976
Retail_Economizer_LI	16.1%	39.1%	18.4%	2.4%	21.7%	2.3%	0.4982
Restaurant_Economizer_LI	12.5%	44.8%	17.4%	2.3%	20.7%	2.3%	0.5000
Grocery_Economizer_LI	11.2%	46.0%	16.3%	2.3%	21.9%	2.3%	0.4992
Warehouse_Economizer_LI	15.4%	39.9%	20.6%	2.3%	19.5%	2.3%	0.5000
Education_Economizer_LI	16.9%	38.1%	19.7%	2.3%	20.7%	2.3%	0.4971
Health_Economizer_LI	10.4%	43.5%	15.5%	2.8%	24.8%	3.0%	0.4912
Lodging_Economizer_LI	14.0%	43.2%	18.6%	2.3%	19.7%	2.3%	0.5000
Other_Economizer_LI	14.5%	41.2%	18.4%	2.4%	21.1%	2.4%	0.4979
Office_Economizer_NYC	18.9%	35.9%	20.0%	2.3%	20.6%	2.3%	0.5000
Retail_Economizer_NYC	15.6%	39.8%	18.0%	2.4%	21.8%	2.3%	0.4915
Restaurant_Economizer_NYC	12.0%	45.5%	16.8%	2.3%	21.1%	2.3%	0.4929
Grocery_Economizer_NYC	10.8%	46.5%	15.8%	2.3%	22.3%	2.3%	0.4896
Warehouse_Economizer_NYC	14.7%	41.2%	19.9%	2.3%	19.5%	2.3%	0.5000
Education_Economizer_NYC	16.3%	38.8%	18.9%	2.3%	21.5%	2.3%	0.5000
Health_Economizer_NYC	9.8%	44.6%	15.0%	2.8%	24.9%	2.9%	0.4730
Lodging_Economizer_NYC	13.1%	44.4%	17.8%	2.3%	20.0%	2.3%	0.4879
Other_Economizer_NYC	13.9%	42.1%	17.8%	2.4%	21.5%	2.4%	0.4919
DATA CENTERS (all are continuous)							0.0000
Data Center_ElecHeat_NYC	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecHeat_LI	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecHeat_UP	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecHeat_HV	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Cool_NYC	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Cool_LI	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Cool_HV	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Cool_UP	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Vent	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecDHW	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Office	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_Refrig	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_InLight	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecTotl_NYC	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecTotl_LI	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecTotl_UP	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecTotl_HV	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_ElecMisc	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000
Data Center_OutLight	4.5%	13.2%	7.5%	8.8%	60.1%	5.9%	1.0000

Appendix J: Other Analysis Inputs and Assumptions

Screening Input	Value	Notes	Source
Years of analysis	2013-2032		
Real Discount Rate (RDR)	5.50%	Consistent with current practice by New York efficiency programs	PSC guidance for EEPS is 5.5%
Long-term Inflation Rate	Varies by year	Inflation rates calculated from an energy-weighted Consumer Price Index, used to convert other years' dollar values to 2012$	NYSERDA
Accounting of Costs & Benefits		The items below can be accounted for as costs or benefits. The choice doesn't affect net benefits, but does affect the BCRs.	
Fossil Fuel Impacts	Costs & Benefits	Savings are benefits, increased usage (e.g., the "heating penalty" for lighting measures) is a cost	As used for 2008 NYSERDA study
O&M Savings	Benefit	Usually accounted for as a benefit	As used for 2008 NYSERDA study
Deferred Replacement Credit for Early-retirement Retrofit Measures	Benefit	Usually accounted for as a benefit	As used for 2008 NYSERDA study
Summer Peak Capacity Components	Generation, Transmission & Distribution	Avoided costs provided by NYSERDA did not include distribution avoided costs. We therefore included distribution costs from the 2008 New York electric potential study.	Electric sales forecast, 2008 NYSERDA study for distribution costs.
Electric Line Loss Factors – Energy	10.96%	Average ratio between 'Load' and 'Generation' in the NYISO electric sales forecast. Line loss factors applied for grid-scale renewable energy are zero since it occurs and is only reported at generation.	NYSERDA
Electric Line Loss Factors – Capacity	10.96%	Statewide Average	NYSERDA
Emissions Factors		Emissions factors are for end use or "smokestack" impacts only, and do not account for upstream impacts of extraction, refining, or transportation	See full citations below this table
Electric Generation: CO2e	625 lb/MWh at meter	Equivalent to 563 lb/MWh at generation, accounting for average line losses	NYSERDA
Electric Generation: NOx	0.74 lb/MWh at meter	Equivalent to 0.667 lb/MWh at generation, accounting for average line losses	NYSERDA
Electric Generation: SO2	0.88 lb/MWh at meter	Equivalent to 0.793 lb/MWh at generation, accounting for average line losses	NYSERDA
Natural Gas: CO2	116.9 lb/MMBtu		[1], Table 1, row 41
Natural Gas: NOx	0.101 lb/MMBtu	Weighted average by equipment type	[2], Table 8
Natural Gas: SO2	0.00060 lb/MMBtu	Weighted average by equipment type	[2], Table 8
Petroleum Fuels: CO2	160.2 lb/MMBtu	Weighted average by fuel type	[1], Table 1, rows 46, 57, 78, 64
Petroleum Fuels: NOx	0.234 lb/MMBtu	Weighted average by fuel and equipment type	[2], Table 8
Petroleum Fuels: SO2	0.215 lb/MMBtu	Weighted average by fuel and equipment type	[2], Table 8
Biofuels: CO2	0.0 lb/MMBtu	Biofuels were assumed to be CO2-neutral	
Biofuels: NOx	0.34 lb/MMBtu	Weighted average by application	[3], [4], [6], [7]
Biofuels: SO2	0.03 lb/MMBtu	Weighted average by application	[3], [5], [6], [7]
Biofuels: Res Particulate Matter	0.075 lb/MMBtu	Weighted-average values for different types of biofuels	[8]
Biofuels: Com Particulate Matter	0.03 lb/MMBtu		

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Appendix K: Bibliography and Source Citations

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