Report #: DOE/EIA-0554(2010)
Release date: April 9, 2010
Next release date: March 2011

Assumptions to the Annual Energy Outlook 2010

Table 5.1. 2003 Total Floorspace by Census Division and Principal Building Activity

(Millions of Square Feet)

	Assembly	Education	Food Sales	Food Service	Health Care	Lodging	Large Office	Small Office	Merc/ Service	Warehouse	Other	Total
New England	431	299	75	45	48	374	282	320	819	411	351	3,452
Middle Atlantic	1,243	1,384	163	127	310	797	1,523	1,065	1,641	1,112	1,177	10,543
East North Central	1,355	1,990	218	248	316	549	1,297	1,129	2,148	2,023	1,152	12,424
West North Central	772	552	102	206	123	595	219	704	1,045	994	369	5,680
South Atlantic	1,161	2,445	223	433	469	939	1,173	1,065	3,391	1,836	865	13,999
East South Central	546	341	67	99	134	368	195	371	985	390	223	3,719
West South Central	965	1,198	197	232	235	387	916	501	2,076	1,740	575	9,022
Mountain	411	640	64	32	94	438	230	535	1,087	506	168	4,207
Pacific	809	1,027	146	232	176	649	1,028	915	2,051	1,066	515	8,613
United States	7,693	9,874	1,255	1,654	1,905	5,096	6,861	6,605	15,242	10,078	5,395	71,658

Note: Totals may not equal sum of components due to independent rounding.

Source: Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey Public Use Data

Table 5.2. Floorspace Attrition Parameters

	Assembly	Education	Food Sales	Food Service	Health Care	Lodging	Large Office	Small Office	Merc/ Service	Warehouse	Other
Median Expected Lifetime (years)	55	62	55	50	55	53	65	58	50	58	60
gamma	2.2	2.1	2.3	2.0	2.5	2.1	2.0	2.0	2.2	2.0	2.3

Sources: Energy Information Administration, Commercial Buildings Energy Consumption Survey 2003, 1999, 1995, 1992, and 1989 Public Use Data, 1986 Nonresidential Buildings Energy Consumption Survey, McGraw-Hill Construction Dodge Annual Starts - non residential building starts, Northwest Energy Efficiency Alliance, Assessment of the Commercial Building Stock in the Pacific Northwest, KEMA-XENERGY, Inc., March 2004, and public information on demolitions.

Table 5.3. Capital Cost and Performance Parameters of Selected Commercial Distributed Generation Technologies

Technology Type	Year	Average Generating Capacity (kW)	Electrical Efficiency	Combined Efficiency (Elec.+Thermal)	Installed Capital Cost ($2005 per kW of Capacity)*	Service Life (Years)
Solar Photovoltaic	2008	30	0.16	N/A	$6,362	30
	2010	32	0.18	N/A	$5,717	30
	2015	35	0.20	N/A	$4,135	30
	2020	40	0.22	N/A	$3,830	30
	2025	40	0.22	N/A	$3,790	30
	2030	45	0.25	N/A	$3,200	30
Fuel Cell	2008	200	0.41	0.68	$6,121	20
	2010	200	0.44	0.66	$5,989	20
	2015	200	0.45	0.67	$5,203	20
	2020	200	0.47	0.69	$4,187	20
	2025	200	0.48	0.70	$3,647	20
	2030	200	0.49	0.72	$3,108	20
Natural Gas Engine	2008	300	0.31	0.78	$1,980	20
	2010	300	0.32	0.78	$1,878	20
	2015	300	0.32	0.78	$1,714	20
	2020	300	0.32	0.78	$1,551	20
	2025	300	0.33	0.79	$1,343	20
	2030	300	0.33	0.79	$1,134	20
Oil-Fired Engine	2008	300	0.34	0.74	$2,391	20
	2010	300	0.34	0.74	$2,268	20
	2015	300	0.35	0.74	$2.071	20
	2020	300	0.35	0.74	$1,873	20
	2025	300	0.36	0.78	$1,622	20
	2030	300	0.36	0.82	$1,370	20
Natural Gas Turbine	2008	1000	0.23	0.68	$1,865	20
	2010	1000	0.23	0.68	$1,775	20
	2015	1000	0.24	0.68	$1,684	20
	2020	1000	0.24	0.69	$1,593	20
	2025	1000	0.25	0.69	$1,511	20
	2030	1000	0.26	0.70	$1,429	20
Natural Gas Micro Turbine	2008	250	0.29	0.60	$2,540	20
	2010	250	0.29	0.60	$2,328	20
	2015	250	0.31	0.60	$1,981	20
	2020	250	0.33	0.61	$1,634	20
	2025	250	0.34	0.62	$1,343	20
	2030	250	0.36	0.63	$1,052	20
Wind	2008	30	0.13	N/A	$3,626	30
	2010	32	0.13	N/A	$3,445	30
	2015	35	0.13	N/A	$3,159	30
	2020	40	0.13	N/A	$3,085	30
	2025	40	0.13	N/A	$3,078	30
	2030	50	0.13	N/A	$3,071	30

*Installed costs are given in 2005 dollars in the original source document. Costs for solar photovoltaic, fuel cell, microturbine, and wind technologies include learning effects.

Sources: Energy Information Administration, *Commercial and Industrial CHP Technology Cost and Performance Data Analysis for EIA's NEMS,* Decision Analysis Corporation and Discovery Insights LLC., February 2006, National Renewable Energy Laboratory, *Gas-Fired Distributed Energy Resource Technology Characterizations: Reference Number NREL/TP-620-34783,* November 2003, Discovery Insights, *LLC, "Installed Costs for Small CHP Systems - Estimates and Projections"* (April 2005) California Solar Initiative program data, and Solar Energy Industries Association, *Our Solar Power Future - The U.S. Photovoltaic Industry Roadmap through 2030 and Beyond,* (SEIA, September 2004).

Table 5.4. Assumed Behavior Rules for Choosing Space Heating Equipment in Large Office Buildings

(Percent)

	Unrestricted	Same Fuel	Same Technology	Total
New Equipment Decision	21	30	49	100
Replacement Decision	7	31	62	100
Retrofit Decision	1	4	95	100

Source: Energy Information Administration, *Model Documentation Report: Commercial Sector Demand Module of the National Energy Modeling System*, DOE/EIA-M066(2010) (June 2010).

Table 5.5. Assumed Distribution of Risk-adjusted Time Preference Premiums for Space Heating and Lighting Equipment in 2015

(Percent)

Proportion of Floorspace-Space Heating (2015)	Proportion of Floorspace-Lighting (2015)	Time Preference Premium
27.0	27.0	1000.0
23.0	23.0	100
19.0	18.6	45
18.6	18.6	25
10.7	8.8	15
1.5	1.5	6.5
0.2	2.5	0.0
100.0	100.0	--

Source: Energy Information Administration, *Model Documentation Report: Commercial Sector Demand Module of the National Energy Modeling System*, DOE/EIA-M066(2010) (June 2010).

Table 5.6. Capital Cost and Efficiency Ratings of Selected Commercial Space Heating Equipment[1]

Equipment Type	Vintage	Efficiency[2]	Capital Cost ($2007 per Mbtu/hour)[3]	Maintenance Cost ($2007 per Mbtu/hour)[3]	Service Life (Years)
Electric Rooftop Heat Pump	2007- typical	3.2	$72.78	$1.39	15
	2007- high efficiency	3.4	$96.67	$1.39	15
	2010 - typical (standard)	3.3	$76.67	$1.39	15
	2010 - high efficiency	3.4	$96.67	$1.39	15
	2020 - typical	3.3	$76.67	$1.39	15
	2020 - high efficiency	3.4	$96.67	$1.39	15
Ground-Source Heat Pump	2007- typical	3.5	$140.00	$16.80	20
	2007- high efficiency	4.9	$170.00	$16.80	20
	2010- typical	3.5	$140.00	$16.80	20
	2010 - high efficiency	4.9	$170.00	$16.80	20
	2020 - typical	4.0	$140.00	$16.80	20
	2020 - high efficiency	4.9	$170.00	$16.80	20
Electric Boiler	Current typical	0.98	$17.53	$0.58	21
Packaged Electric	Typical	0.96	$16.87	$3.95	18
Natural Gas Furnace	Current Standard	0.80	$9.35	$0.97	20
	2007 - high efficiency	0.82	$9.90	$0.94	20
	2020 - typical	0.81	$9.23	$0.96	20
	2020 - high efficiency	0.90	$11.57	$0.86	20
	2030 - typical	0.82	$9.12	$0.94	20
	2030 - high efficiency	0.91	$11.44	$0.85	20
Natural Gas Boiler	Current Standard	0.78	$21.56	$0.48	25
	2007 - mid efficiency	0.84	$24.35	$0.45	25
	2007 - high efficiency	0.95	$38.28	$0.50	25
	2012 - standard	0.80	$21.02	$0.47	25
Natural Gas Heat Pump	2007 - absorption	1.4	$158.33	$2.50	15
	2010 - absorption	1.4	$158.33	$2.50	15
	2020 - absorption	1.4	$158.33	$2.50	15
Distillate Oil Furnace	Current Standard	0.81	$11.14	$0.96	20
	2020 - typical	0.81	$11.14	$0.96	20
Distillate Oil Boiler	Current Standard	0.80	$17.19	$0.15	20
	2007 - high efficiency	0.87	$19.16	$0.14	20
	2012 - standard	0.81	$16.98	$015	20

[1]Equipment listed is for the New England Census division, but is also representative of the technology data for the rest of the U.S. See the source referenced below for the complete set of technology data.

[2]Efficiency measurements vary by equipment type. Electric rooftop air-source heat pumps, ground source and natural gas heat pumps are rated for heating performance using coefficient of performance; natural gas and distillate furnaces and boilers are based on Thermal Efficiency.

[3]Capital and maintenance costs are given in 2007 dollars.

Source: Energy Information Administration, "EIA - Technology Forecast Updates - Residential and Commercial Building Technologies - Reference Case Second Edition (Revised)", Navigant Consulting, Inc., Reference Number 20070831.1, September 2007.