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Assumptions to the Annual Energy Outlook 2006

Table 11. 1999 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	378	575	10	40	86	169	565	311	824	429	348	3,735
Middle Atlantic	944	1,139	212	182	291	315	1,094	490	1,801	1,314	844	8,625
East North Central	1,202	1,506	115	463	336	725	1,096	847	2,183	1,983	751	11,205
West North Central	864	744	58	95	176	215	560	555	1,227	782	281	5,556
South Atlantic	848	997	156	302	312	825	1,507	1,077	2,611	1,909	457	11,001
East South Central	781	438	101	166	103	467	331	395	1,288	963	187	5,220
West South Central	1,028	913	135	207	215	303	663	644	1,569	1,085	501	7,264
Mountain	680	758	103	104	113	545	458	389	586	520	322	4,579
Pacific	1,074	1,580	105	292	233	956	1,145	969	1,698	1,493	607	10,152
United States	7,798	8,651	994	1,851	1,865	4,521	7,418	5,678	13,786	10,477	4,298	67,338

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

Source: Energy Information Administration, Commercial Buildings Energy Consumption Survey 1999 Public Use Data

Table 12. Floorspace Attrition Parameters

	Assembly	Education	Food Sales	Food Service	Health Care	Lodging	Large Office	Small Office	Merc/ Service	Warehouse	Other
Median Expected Lifetime (years)	80	80	65	65	65	69	73	73	65	80	75
gamma	1.8	2.6	2.5	2.5	2.3	2.0	2.0	2.0	1.8	1.6	2.5

Sources: Energy Information Administration, Commercial Buildings Energy Consumption Survey 1999, 1995, 1992, and 1989 Public Use Data, 1986 Nonresidential Buildings Energy Consumption Survey, McGraw-Hill Construction Dodge Annual Starts - non residential building starts, and Journal of Business and Economic Statistics, April 1986, Vol. 4, No. 2.

Table 13. 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 ($2003 per kW of Capacity)*	Service Life (Years)
Solar Photovoltaic	2004	25	0.14	N/A	$5,819	30
	2010	32	0.18	N/A	$4,032	30
	2015	35	0.20	N/A	$3,807	30
	2020	40	0.22	N/A	$3,738	30
	2025	40	0.22	N/A	$3,440	30
	2030	45	0.25	N/A	$3,120	30
Fuel Cell	2004	200	0.36	0.72	$6,044	20
	2010	200	0.49	0.72	$5,439	20
	2015	200	0.50	0.72	$5,439	20
	2020	200	0.51	0.72	$5,025	20
	2025	200	0.52	0.73	$4,048	20
	2030	200	0.53	0.75	$3,071	20
Natural Gas Engine	2004	200	0.31	0.77	$2,078	20
	2010	200	0.33	0.77	$1,652	20
	2015	200	0.33	0.78	$1,507	20
	2020	200	0.34	0.78	$1,362	20
	2025	200	0.34	0.78	$1,215	20
	2030	200	0.35	0.78	$1,067	20
Oil-Fired Engine	2004	200	0.31	0.83	$1,320	20
	2010	200	0.31	0.82	$1,150	20
	2015	200	0.31	0.81	$1.040	20
	2020	200	0.31	0.81	$ 990	20
	2025	200	0.31	0.81	$ 990	20
	2030	200	0.31	0.81	$ 990	20
Natural Gas Turbine	2004	1000	0.22	0.65	$3,299	20
	2010	1000	0.24	0.67	$2,978	20
	2015	1000	0.26	0.68	$2,878	20
	2020	1000	0.27	0.69	$2,779	20
	2025	1000	0.28	0.70	$2,730	20
	2030	1000	0.28	0.70	$2,680	20
Natural Gas Micro Turbine	2004	200	0.28	0.62	$1,732	20
	2010	200	0.36	0.63	$1,684	20
	2015	200	0.37	0.64	$1,592	20
	2020	200	0.38	0.65	$1,400	20
	2025	200	0.39	0.66	$1,316	20
	2030	200	0.39	0.66	$1,231	20

*Installed costs are given in 2003 dollars in the original source document. Costs for solar photovoltaic, fuel cell, and microturbine technologies include learning effects.

Sources: 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), Solar Energy Industries Association, *Our Solar Power Future - The U.S. Photovoltaic Industry Roadmap through 2030 and Beyond,* (SEIA, September 2004), and ONSITE SYCOM Energy Corporation, *The Market and Technical Potential for Combined Heat and Power in the Commercial/Institutional Sector*, (Washington, DC, January 2000).

Table 14. 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	8	35	57	100
Retrofit Decision	0	5	95	100

Source: Energy Information Administration, *Model Documentation Report: Commercial Sector Demand Module of the National Energy Modeling System*, DOE/EIA-M066(2006) (February 2006).

Table 15. Assumed Distribution of Time Preference Premiums

(Percent)

Proportion of Floorspace-All Services Except Lighting	Proportion of Floorspace-Lighting	Time Preference Premium
27.0	27.0	1000.0
25.4	25.4	152.9
20.4	20.4	55.4
16.2	16.2	30.9
10.0	8.5	19.9
0.8	2.3	13.6
0.2	0.2	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(2006) (February 2006).

Table 16. Capital Cost and Efficiency Ratings of Selected Commercial Space Heating Equipment[1]

Equipment Type	Vintage	Efficiency[2]	Capital Cost ($2004 per Mbtu/hour)[3]	Maintenance Cost ($2004 per Mbtu/hour)[3]	Service Life (Years)
Electric Heat Pump	Current Standard	6.8	$105.56	$3.33	14
	2004- high efficiency	10.6	$194.44	$3.33	14
	2006-Standard	7.7	$115.28	$3.33	14
	2010 - typical	7.7	$115.28	$3.33	14
	2010 - high efficiency	10.6	$194.44	$3.33	14
	2020 - typical	7.8	$115.28	$3.33	14
	2020 - high efficiency	10.8	$194.44	$3.33	14
Ground-Source Heat Pump	2004- typical	3.5	$195.83	$1.46	20
	2004- high efficiency	4.9	$300.00	$1.46	20
	2010- typical	3.5	$195.83	$1.46	20
	2010 - high efficiency	4.9	$300.00	$1.46	20
	2020 - typical	3.8	$195.83	$1.46	20
	2020 - high efficiency	5.1	$300.00	$1.46	20
Electric Boiler	Current Standard	0.98	$21.85	$0.14	21
Packaged Electric	1995	0.93	$20.59	$3.64	18
Natural Gas Furnace	Current Standard	0.80	$9.75	$0.97	18
	2004 - high efficiency	0.92	$14.16	$0.84	18
	2020 - typical	0.81	$8.58	$0.96	18
Natural Gas Boiler	Current Standard	0.80	$23.09	$0.55	25
	2004 - high efficiency	0.90	$36.81	$0.67	25
	2010 - typical	0.81	$22.79	$0.55	25
Natural Gas Heat Pump	2004 - absorption	1.3	$180.56	$4.17	15
	2010 - absorption	1.4	$180.56	$4.17	15
	2020 - absorption	1.5	$180.56	$4.17	15
Distillate Oil Furnace	Current Standard	0.81	$10.19	$0.96	15
	2020 - typical	0.82	$10.06	$0.94	15
Distillate Oil Boiler	Current Standard	0.83	$15.76	$17.09	20
	2004 - high efficiency	0.89	$19.35	$0.12	20
	2010 - typical	0.83	$16.66	$013	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 air-source heat pumps are rated for heating performance using the Heating Seasonal Performance Factor (HSPF); natural gas and distillate furnaces are based on Thermal Efficiency; ground source and natural gas heat pumps are rated on coefficient of performance; and boilers are based on combustion efficiency.

[3]Capital and maintenance costs are given in 2004 dollars.

Source: Energy Information Administration, "EIA - Technology Forecast Updates - Residential and Commercial Building Technologies - Reference Case", Navigant Consulting, Inc., Reference Number 117943, September 2004.