

ATTACHMENT 12

References for Energy End-Use, Electricity Demand and GHG Emissions Reference and Calculations

The tables in this attachment provide a basis for applicants to estimate the potential impact and benefits associated with their proposals. Applicants must use these tables when estimating the proposed project's energy and peak demand savings and greenhouse gas (GHG) impacts. The tables characterize California's residential and commercial electricity market in terms of consumption and peak demand for major end use categories and a statewide GHG emissions factor.

Applicants must temper their market impact estimates with realistic assumptions about the timeframe for achieving market penetration as it relates to construction activity and the market connection challenges associated with all technology transfer efforts. Applicants must also discuss the potential for competing technologies, and account for them in their discussion of market impacts assumed for the proposed efforts.

A. Residential Data

The following tables have been assembled from source data used by the Energy Commission for assembling the **California Energy Demand 2006-2016 Residential Demand Forecast**. These standardized end-use data will provide the project evaluation committee with a common reference for comparing residential energy and demand savings estimates. The total number of homes used in the forecast was 12,345,233.

Table 1: Residential Peak Demand and Energy Consumption by End-Use

Residential Sector End Uses	Peak Demand*		Annual Energy	
	MW	% of Total MW	Total Energy (GWh/ Year)	% of Total Energy
Air Conditioning	12,660	50%	7,252	8%
Cooking	1,098	4%	2,888	3%
Dishwashers	502	2%	2,805	3%
Domestic Hot Water	246	1%	1,691	2%
Dryers	805	3%	4,497	5%
Freezers	352	1%	2,251	2%
Misc (includes lighting)	4,955	20%	36,901	41%
Pools & Spas	1,151	5%	5,415	6%
Refrigerators	2,214	9%	15,218	17%
Space Heating	-	0%	3,662	4%
TVs	1,004	4%	6,409	7%
Washers	279	1%	1,658	2%
Waterbeds	-	0%	-	0%
Total	25,266	100%	90,647	100%

*Peak demand numbers are estimates based on load factor.

ATTACHMENT 12

References for Energy End-Use, Electricity Demand and GHG Emissions Reference and Calculations

Table 2: Residential Gas Consumption by End-Use

End Use	Millions of Therms/Year	% of Total
Air Conditioning	52	1.0%
Cooking	304	5.7%
Dishwashers (water heating)	368	6.9%
Domestic Hot Water	1,200	22.5%
Dryers	166	3.1%
Miscellaneous	189	3.5%
Pools & Spas	287	5.4%
Space Heating	2,228	41.7%
Washers (water heating)	543	10.2%
Total	5,336	100%

B. Commercial End-Use Data

For commercial buildings, use the energy and peak demand tables found in the Energy Commission's California Commercial End Use Survey (CEUS) Report (March 2006) located at the following website: <http://www.energy.ca.gov/ceus/index.html>. Before using this data, refer to Chapter 7 of the CEUS report. The following are excerpts from the report.

Table 3: Overview of Energy Usage in the Statewide Service Area (Table 8-1 in the CEUS Report)

Building Type	Floor Stock (kft ²)	Annual Energy Intensities			Total Annual Usage	
		Electricity (kWh/ft ²)	Natural Gas (therms/ft ²)	Natural Gas (kBtu/ft ²)	Electricity (GWh)	Natural Gas (Mtherms)
All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<30k ft ²)	361,584	13.10	0.11	10.54	4738	38.10
Large Office (>=30k ft ²)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.98	5986	312.60
Retail	702,053	14.06	0.05	4.62	9871	32.50
Food Store	144,209	40.99	0.28	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10817	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,706	6.74	0.03	3.44	4380	22.40

ATTACHMENT 12

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Table 4: Electric Usage (GWh) by Building Type and End Use (Table 8-2 in the CEUS Report)

Building Type	Heat	Cool	Vent.	Refrig.	WH	Cook	Int. Ltg.	Ext. Ltg.	Office Equip.	Misc.	Air Comp.	Motors	Proc.	Total
All Commercial	1,087	10,017	8,000	9,014	611	2,805	19,265	3,916	4782	3924	204	2811	642	67,077
Small Office	72	943	467	208	90	38	1,386	343	793	283	1	79	36	4,739
Large Office	322	2358	2,019	268	80	77	2,945	324	2365	383	18	474	60	11,691
Restaurant	7	858	482	1,469	56	1,546	961	300	94	168	1	41	3	5,986
Retail	55	1553	1,267	726	96	157	4,246	644	343	483	37	201	64	9,871
Food Store	12	415	372	3,233	20	266	1,233	137	54	138	1	26	6	5,911
Refrigerated Warehouse	2	31	23	1284	3	3	262	33	17	55	4	174	22	1,913
Unrefrigerated Warehouse	20	183	156	154	26	12	1,223	145	131	215	9	162	32	2,467
School	56	520	429	225	43	78	1,281	330	206	110	1	37	7	3,322
College	159	393	423	95	25	55	790	188	148	100	2	119	28	2,524
Health	166	901	940	166	18	101	1,119	132	200	586	1	181	50	4,561
Lodging	114	650	483	244	9	185	945	165	46	301	0	128	6	3,275
Miscellaneous	104	1,212	941	942	145	287	2,874	1,175	386	1103	129	1190	330	10,817
All Offices	393	3,301	2,485	476	171	115	4,331	666	3157	666	19	553	95	16,430
All Warehouses	22	214	179	1,438	28	15	1,485	178	148	270	13	336	54	4,380

C. Greenhouse Gas Emissions

Table 5: Standardized Emission Factors for Electricity and Gas

	Emissions Factor (CO ₂ e)	Emissions Factor(CO ₂ e)
Electricity ¹	0.588 lbs/kWh saved	0.000283 metric tons/kWh
Gas ²	11.7 lbs/therm saved	0.0053 metric tons/therm

Energy Costs

	Average Statewide Residential	Average Statewide Commercial
Electricity ³	\$ 0.15/kWh	\$ 0.1418/kWh
Natural Gas ⁴	\$ 0.96/therm	\$ 0.705/therm

¹ Energy Commission staff estimates.

² California Air Resources Board staff calculations.

³ U.S. Energy Information Administration (EIA) 2012 summaries, tables 6 through 10.

http://www.eia.gov/electricity/sales_revenue_price/.

⁴ U.S. Energy Information Administration, www.eia.gov/dnav/ng/ng_pri_sum_dcu_SCA_a.htm.