

# Information paper – 8 US office energy data

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## WHAT COLOUR is YOUR BUILDING?

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This information paper is one of a series of papers written during the preparation of the book **What Colour is Your Building?** ([www.whatcolourisyourbuilding.com](http://www.whatcolourisyourbuilding.com)). The papers do not form part of the book and have not been peer reviewed. They provide further technical detail, analysis and information to support statements made in the book. All of the papers can be downloaded from [www.wholecarbonfootprint.com](http://www.wholecarbonfootprint.com).

# US office energy data

This information paper provides a summary of data from the US Commercial Building Energy Consumption Survey shown in Figure C.5 of Appendix C and summarised in Figure 2.7 of Chapter 2 of the book.

## 1. US COMMERCIAL BUILDING ENERGY CONSUMPTION SURVEY

The US Energy Information Administration (EIA) conducts the Commercial Building Energy Consumption Survey (CBECS) every 4 years.<sup>1</sup> The latest data available is from a survey of 4.8 million buildings (6.6 billion m<sup>2</sup>) in 2003. Table 1 shows the kWh/m<sup>2</sup> summary for all buildings, adapted from Table E2A of CBECS, which was used to create Figure C.5 in Appendix C by applying the CO<sub>2</sub> emission factors used in the book. The 2007 survey did not meet the ‘standards for quality, credible energy information.’ Data collection for the 2012 CBECS began in April 2013.

Building type	Total energy consumption (kWh/m <sup>2</sup> )						% of elec heating for CO <sub>2</sub> calculation
	Light	Equip	Air	Heat	Cool	Total	
Education	36	32	26	25	143	<b>262</b>	5%
Food sales	116	365	19	31	100	<b>630</b>	10%
Food service	80	369	47	55	263	<b>814</b>	10%
Healthcare	104	84	42	44	317	<b>592</b>	5%
Healthcare - inpatient	126	96	63	59	442	<b>786</b>	5%
Healthcare - outpatient	71	66	10	23	128	<b>298</b>	5%
Lodging	77	45	9	15	169	<b>315</b>	10%
Retail	87	59	19	31	92	<b>288</b>	20%
Retail - other than mall	81	40	12	19	82	<b>233</b>	5%
Retail - enclosed and strip malls	90	71	24	39	99	<b>323</b>	33%
Office	73	66	16	28	110	<b>293</b>	10%
Public assembly	22	34	50	30	160	<b>296</b>	5%
Public order and safety	52	53	30	28	202	<b>365</b>	10%
Religious worship	14	24	4	9	85	<b>137</b>	5%
Service	49	46	19	12	116	<b>243</b>	5%
Warehouse and storage	41	28	6	4	63	<b>143</b>	5%
Other buildings	108	101	19	33	257	<b>518</b>	5%
Vacant	5	11	1	2	46	<b>65</b>	5%

**Table 1** CBECS energy breakdown for different building types in 2003 (Source: US EPA)

Table 2 provides a more detailed breakdown by area, climate zone and age of building.

	Major fuel energy intensity (kWh/m <sup>2</sup> of GIA)										
	Total	Space heating	Cooling	Ventilation	Water heating	Lighting	Cooking	Refrigeration	Office equipment	Computers	Other
<b>All buildings</b>	<b>287</b>	104	23	19	22	59	9	17	3	7	25
<b>Building floor space (m<sup>2</sup>)</b>											
100 to 500	<b>312</b>	97	21	9	22	44	22	63	3	5	26
500 to 1,000	<b>252</b>	95	17	8	19	43	16	26	3	4	21
1,000 to 2,250	<b>224</b>	89	14	13	13	46	7	14	3	5	20
2,250 to 4,500	<b>249</b>	94	21	19	20	47	5	12	3	6	22
4,500 to 9,250	<b>280</b>	100	24	24	20	62	5	11	2	6	26
9,250 to 18,500	<b>329</b>	123	26	28	25	72	3	9	Q	10	27
18,500 to 46,500	<b>316</b>	120	25	23	29	72	6	4	3	8	26
Over 46,500	<b>373</b>	120	37	28	33	91	7	8	Q	10	35
<b>Principal building activity</b>											
Education	<b>262</b>	124	25	26	18	36	3	5	1	10	13
Food sales	<b>630</b>	91	31	19	9	116	27	299	5	5	29
Food service	<b>815</b>	136	55	47	127	80	200	133	3	3	30
Healthcare	<b>592</b>	222	44	42	95	104	11	8	4	10	51
Healthcare - inpatient	<b>786</b>	289	59	63	153	126	18	6	3	11	57
Healthcare - outpatient	<b>298</b>	120	23	10	8	71	Q	11	4	8	42
Lodging	<b>315</b>	70	15	9	99	77	10	7	Q	4	22
Retail	<b>288</b>	76	31	19	16	87	7	14	2	3	32
Retail - other than mall	<b>233</b>	78	19	12	3	81	2	16	2	3	18
Retail - enclosed and strip malls	<b>322</b>	74	39	24	24	90	11	13	3	3	42
Office	<b>293</b>	103	28	16	6	73	1	9	8	19	28
Public assembly	<b>296</b>	157	30	50	3	22	3	7	Q	Q	20
Public order and safety	<b>365</b>	157	28	30	44	52	4	9	2	5	33
Religious worship	<b>137</b>	83	9	4	3	14	3	5	0	1	15
Service	<b>243</b>	113	12	19	3	49	Q	7	1	3	36
Warehouse and storage	<b>143</b>	61	4	6	2	41	Q	11	1	2	15
Other buildings	<b>518</b>	250	33	19	7	108	Q	19	Q	9	60
Vacant	<b>66</b>	45	2	1	0	5	Q	Q	Q	0	10
<b>Year constructed</b>											
Before 1920	<b>253</b>	150	6	9	14	29	14	14	2	3	12
1920 to 1945	<b>285</b>	143	12	14	20	42	9	12	1	4	29
1946 to 1959	<b>255</b>	123	14	15	20	41	6	12	2	5	18
1960 to 1969	<b>289</b>	129	18	19	25	46	5	15	3	7	22
1970 to 1979	<b>306</b>	102	25	22	26	68	8	16	3	7	27
1980 to 1989	<b>315</b>	91	31	21	26	75	9	19	4	10	30
1990 to 1999	<b>284</b>	79	29	23	19	66	9	20	4	8	26
2000 to 2003	<b>257</b>	61	28	19	20	68	10	20	2	5	23
<b>Climate zone: 30-year average</b>											
Under 2,000 CDD and:											
More than 7,000 HDD	<b>297</b>	152	8	18	18	49	6	17	3	5	22
5,500-7,000 HDD	<b>324</b>	153	13	18	21	59	8	16	3	7	26
4,000-5,499 HDD	<b>313</b>	117	20	19	24	65	9	16	5	8	30
Fewer than 4,000 HDD	<b>248</b>	59	26	19	24	59	9	18	3	6	25
2,000 CDD or More and --											
Fewer than 4,000 HDD	<b>248</b>	30	55	21	22	61	9	17	3	8	22

Note: Q is data withheld as fewer than 20 buildings in sample or other statistical anomaly.

**Table 1 Summary of CBECS energy data for 2003 (Source: US EPA)**

Figure C.5 in Appendix C was adapted from Table 1 using the following simplified assumptions:

- Equipment includes equipment, computers, cooking, refrigeration and other.
- All equipment was assumed to be electric except cooking which was assumed to be gas (except food service = 10% electric).
- Heating includes space heating and domestic hot water.
- Heating was assumed to be a mix of electric and gas based on proportion of each from Tables E6A and E7A of the CBECS database.

## 2. OTHER DATA SOURCES

Appendix C also contains a summary of data from the Energy Star Portfolio Manager database and the New York City energy benchmarking in 2011. No further information on these is provided in this paper.

### Notes

All websites were accessed on 15 June 2013 unless noted otherwise.

1. The CBECS energy data for 2003 was downloaded from [www.eia.gov/emeu/cbecs/cbecs2003/detailed\\_tables\\_2003/detailed\\_tables\\_2003.html#enduse03](http://www.eia.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html#enduse03)

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