

2. Buildings and Facilities

This chapter presents information on the characteristics of multibuilding facilities and of the buildings located on such facilities. Typical examples of multibuilding facilities are: university campuses, hospital complexes, industrial establishments, and hotels or motels consisting of more than one building at the same site. The Energy Information Administration (EIA) defines a building's principal activity on the basis of how that particular building is used, rather than on the main economic activity of the building's owner or occupant. A commercial building, as defined by the EIA's Commercial Buildings Energy Consumption Survey (CBECS), is one in which more than 50 percent of the floorspace is used for commercial activities. The principal activity of a facility on which a commercial building is located may or may not also be commercial. For example, an office building could be located on a college campus or an industrial site, as well as in an office park.

The first section of this chapter focuses on the buildings in the 1989 CBECS that were located on multibuilding facilities. Because the facilities were selected from a sample of commercial buildings, the results represent only those facilities that included at least one commercial building as defined by the CBECS. This section presents estimates for aggregates of all such buildings, regardless of whether the facility had a central physical plant. These estimates (presented in Tables 2 through 5) were developed using the weights and methodology described in both 1989 CBECS reports.⁵

The second section of this chapter focuses on only those multibuilding facilities identified via the CBECS that also have a central physical plant. Estimates for aggregates of such facilities (presented in Tables 6 through 8) were developed using a network estimator described in Appendix C, "Estimation." Details on the sample design for the Facility Survey are provided in Appendix A of this report.

Buildings on Multibuilding Facilities

An estimated 1.5 million buildings in the 1989 CBECS were located on multibuilding facilities (Table 2). The total floorspace of these buildings was about 25.9 billion square feet. This section presents information on the principal activities of these buildings and the facilities on which they were located, the extent to which the facilities had their own central physical plants, and the amount of energy consumed on multibuilding facilities.

Principal Activities of Facilities

The principal activities of multibuilding facilities were obtained from two sources. Information came directly from the Facility Survey (Form EIA-871B) for the 261 facilities that responded to the survey. For the 132 facilities that did not respond, as well as for the multibuilding facilities without central physical plants, information on the principal activity of the facility came from the sampling and interview forms for the individual CBECS buildings that were located on multibuilding facilities. For estimation purposes, the principal activity was treated as a building characteristic (like ownership). Therefore, it was not necessary to derive special facility weights (via the network estimator) in developing these estimates.

Colleges, universities, and other schools were the most prevalent types of multibuilding facilities, together accounting for over 300,000 commercial buildings and over 7 billion square feet of commercial floorspace (Table 2). Multibuilding office facilities included 191,000 buildings and almost 4 billion square feet. Other important types of multibuilding facilities were shopping centers and malls, hospitals, industrial facilities, and warehouses. Each

⁵Energy Information Administration, Office of Energy Markets and End Use, *Commercial Buildings Characteristics 1989*, DOE/EIA-0246(89) (Washington, DC, June 1991), Appendix B; Energy Information Administration, Office of Energy Markets and End Use, *Commercial Buildings Energy Consumption and Expenditures 1989*, DOE/EIA-0318(89) (Washington, DC, April 1992), Appendix B.

Table 2. Principal Activity of Multibuilding Facility and Principal Activity of Commercial Buildings, Number of Buildings and Floorspace

Commercial Building Characteristics	All Buildings on Facilities	Principal Facility Activity				
		College and University	Other School	Office	Shopping Center and Mall	Hospital
Buildings (thousand)						
All Buildings on Facilities	1,497	77	226	191	161	34
Principal Building Activity						
Assembly	231	14	35	Q	Q	Q
Education	194	26	156	Q	NC	Q
Food Sales and Service	45	Q	Q	NC	Q	NC
Health Care	20	Q	NC	Q	NC	9
Lodging	81	15	Q	Q	Q	Q
Mercantile and Service	250	Q	Q	Q	122	Q
Office	219	10	Q	118	Q	7
Parking Garage	27	Q	Q	7	Q	Q
Warehouse	300	Q	Q	Q	Q	Q
Other	48	Q	Q	Q	NC	Q
Vacant	83	Q	Q	22	Q	Q
Ownership and Occupancy						
Nongovernment Owned						
Owner Occupied	794	26	43	78	83	14
Nonowner Occupied	308	Q	Q	79	78	Q
Government Owned	395	45	180	33	Q	19
Floorspace (million square feet)						
All Buildings on Facilities	25,947	3,549	3,558	3,944	2,699	2,129
Principal Building Activity						
Assembly	3,013	793	385	Q	Q	Q
Education	4,578	1,404	2,917	Q	NC	Q
Food Sales and Service	304	Q	Q	NC	Q	NC
Health Care	1,409	Q	NC	Q	NC	1,288
Lodging	1,683	584	Q	Q	Q	Q
Mercantile and Service	3,254	Q	Q	Q	2,316	Q
Office	4,527	250	Q	2,866	Q	158
Parking Garage	641	Q	Q	187	Q	Q
Warehouse	4,026	Q	Q	Q	Q	Q
Other	1,061	Q	Q	Q	NC	Q
Vacant	1,451	Q	Q	270	Q	Q
Ownership and Occupancy						
Nongovernment Owned						
Owner Occupied	12,438	1,240	670	1,505	1,444	1,315
Nonowner Occupied	4,530	Q	Q	1,212	1,255	Q
Government Owned	8,979	2,238	2,849	1,227	Q	746

See footnotes at end of table.

Table 2. Principal Activity of Multibuilding Facility and Principal Activity of Commercial Buildings, Number of Buildings and Floorspace (Continued)

Commercial Building Characteristics	Principal Facility Activity					
	Industrial	Hotel and Motel	Entertainment Complex	Warehouse	Religious	Other
Buildings (thousand)						
All Buildings on Facilities	162	55	123	213	118	137
Principal Building Activity						
Assembly	Q	Q	62	Q	96	Q
Education	Q	NC	NC	Q	Q	NC
Food Sales and Service	Q	Q	Q	Q	Q	Q
Health Care	NC	NC	NC	NC	NC	Q
Lodging	NC	48	Q	NC	Q	Q
Mercantile and Service	17	Q	Q	23	NC	50
Office	44	Q	Q	Q	Q	Q
Parking Garage	Q	NC	Q	Q	Q	Q
Warehouse	62	Q	Q	164	NC	29
Other	13	NC	Q	Q	NC	22
Vacant	16	Q	Q	Q	Q	Q
Ownership and Occupancy						
Nongovernment Owned						
Owner Occupied	125	48	78	113	113	73
Nonowner Occupied	18	Q	Q	80	Q	25
Government Owned	Q	NC	39	Q	NC	39
Floorspace (million square feet)						
All Buildings on Facilities	2,532	653	936	3,132	944	1,872
Principal Building Activity						
Assembly	Q	Q	614	Q	804	Q
Education	Q	NC	NC	Q	Q	NC
Food Sales and Service	Q	Q	Q	Q	Q	Q
Health Care	NC	NC	NC	NC	NC	Q
Lodging	NC	562	Q	NC	Q	Q
Mercantile and Service	134	Q	Q	201	NC	330
Office	741	Q	Q	Q	Q	Q
Parking Garage	Q	NC	Q	Q	Q	Q
Warehouse	1,045	Q	Q	2,243	NC	344
Other	241	NC	Q	Q	NC	335
Vacant	323	Q	Q	Q	Q	Q
Ownership and Occupancy						
Nongovernment Owned						
Owner Occupied	1,937	593	605	1,465	916	747
Nonowner Occupied	396	Q	Q	1,079	Q	308
Government Owned	Q	NC	315	589	NC	816

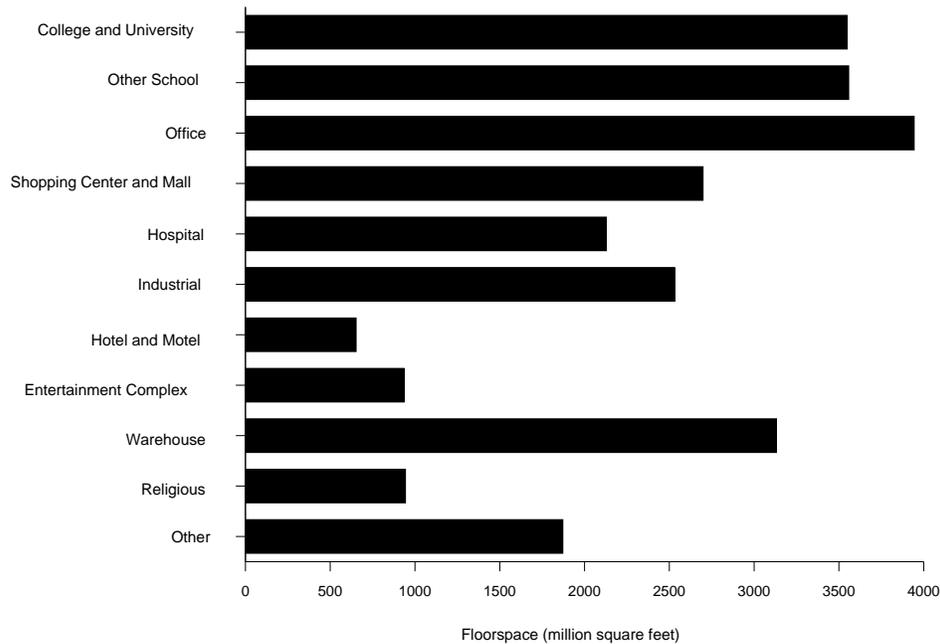
NC = No cases in sample.

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

Notes: •See the "Glossary" for definitions of terms used in this report. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-871A, "Building Questionnaire," and EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

Figure 1. Floorspace of Commercial Buildings on Multibuilding Facilities, by Principal Facility Activity



Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-871A, "Building Questionnaire," and EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

of these latter types of facilities contained over 2 billion square feet of commercial floorspace (Figure 1).

Additional insights about the commercial building sector from the information on Table 2 include:

- A total of 2.5 billion square feet of commercial floorspace, including 1.0 billion square feet of warehouses and 741 million square feet of offices, was located on industrial facilities. Predominantly vacant buildings accounted for 13 percent of the commercial floorspace on industrial facilities (323 million square feet).
- Of the 1.7 billion square feet of lodging buildings on multibuilding facilities, 584 million square feet were located on colleges and universities, while only 562 million square feet were part of hotel and motel complexes.
- Only 40 percent of the 3.5 billion square feet of commercial floorspace on colleges and universities consisted of education buildings (i.e., classroom buildings).
- Government (local, State, federal) owned 35 percent of the floorspace on multibuilding facilities (9.0 billion square feet). These buildings consisted primarily of colleges and universities (2.2 billion square feet), other schools (2.8 billion square feet), and offices (1.2 billion square feet).

The regional distribution of buildings on multibuilding facilities roughly matched the Census Region distribution of all commercial buildings. The South contained 44 percent of the commercial buildings, and 37 percent of the commercial floorspace, on multibuilding facilities (Table 3).

Table 3. Commercial Buildings on Multibuilding Facilities by Census Region, Number of Buildings and Floorspace

Commercial Building Characteristics	All Buildings on Facilities	Census Region			
		Northeast	Midwest	South	West
Buildings (thousand)					
All Buildings on Facilities	1,497	247	232	652	367
Principal Facility Activity					
College and University	77	18	9	20	29
Other School	226	11	21	106	88
Office	191	18	17	99	57
Shopping Center and Mall	161	38	31	57	35
Hospital	34	6	10	12	7
Industrial	162	16	42	82	22
Hotel and Motel	55	Q	Q	20	25
Entertainment Complex	123	43	24	39	Q
Warehouse	213	46	39	84	44
Religious	118	20	Q	66	Q
Other	137	27	19	67	23
Floorspace (million square feet)					
All Buildings on Facilities	25,947	4,766	5,483	9,635	6,062
Principal Facility Activity					
College and University	3,549	779	576	1,145	1,048
Other School	3,558	360	772	1,664	763
Office	3,944	480	357	1,807	1,299
Shopping Center and Mall	2,699	Q	827	685	705
Hospital	2,129	447	1,026	432	224
Industrial	2,532	369	708	1,068	387
Hotel and Motel	653	Q	Q	185	371
Entertainment Complex	936	216	161	324	Q
Warehouse	3,132	815	551	1,067	698
Religious	944	209	Q	500	Q
Other	1,872	557	350	756	208

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

Notes: •See the "Glossary" for definitions of terms used in this report. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-871A, "Building Questionnaire," and EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

Central Physical Plants

The key characteristic used for determining which multibuilding facilities to include in the Facility Survey was the presence of a central physical plant. In the 1989 CBECS, 14 percent of the commercial buildings on multibuilding facilities were located on facilities that included a central physical plant (Table 4). Buildings on facilities with central physical plants accounted for 32 percent of the floorspace on multibuilding facilities.

Table 4. Commercial Buildings on Multibuilding Facilities by Presence of a Central Physical Plant, Number of Buildings and Floorspace

Commercial Building Characteristics	All Buildings on Facilities	with Central Plant on Facility	Without Central Plant on Facility
Buildings (thousand)			
All Buildings on Facilities	1,497	203	1,294
Principal Facility Activity			
College and University	77	54	23
Other School	226	44	182
Office	191	10	181
Shopping Center and Mall	161	Q	158
Hospital	34	19	15
Industrial	162	53	109
Hotel and Motel	55	Q	49
Entertainment Complex	123	Q	121
Warehouse	213	NC	213
Religious	118	Q	115
Other	137	11	126
Floorspace (million square feet)			
All Buildings on Facilities	25,947	8,346	17,601
Principal Facility Activity			
College and University	3,549	2,929	620
Other School	3,558	731	2,828
Office	3,944	845	3,099
Shopping Center and Mall	2,699	Q	2,641
Hospital	2,129	1,691	438
Industrial	2,532	1,304	1,228
Hotel and Motel	653	Q	539
Entertainment Complex	936	Q	861
Warehouse	3,132	NC	3,132
Religious	944	Q	927
Other	1,872	583	1,289

NC = No cases in sample.

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

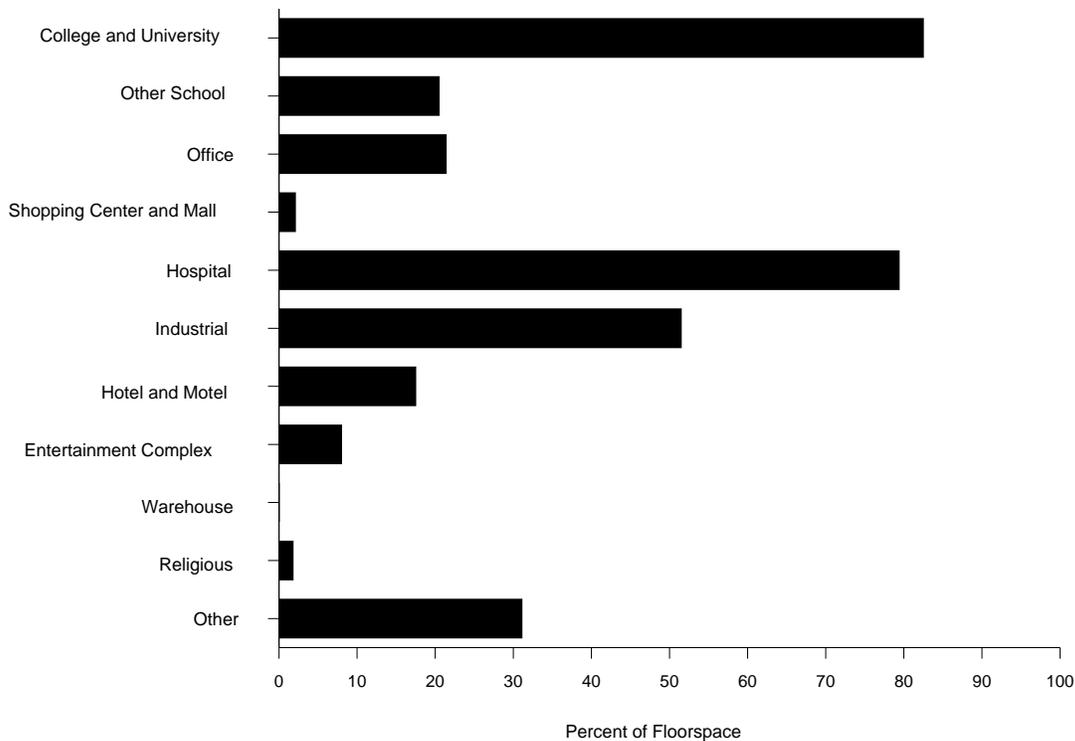
Notes: •See the "Glossary" for definitions of terms used in this report. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-871A, "Building Questionnaire," and EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

Some types of facilities were more likely than others to have central physical plants (Figure 2).

- Warehouse facilities, shopping centers, religious facilities, entertainment complexes, and hotels and motels were unlikely to have central physical plants.
- Only 21 percent of the "other schools" floorspace (mainly elementary and secondary schools) was located on facilities with central physical plants, but 83 percent of the college and university floorspace was located on such facilities.
- Among hospitals, 79 percent of the commercial floorspace was located on facilities with central physical plants.
- Slightly more than half (52 percent) of the commercial floorspace on industrial facilities was located on facilities with central physical plants.
- Only 21 percent of the commercial floorspace on office facilities was located on facilities with central physical plants.

Figure 2. Percent of Commercial Floorspace on Multibuilding Facilities with Central Physical Plants by Principal Facility Activity



Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-871A, "Building Questionnaire," and EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

Energy Consumption

Buildings on multibuilding facilities accounted for 50 percent (2.9 quadrillion Btu) of the energy consumed in all commercial buildings in 1989. This amount included 49 percent of the electricity, 44 percent of the natural gas, 34 percent of the fuel oil, and (not surprisingly) 90 percent of the district heat (Table 5).⁶

In 1989, commercial buildings on facilities with central physical plants consumed 1.6 quadrillion Btu of energy, accounting for 28 percent of the total consumed by all commercial buildings and 55 percent of the energy consumed on all multibuilding facilities. District heat comprised 30 percent of the energy consumed by commercial buildings on facilities with central physical plants.

Commercial buildings in multibuilding facilities with central physical plants consumed 191,000 Btu per square foot in 1989, considerably more than the 92,000 Btu per square foot consumed by commercial buildings overall.⁷ However, this difference does not mean that buildings served by central physical plants are less

Table 5. Energy Consumed at Commercial Buildings on Multibuilding Facilities
(Trillion Btu)

Commercial Building Characteristics	Major Fuels	Electricity	Natural Gas	Fuel Oil	District Heat
All Buildings on Facilities . . .	2,901	1,345	905	123	527
Principal Facility Activity					
College and University	541	215	Q	Q	197
Other School	253	88	133	20	Q
Office	412	278	69	Q	63
Shopping Center and Mall . . .	225	142	80	3	*
Hospital	478	140	173	Q	147
Industrial	439	228	106	Q	82
Hotel and Motel	69	29	35	Q	Q
Entertainment Complex	70	32	35	4	*
Warehouse	143	72	65	6	NC
Religious	45	12	21	11	1
Other	225	110	73	Q	Q
Central Physical Plant					
Present on Facility	1,593	635	423	60	476
Not Present on Facility	1,308	711	482	63	51

* Value rounds to zero in the units displayed.

NC = No cases in sample.

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

Notes: •"District Heat" includes district steam and district hot water. •See the "Glossary" for definitions of terms used in this report.

•Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-871A through EIA-871F of the 1989 Commercial Buildings Energy Consumption Survey.

⁶Energy Information Administration, Office of Energy Markets and End Use, *Commercial Buildings Energy Consumption and Expenditures 1989*, DOE/EIA-0318(89) (Washington DC, April 1992), Table 11.

⁷Energy Information Administration, Office of Energy Markets and End Use, *Commercial Buildings Energy Consumption and Expenditures 1989*, DOE/EIA-0318(89) (Washington, DC, April 1992), Table 13.

energy-efficient than other commercial buildings. As Table 4 shows, some of the types of facilities most likely to have central physical plants (hospitals and industrial) are likely to be dominated by energy-intensive building types.

Characteristics of Facilities

The results presented in this section are based on the Facility Survey, and only pertain to multibuilding facilities with central physical plants. The estimation methodology is described in Appendix C, "Estimation."

Separate estimates of facility characteristics are made for the industrial and commercial sectors⁸ for two reasons: (1) to examine overlap between EIA's commercial and manufacturing surveys and (2) in expectation that commercial and industrial facilities would have different characteristics, especially regarding energy use. Energy is used in the commercial sector largely for space conditioning (heating and cooling) and lighting, both of which are related to building floorspace. Industrial energy consumption is driven largely by processing requirements. The industrial and commercial sectors overlap where industrial establishments combine both industrial and commercial buildings on the same multibuilding site.

- In 1989, there were 30,729 multibuilding facilities with central physical plants and at least one commercial building (Table 6). These facilities contained 12 billion square feet of floorspace. Forty-two percent of the facilities were commercial, and these included 55 percent of the floorspace contained in multibuilding facilities with central physical plants.
- Overall, 61 percent of the floorspace on facilities consisted of commercial buildings. By sector, 92 percent of the floorspace on commercial facilities, and 21 percent of the floorspace on industrial facilities, was contained in commercial buildings.
- The mean floorspace per facility was 395,000 square feet. Commercial facilities were larger than industrial facilities, 517,000 square feet versus 298,000 square feet. Among commercial facilities the largest were colleges and universities (1,393,000 square feet); the smallest were other schools (114,000 square feet) (Figure 3).

Sixty percent of all facilities contained 200,000 square feet or less of floorspace (Table 7). On the other hand, 2,596 facilities were larger than 1 million square feet, with 314 of these larger than 5 million square feet. As would be expected, larger facilities tended to have more buildings. Overall, 32 percent of all facilities, and 52 percent of commercial facilities, had 4 or fewer buildings. The largest facilities in the sample contained over 1,000 buildings.

The Facility Survey estimate of 1989 commercial floorspace on multibuilding facilities with central physical plants, 7.4 billion square feet (Table 6), is lower than the corresponding 1989 CBECS Building Characteristics Survey estimate, 8.3 billion square feet (Table 4). The Building Characteristics Survey estimate is likely to be more accurate for three reasons:

- The Building Characteristics Survey used a more efficient sample design. Estimates from the Building Characteristics Survey were based on a national probability sample of buildings, while facilities were sampled indirectly through the buildings sample. The network estimator's use of information (including imputed data) from the Facility Survey introduced an additional source of variability and possible bias in the facilities estimate. (The network estimator is described in Appendix C, "Estimation.")

⁸In addition to commercial and industrial facilities, estimates for "All Sectors" include a few (4) facilities which were reported to be residential. These were facilities such as apartment complexes, from which a commercial building (e.g., management office) had been selected for the 1989 CBECS Building Survey.

Table 6. Number and Floorspace of Multibuilding Facilities with Central Physical Plants

Facility Characteristics	Number of Facilities	Facility Floorspace (million square feet)		Floorspace per Facility (thousand square feet)	Percent Commercial Floorspace
		Total	Commercial		
All Sectors					
All Facilities	30,729	12,114	7,403	395	61
Census Region					
Northeast	4,739	2,111	1,563	446	74
Midwest	5,472	2,631	1,689	482	64
South	16,637	5,172	2,300	311	45
West	3,881	2,199	1,851	584	84
Total Floorspace (square feet)					
200,000 or Less	18,500	1,537	743	83	49
200,001 to 500,000	8,034	2,506	1,292	312	51
500,001 to 1,000,000	1,599	1,032	863	646	84
1,000,001 to 5,000,000	2,282	4,262	3,116	1,868	73
Over 5,000,000	314	2,777	1,390	8,826	52
Commercial Sector					
All Facilities	12,790	6,607	6,075	517	92
Census Region					
Northeast	1,691	1,323	1,231	806	93
Midwest	2,379	1,565	1,505	662	96
South	6,048	1,807	1,720	299	95
West	2,672	1,912	1,619	719	85
Principal Facility Activity					
College and University	2,267	3,093	2,781	1,393	90
Other School	6,244	712	655	114	92
Office	947	749	745	805	99
Hospital	2,146	1,614	1,481	754	92
Other	1,185	438	413	374	94
Total Floorspace (square feet)					
200,000 or Less	7,281	509	494	70	97
200,001 to 500,000	2,470	817	775	330	95
500,001 to 1,000,000	1,377	872	796	633	91
1,000,001 to 5,000,000	1,455	2,768	2,692	1,903	97
Over 5,000,000	207	1,641	1,319	7,942	80

See footnotes at end of table.

Table 6. Number and Floorspace of Multibuilding Facilities with Central Physical Plants (Continued)

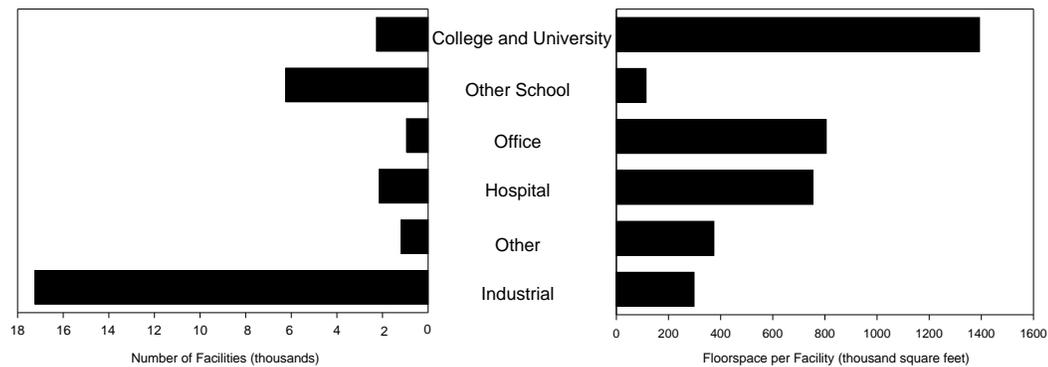
Facility Characteristics	Number of Facilities	Facility Floorspace (million square feet)		Floorspace per Facility (thousand square feet)	Percent Commercial Floorspace
		Total	Commercial		
Industrial Sector					
All Facilities	17,241	5,121	1,073	298	21
Census Region					
Northeast	Q	Q	Q	Q	Q
Midwest	Q	932	155	Q	17
South	10,521	3,346	562	319	17
West	Q	Q	Q	Q	Q
Total Floorspace (square feet)					
200,000 or Less	11,219	1,028	249	92	24
200,001 to 500,000	5,050	1,557	403	308	26
500,001 to 1,000,000	Q	Q	Q	Q	Q
1,000,001 to 5,000,000	650	Q	289	1,920	Q
Over 5,000,000	Q	Q	Q	Q	Q

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

Notes: •"All Sectors" estimates include multibuilding residential facilities. •See the "Glossary" for definitions of terms used in this report. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

Figure 3. Number of Multibuilding Facilities and Average Floorspace per Facility by Principal Facility Activity



Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

Table 7. Number of Buildings on Multibuilding Facilities with Central Plants, Number of Facilities

Facility Characteristics	All Facilities	Number of Buildings on Facility				
		4 or Less	5 to 10	11 to 25	26 to 100	Over 100
All Sectors						
All Facilities	30,729	9,701	11,032	4,347	4,672	978
Total Floorspace (square feet)						
200,000 or Less	18,500	7,612	9,235	Q	Q	NC
200,001 to 500,000	8,034	1,504	892	Q	Q	Q
500,001 to 1,000,000	1,599	334	Q	Q	Q	Q
1,000,001 to 5,000,000	2,282	Q	Q	346	823	Q
Over 5,000,000	314	Q	Q	Q	Q	215
Commercial Sector						
All Facilities	12,790	6,678	2,980	1,453	1,092	587
Principal Facility Activity						
College and University	2,267	Q	Q	Q	511	Q
Other School	6,244	Q	1,441	Q	Q	Q
Office	947	Q	Q	Q	Q	Q
Hospital	2,146	Q	Q	428	227	Q
Other	1,185	Q	Q	Q	Q	Q
Total Floorspace (square feet)						
200,000 or Less	7,281	5,373	1,519	Q	Q	NC
200,001 to 500,000	2,470	Q	Q	694	Q	NC
500,001 to 1,000,000	1,377	329	Q	Q	375	Q
1,000,001 to 5,000,000	1,455	Q	Q	217	509	Q
Over 5,000,000	207	Q	Q	Q	Q	Q
Industrial Sector						
All Facilities	17,241	Q	Q	Q	Q	Q
Total Floorspace (square feet)						
200,000 or Less	11,219	Q	Q	Q	Q	NC
200,001 to 500,000	5,050	Q	Q	Q	Q	Q
500,001 to 1,000,000	Q	Q	Q	Q	Q	Q
1,000,001 to 5,000,000	650	Q	Q	Q	Q	Q
Over 5,000,000	Q	NC	Q	Q	Q	Q

NC = No cases in sample.

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

Notes: •"All Sectors" estimates include multibuilding residential facilities. •See the "Glossary" for definitions of terms used in this report. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.

- The floorspace data were collected more carefully in the Building Characteristics Survey because the Building Questionnaire was administered by interviewers who were trained in the definition of what constituted an in-scope commercial building. The Facility Form was mailed to respondents, who were required to read a two-page instruction form. The resulting floorspace data showed a variety of serious reporting errors (Appendix B, "Data Quality").
- Commercial floorspace had to be imputed for nearly half of the facilities eligible for the Facility Survey. In contrast, 99 percent of the Building Characteristics Survey respondents provided data on the building square footage category, and 82 percent provided the exact square footage.

Cogeneration

One of the goals of the Facility Survey was to provide information about the extent of cogeneration in the commercial sector. Cogeneration is the combined production of electric power and another form of useful energy (such as heat or steam) by a single process. The CBECS sample design, which is targeted at individual commercial buildings, deliberately screens out buildings in which over half the floorspace is noncommercial. This technique also effectively screens out many commercial buildings with central physical plants, which are required in order for cogeneration to take place. As a consequence, CBECS has never been able to survey more than a handful of buildings with cogeneration activities.

Several questions on the Facility Form focused specifically on cogeneration. One question asked whether the facility had been designated as a qualifying facility under the Public Utilities Regulatory Policies Act of 1978 (PURPA). In return for meeting certain criteria, designation as a qualifying facility guarantees that electric utilities will purchase any excess output from the facility. Another question asked whether the central plant had a cogeneration system. Those with cogeneration systems were asked to supply (1) the total nameplate capacity and (2) information on whether it was electrically interconnected with an electric utility.

Due to nonresponses and reporting errors, the Facility Survey was unable to identify much more cogeneration activity than previous CBECS had identified. As discussed in Appendix B, "Data Quality," the question on qualifying facilities had a very high nonresponse and the question on cogeneration elicited severe reporting errors. After much imputation, 9,570 facilities were estimated to be qualifying facilities (Table 8). Hospitals accounted for 10 percent of the qualifying facilities identified. Conversely, 45 percent of the hospitals were qualifying facilities.

Estimates for the number of facilities with cogeneration systems were unpublishable at the national level. However, over one-third (122) of the 314 largest facilities (containing more than 5,000,000 square feet of floorspace) reported cogeneration systems. Of these 122 facilities, 88 were connected to the grid. In the commercial sector, 28 percent of the largest facilities, but only 12 percent of the next largest (1 to 5 million square feet), reported cogeneration systems. These limited data suggest that the incidence of cogeneration systems declines sharply with decreasing facility size.

Table 8. Qualifying Facilities and Cogeneration, Number of Multibuilding Facilities

Facility Characteristics	Number of Facilities	Qualifying Facilities	Cogeneration System	
			Total	Connected to Grid
All Sectors				
All Facilities	30,729	9,570	Q	Q
Total Floorspace (square feet)				
200,000 or Less	18,500	Q	Q	Q
200,001 to 500,000	8,034	Q	Q	Q
500,001 to 1,000,000	1,599	612	Q	Q
1,000,001 to 5,000,000	2,282	540	Q	Q
Over 5,000,000	314	Q	122	88
Commercial Sector				
All Facilities	12,790	Q	Q	Q
Principal Facility Activity				
College and University	2,267	Q	Q	Q
Other School	6,244	Q	Q	Q
Office	947	Q	Q	Q
Hospital	2,146	962	Q	Q
Other	1,185	Q	Q	Q
Total Floorspace (square feet)				
200,000 or Less	7,281	Q	Q	Q
200,001 to 500,000	2,470	Q	Q	Q
500,001 to 1,000,000	1,377	563	Q	Q
1,000,001 to 5,000,000	1,455	328	176	164
Over 5,000,000	207	Q	57	Q
Industrial Sector				
All Facilities	17,241	Q	Q	Q
Total Floorspace (square feet)				
200,000 or Less	11,219	Q	Q	Q
200,001 to 500,000	5,050	Q	Q	Q
500,001 to 1,000,000	Q	Q	Q	Q
1,000,001 to 5,000,000	650	Q	Q	Q
Over 5,000,000	Q	Q	Q	Q

Q = Data withheld because the Relative Standard Error (RSE) was greater than 50 percent, or fewer than 20 buildings were sampled.

Notes: •"All Sectors" estimates include multibuilding residential facilities. •See the "Glossary" for definitions of terms used in this report. •Totals may not equal sum of components because of independent rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, Form EIA-871B, "Facility Form" of the 1989 Commercial Buildings Energy Consumption Survey.