



2018 Commercial Buildings Energy Consumption Survey Preliminary Consumption and Expenditures Highlights



Independent Statistics & Analysis
U.S. Energy Information
Administration

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2018 Commercial Buildings Energy Consumption Survey

Preliminary Consumption and Expenditures Highlights

September 2022

U.S. Energy Information Administration
Office of Energy Statistics
U.S. Department of Energy
Washington, DC 20585

This publication is available at:
<https://www.eia.gov/cbecs>

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What is the *Commercial Buildings Energy Consumption Survey* (CBECS)?

CBECS is:

- The only independent, statistically representative source of national-level data on the characteristics and energy use of commercial buildings
- A snapshot of the commercial buildings stock and energy use for the reference year—in this case, 2018
- A sample survey where every commercial building has a known chance of being selected

The U.S. Energy Information Administration (EIA) collects data for commercial buildings in two parts:

- We collect building characteristics through an in-person or web survey. Respondents, such as building owners and managers, completed the survey at 6,436 buildings for the 2018 CBECS, representing 5.9 million buildings in the United States.
- We collect energy usage data from suppliers of electricity, natural gas, fuel oil, and district heat.

We have conducted the CBECS periodically since 1979, as required by Congress.

- The 2018 CBECS is the 11th iteration.





Key takeaways from EIA's 2018 CBECS consumption and expenditures results

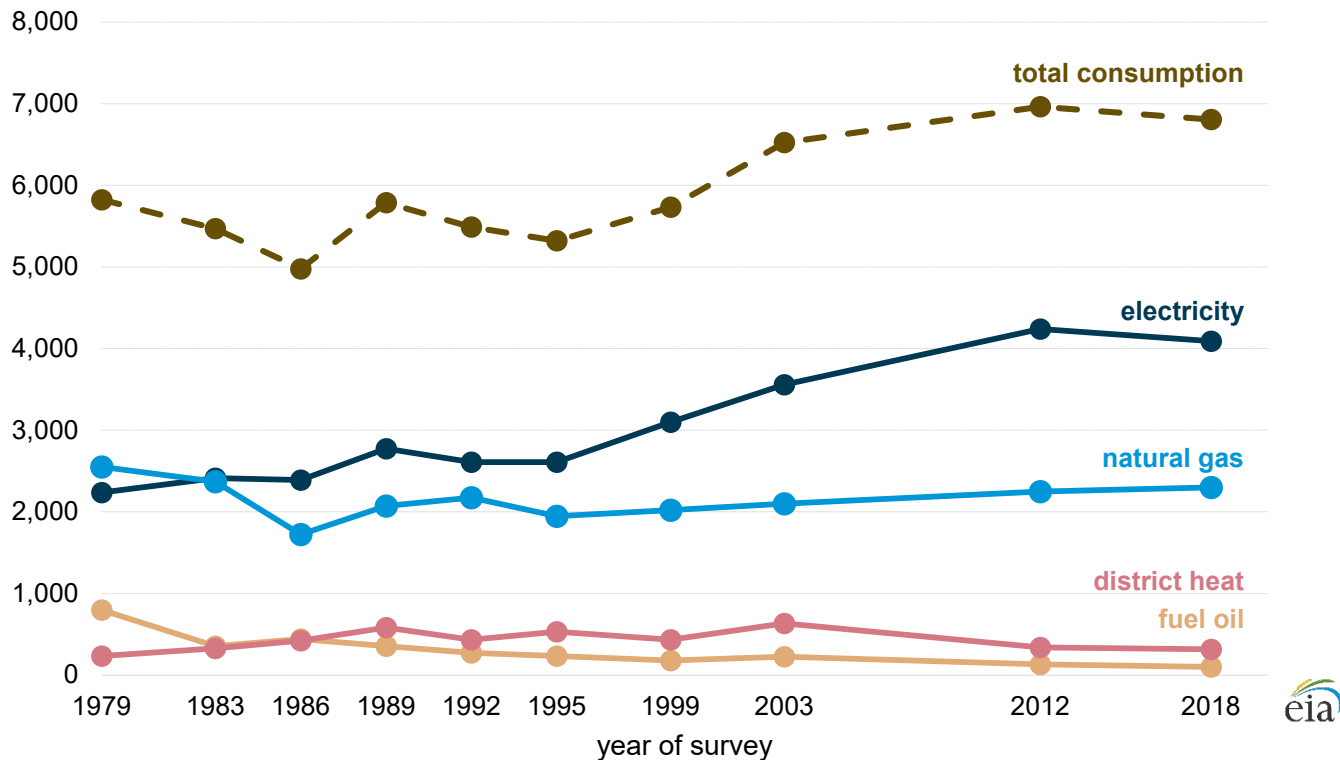
- Even though there were no significant changes in total energy usage, commercial buildings overall consumed 12% less total energy per square foot of floorspace in 2018 than in 2012.
- Buildings used primarily for inpatient health care, offices, and education also had statistically significant decreases in total energy intensity.
- Electricity and natural gas continued to be the dominant energy sources for commercial buildings, accounting for 94% of total energy consumption.
- Electricity accounted for the most energy consumed in all census regions, and its share of total consumption was highest in the South.
- Commercial buildings spent \$142 billion on energy in 2018, averaging \$1.47 per square foot.
- Large buildings (over 100,000 square feet) were few in number but consumed over one-third of total energy in commercial buildings.
- Food service, food sales, and inpatient health care buildings were the most energy intensive; vacant, warehouse and storage, and religious worship buildings were the least intensive.
- Electricity intensity was higher in hotter climates, and natural gas intensity was higher in colder climates.

Notes: These data are for reference year 2018 and do not reflect the impact of the COVID-19 pandemic. All data referenced in this document are available in the [CBECS consumption and expenditures tables](#). Unless otherwise noted, all differences are statistically significant at the 10% significance level or lower. A lower significance level indicates a lower likelihood of incorrectly concluding a difference exists between two values when no difference actually exists.

Trends: Commercial Building Energy Consumption Over CBECS Survey Years

There were no significant changes in total energy usage of any source from 2012 to 2018

Total energy consumption by major fuel, 1979–2018
trillion British thermal units



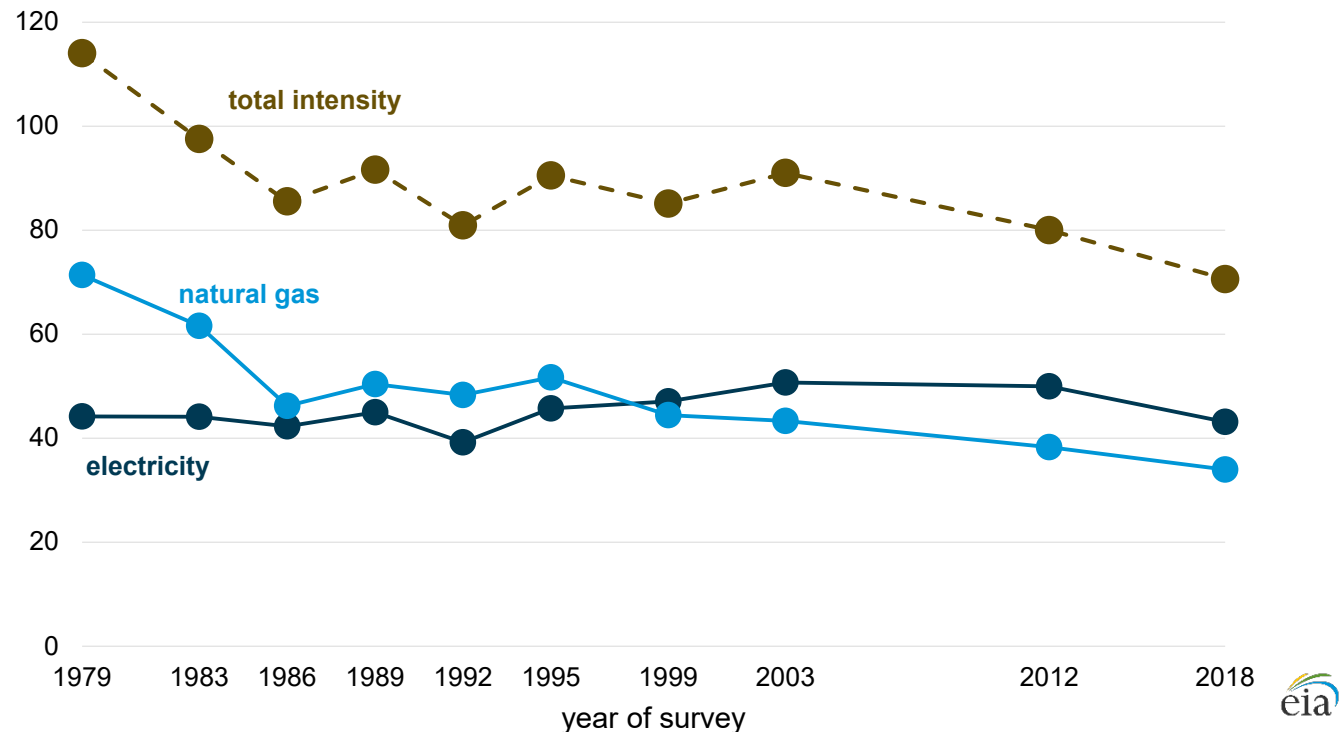
Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: Btu = British thermal units

¹ Site energy is the amount of energy delivered to commercial buildings and does not include electrical system losses.

- U.S. commercial buildings used 6,807 trillion British thermal units (Btu) of total site energy¹: 4,090 trillion Btu of electricity, 2,300 trillion Btu of natural gas, 101 trillion Btu of fuel oil, and 316 trillion Btu of district heat.
- None of the changes in energy consumption between 2012 and 2018 were statistically significant.
- Since the first CBECS in 1979, total site energy has increased by 17%, site electricity by 83%, and fuel oil has decreased by 88%. Neither natural gas nor district heat showed statistically significant changes.

Energy intensity continued to decrease in commercial buildings

Energy intensity by select fuels, 1979–2018
thousand British thermal units per square foot



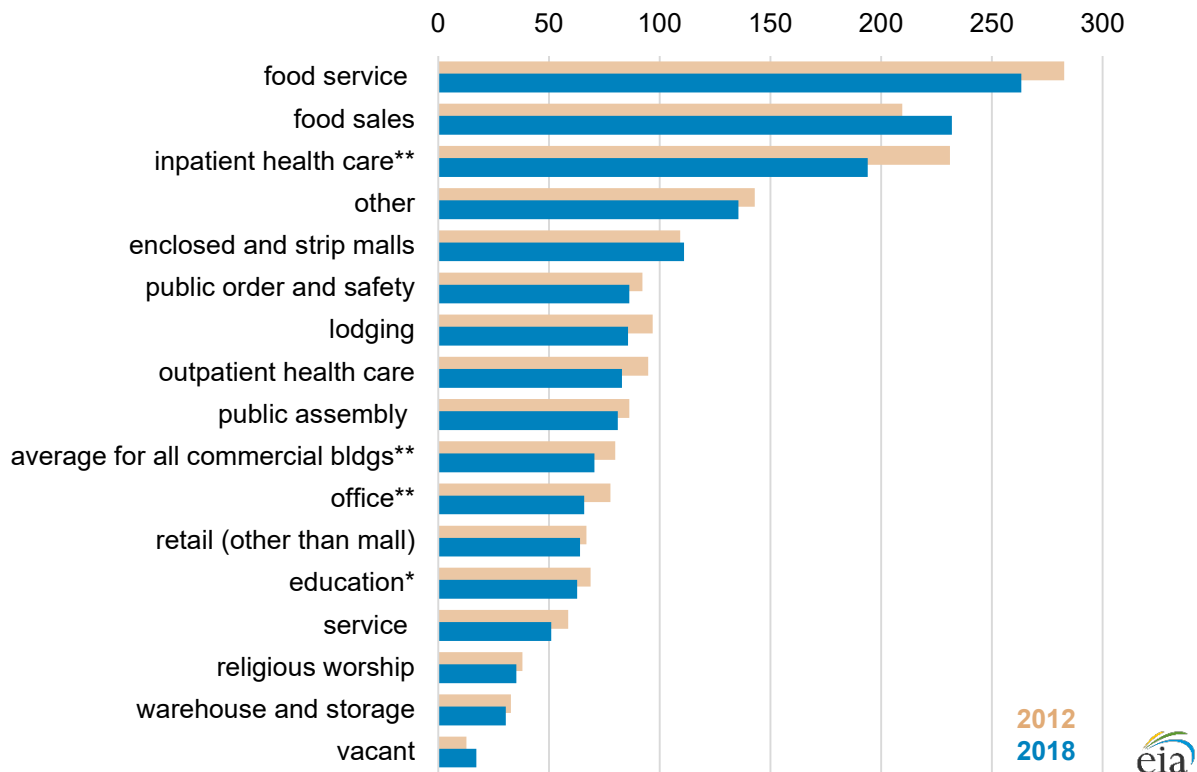
Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: Btu = British thermal units

- Total floorspace in commercial buildings increased while energy consumption did not, meaning consumption per square foot (energy intensity) decreased.
- The average total energy used per square foot in commercial buildings decreased by 12% since the 2012 CBECS, from 80.0 thousand Btu per square foot to 70.6 thousand Btu per square foot.
- In addition, electricity intensity decreased by 14%, and natural gas intensity decreased by 11% from 2012 to 2018.

Energy intensity decreased in several building types from 2012 to 2018

Major fuel intensity by principal building activity, 2012–2018

thousand British thermal units per square foot



- Inpatient health care, office, education, and commercial buildings overall showed statistically significant decreases in average major fuel (electricity, natural gas, fuel oil, and district heat) energy use per square foot.
- Energy intensity in inpatient health care buildings has decreased by 16% from 2012 to 2018, the largest intensity decrease of all the building types.

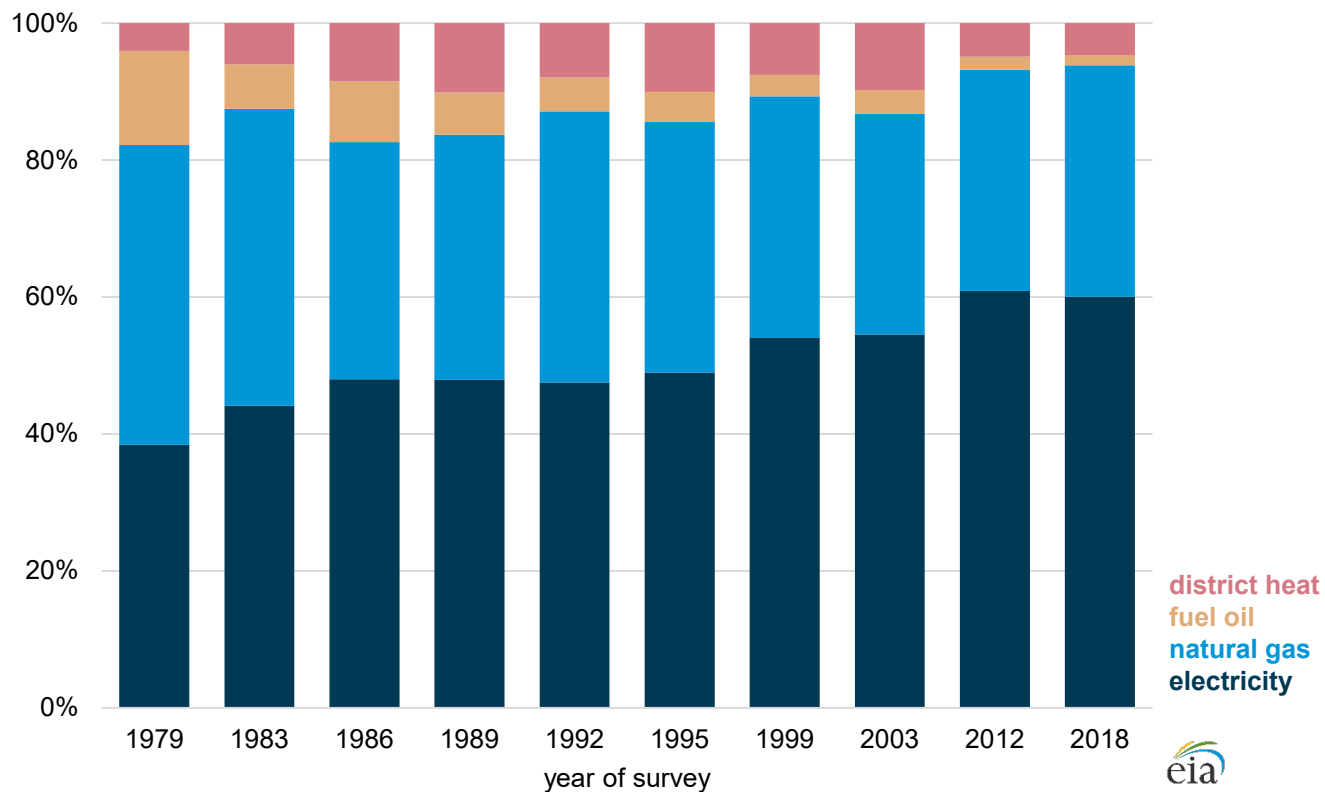
Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

* Change is statistically significant at the 10% significance level.

** Change is statistically significant at the 5% significance level.

Electricity and natural gas continued to be the dominant energy sources for commercial buildings

Total energy consumption by major fuel, 1979–2018
percentage



Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

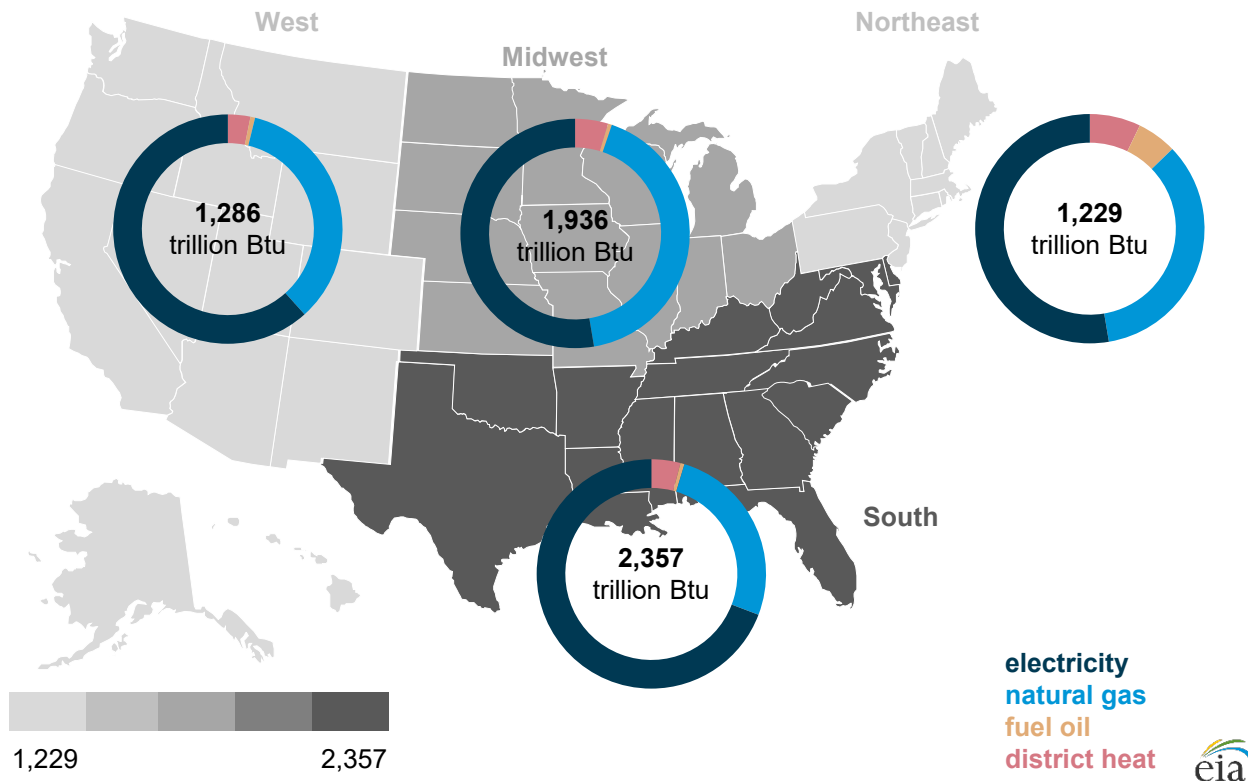
- Together, electricity and natural gas accounted for about 94% of total energy consumed in 2018.
- Electricity increased its share of total energy consumed from 38% in 1979 to 60% in 2018.
- Natural gas continues to account for approximately one-third of total energy consumption.
- Fuel oil's share of total energy was 1% in 2018, its smallest share since 1979, when CBECS began collecting data.

Snapshot: Commercial Building Energy Consumption and Expenditures in 2018

Electricity accounted for the most energy consumed across all census regions

Total energy consumption by fuel and region, 2018

British thermal units and share of total



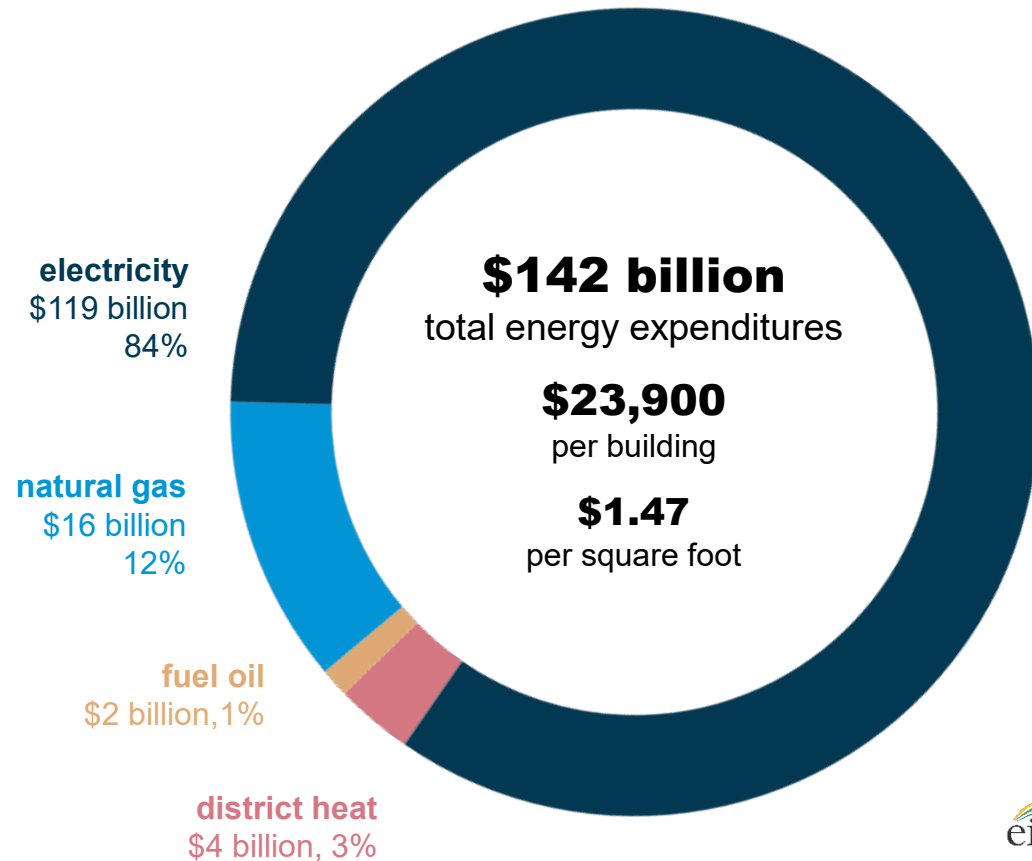
- The South had the largest total energy consumption (2,357 trillion Btu) and the largest share of electricity usage of any census region (69%).
- The Midwest had the second-largest total energy consumption and the largest share of natural gas usage of any census region (42%).
- The Northeast was the only census region in which fuel oil accounted for more than 1% of energy consumption.

Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

Note: Btu = British thermal units

Commercial buildings spent \$142 billion on energy in 2018, averaging \$1.47 per square foot

Total commercial buildings energy expenditures by major fuels, 2018
billion dollars and share of total

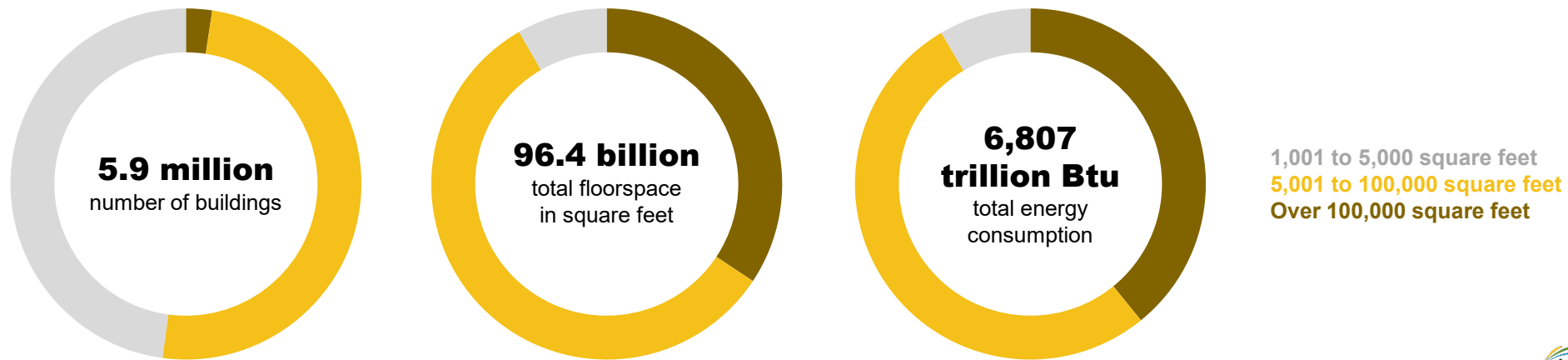


- On average, a commercial building spent \$23,900 on energy during 2018, ranging from \$5,000 per building for the smallest buildings (1,001 to 5,000 square feet) to \$1.5 million per building for buildings over 500,000 square feet.
- Energy expenditures averaged \$1.47 per square foot and varied by principal building activity. Food sales and food service buildings spent more than \$5.00 per square foot, and vacant and warehouse and storage buildings spent less than \$0.75 per square foot.
- Commercial buildings spent \$119 billion dollars on electricity, or 84% of their total energy expenditures. Natural gas accounted for 12% of total commercial building energy expenditures (\$16 billion).

Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

Large buildings were few in number but consumed over one-third of energy

Number of buildings, square footage, and total energy consumption by square footage category, 2018
percentage



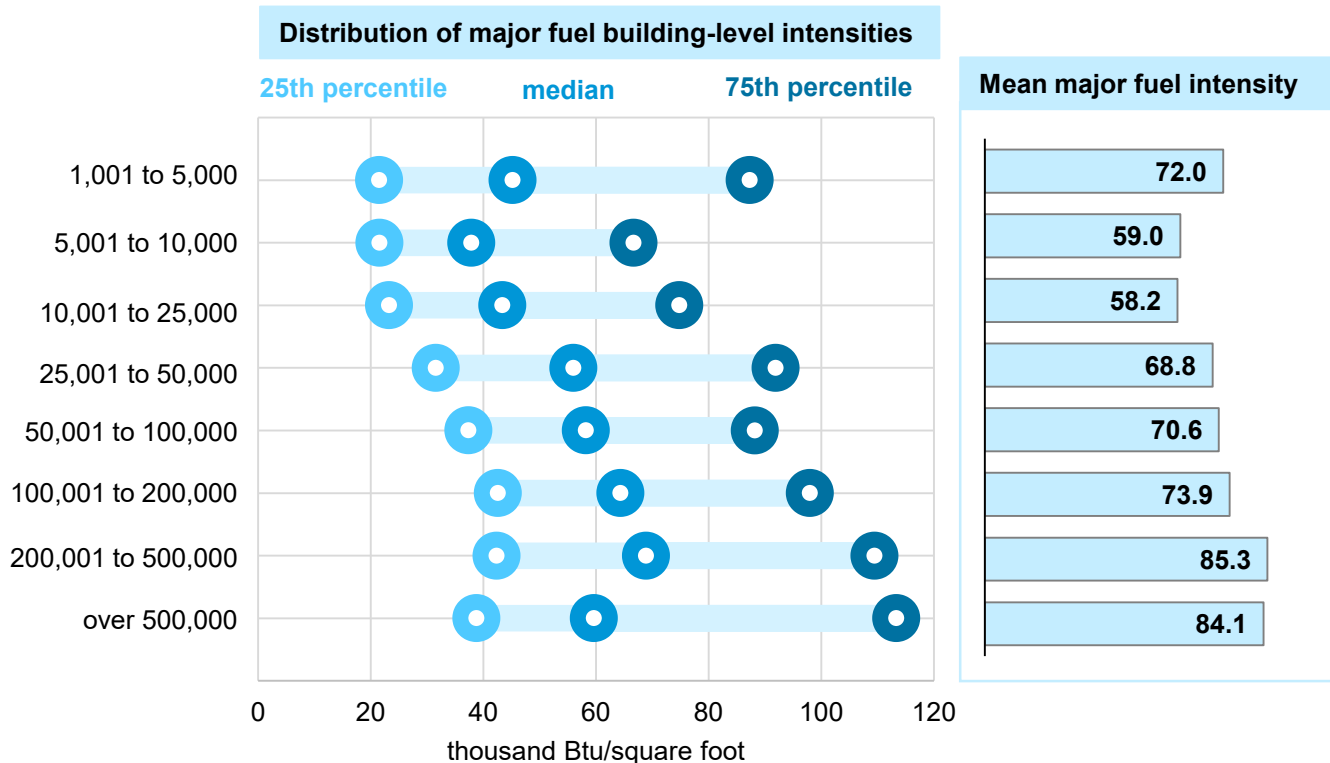
Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: Btu = British thermal units



- Buildings over 100,000 square feet accounted for 2% of all commercial buildings and 34% of total commercial floorspace. These buildings consumed 2,665 trillion Btu, which was 39% of commercial building total energy consumption.
- Small buildings (1,001 to 5,000 square feet) account for almost half the building stock but used only 8% of the total energy.

The smallest buildings were more energy intensive than some larger buildings

Major fuel intensities by square footage category, 2018
thousand British thermal units per square foot



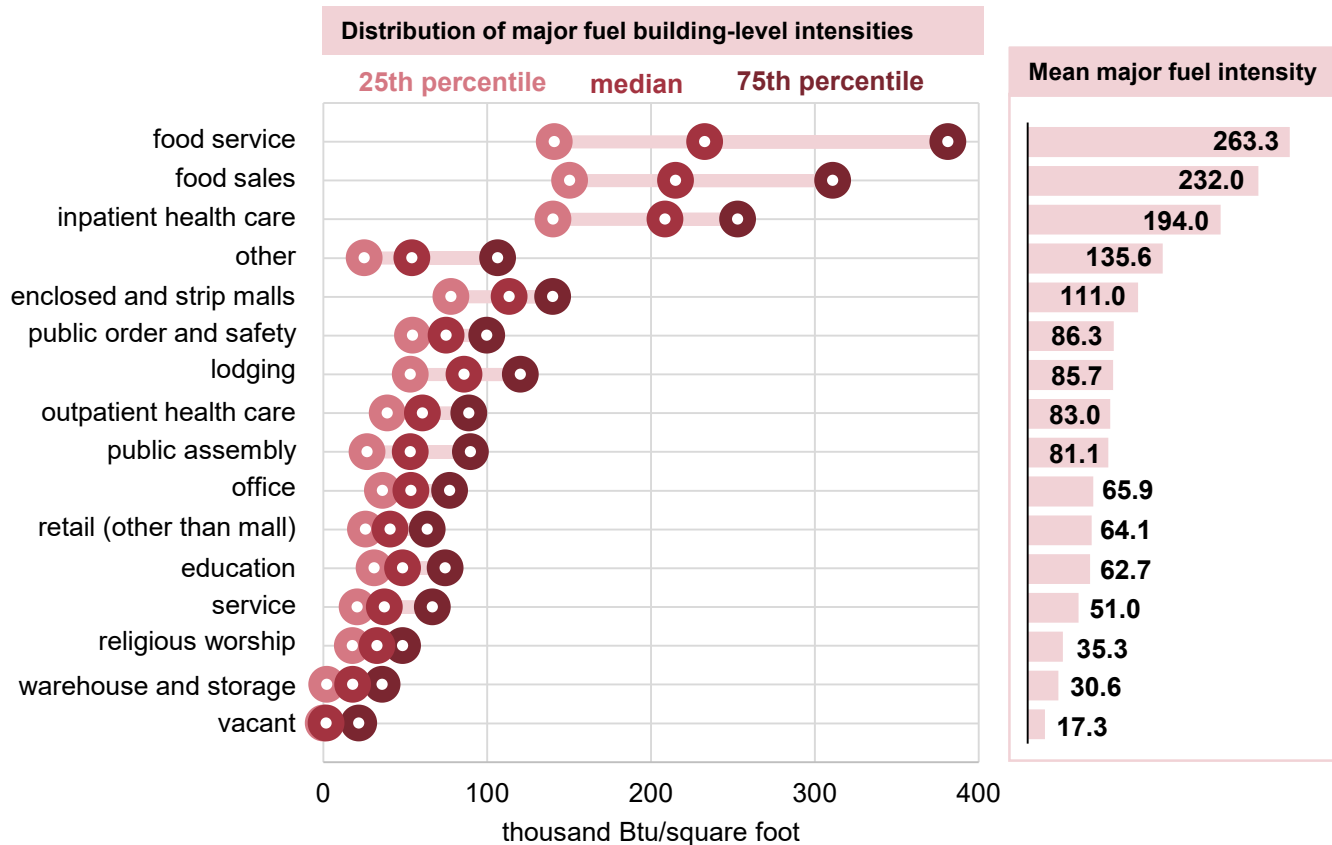
- The smallest buildings (1,001 to 5,000 square feet) had a significantly higher mean energy intensity than buildings between 5,001 and 25,000 square feet. Many of the smallest buildings were in more energy-intensive building categories (such as, food service and food sales).
- Buildings that were 200,001 to 500,000 square feet and over 500,000 square feet were the most energy intensive (85.3 and 84.1 thousand Btu per square foot).
- The largest buildings (over 500,000 square feet) had the widest distribution of intensities.

Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: Btu = British thermal units



Food service, food sales, and inpatient health care buildings were the most energy intensive

Major fuel intensities by principal building activity, 2018
thousand British thermal units per square foot



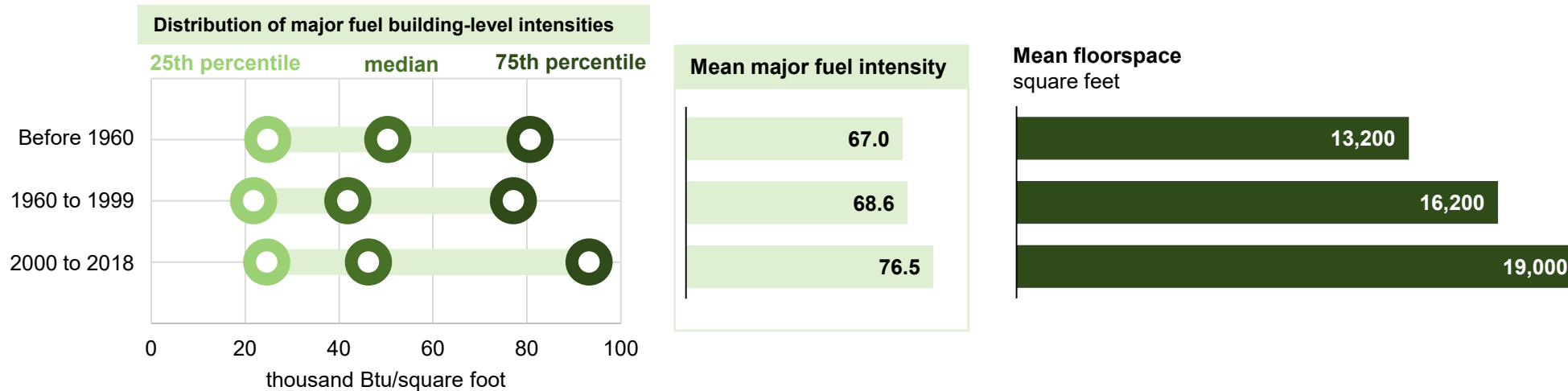
- Food service, food sales, and inpatient health care buildings were the most energy intensive. These buildings also had the widest distribution of intensities.
- Vacant buildings were the least energy intensive, followed by warehouse and storage and religious worship buildings.

Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: Btu = British thermal units



The newest buildings were the most energy intensive

Major fuel intensities and mean total floorspace by year of construction, 2018
thousand British thermal units per square foot



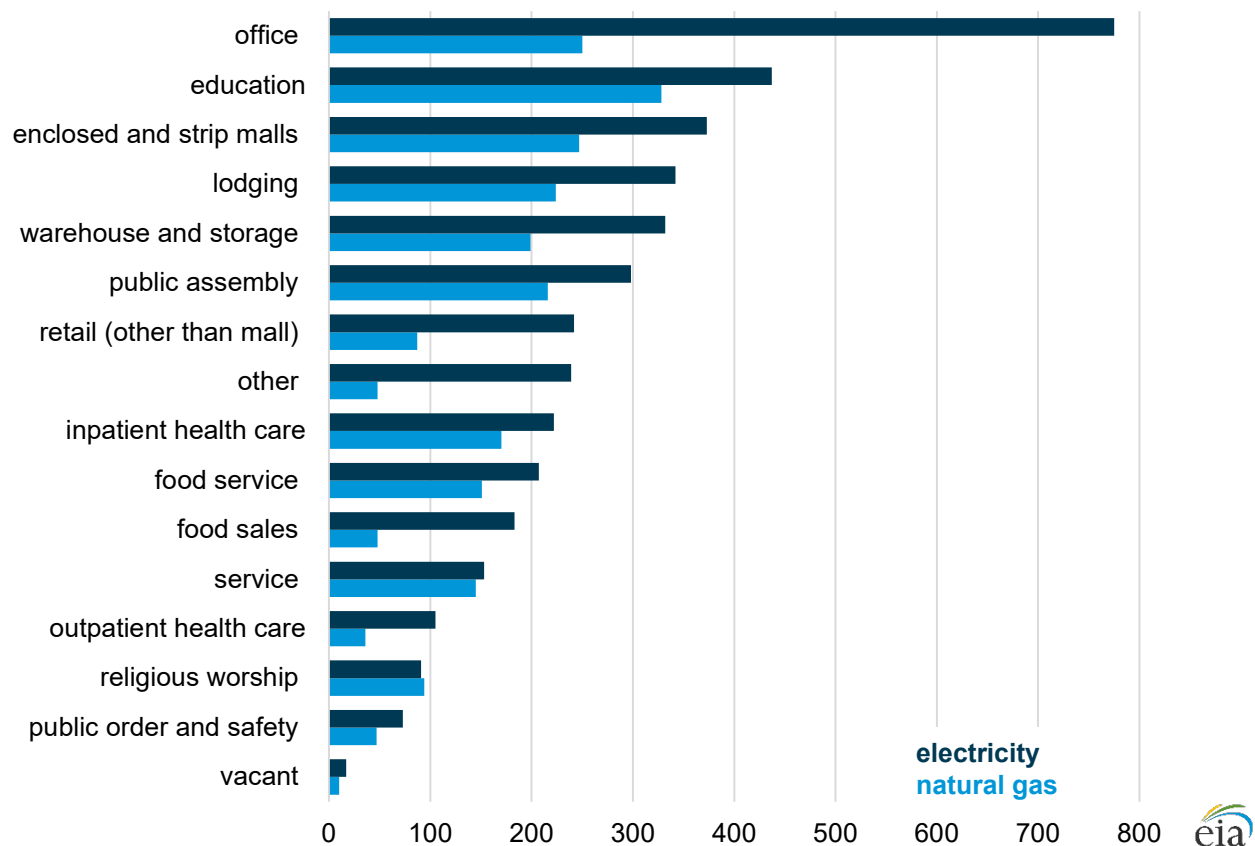
Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*
Note: Btu = British thermal units

- Buildings constructed since 2000 were significantly more energy intensive on average (at 76.5 thousand Btu per square foot). The newest buildings were also significantly larger than all older buildings (at 19,000 square feet).
- The oldest buildings (constructed before 1960) were significantly smaller and less energy intensive than buildings constructed since 2000.

Offices consumed the most electricity, and education buildings consumed the most natural gas

Total energy consumption by fuel and principal building activity, 2018

trillion British thermal units

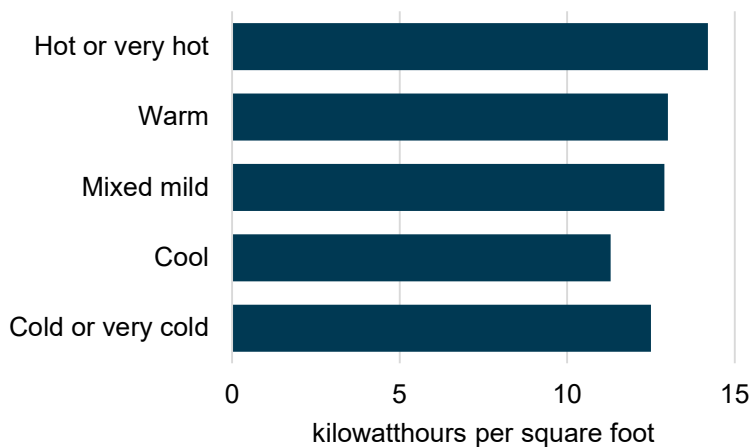


- Office buildings consumed the largest amount of electricity (775 trillion Btu) and approximately three times more electricity than natural gas (250 trillion Btu).
- Education buildings consumed the most natural gas (328 trillion Btu).
- Service, religious worship, and public order and safety were the only building types that did not use significantly more electricity than natural gas.

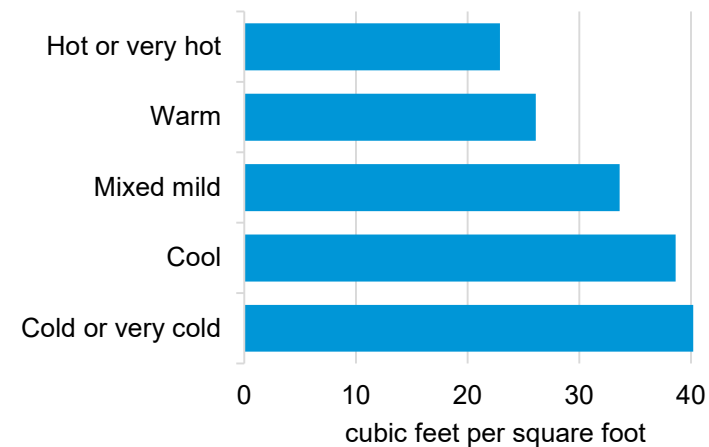
Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*

Electricity intensity was higher in hotter climates, and natural gas intensity higher in colder climates

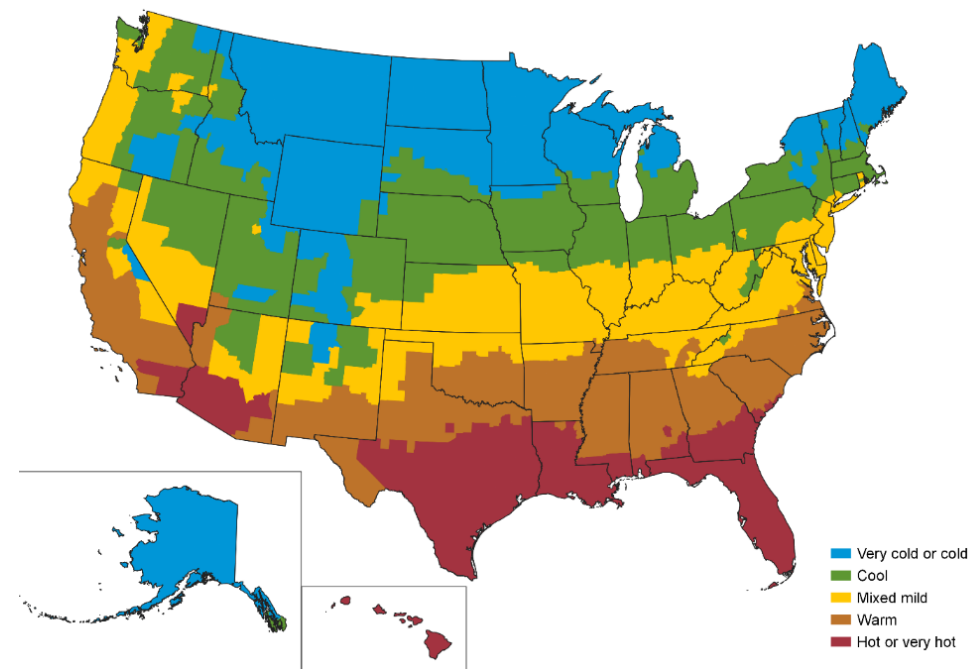
Electricity intensity by climate zone, 2018
kilowatthours per square foot



Natural gas intensity by climate zone, 2018
cubic feet per square foot



U.S. climate zones (2018 CBECS)



Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*



Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*



- Commercial buildings in the hot or very hot, warm, and mixed mild regions had significantly higher average electricity intensities than those in the cool region.
- Average natural gas intensities increased as climate zones became cooler. Commercial buildings in the cool and cold or very cold climate zones did not differ significantly in natural gas intensity.

Data source: ANSI/ASHRAE, Standard 169-2021, *Climatic Data for Building Design Standards*

Note: Adapted with permission from Figure A-2, Climate zones for United States counties, ANSI/ASHRAE Standard 169-2021, *Climatic Data for Building Design Standards*, © 2021 ASHRAE.

References and Additional Information



Additional CBECS information

- [2018 building characteristics tables](https://www.eia.gov/consumption/commercial/data/2018/index.php?view=characteristics)
<https://www.eia.gov/consumption/commercial/data/2018/index.php?view=characteristics>
- [Guide to the tables](https://www.eia.gov/consumption/commercial/data/2018/guide.php)
<https://www.eia.gov/consumption/commercial/data/2018/guide.php>
- [CBECS terminology](https://www.eia.gov/consumption/commercial/terminology.php)
<https://www.eia.gov/consumption/commercial/terminology.php>
- [CBECS building type definitions](https://www.eia.gov/consumption/commercial/building-type-definitions.php)
<https://www.eia.gov/consumption/commercial/building-type-definitions.php>
- [Frequently asked questions \(FAQs\)](https://www.eia.gov/consumption/commercial/faq.php)
<https://www.eia.gov/consumption/commercial/faq.php>



Projected schedule of additional 2018 CBECS data releases

We will release the consumption and expenditures data tables with end use estimates and microdata in December 2022.



For more information

U.S. Energy Information Administration homepage | www.eia.gov

Commercial Buildings Energy Consumption Survey | www.eia.gov/cbecs

Today in Energy | www.eia.gov/todayinenergy