

New Data from the 2012 Commercial Buildings Energy Consumption Survey (CBECS): Consumption and End Uses



Interagency Sustainability Working Group

May 19, 2016 | Washington, DC

Joelle Michaels, CBECS Survey Manager

Overview

- CBECS background
- 2012 CBECS results
- The next CBECS
- Questions?

CBECS provides unique information about buildings in the U.S.

- The Commercial Buildings Energy Consumption Survey (CBECS) is the only independent, statistically representative source of national-level data on the *characteristics* and *energy use* of commercial buildings
- Mandated by Congress in 1977, it has been conducted every 3 to 5 years since 1979
- The final consumption and expenditures data from the 2012 CBECS were just released: <http://www.eia.gov/consumption/commercial/>
- 2012 CBECS final sample of 6,720 buildings, one of the largest ever

CBECS is a multi-year, multi-phase project



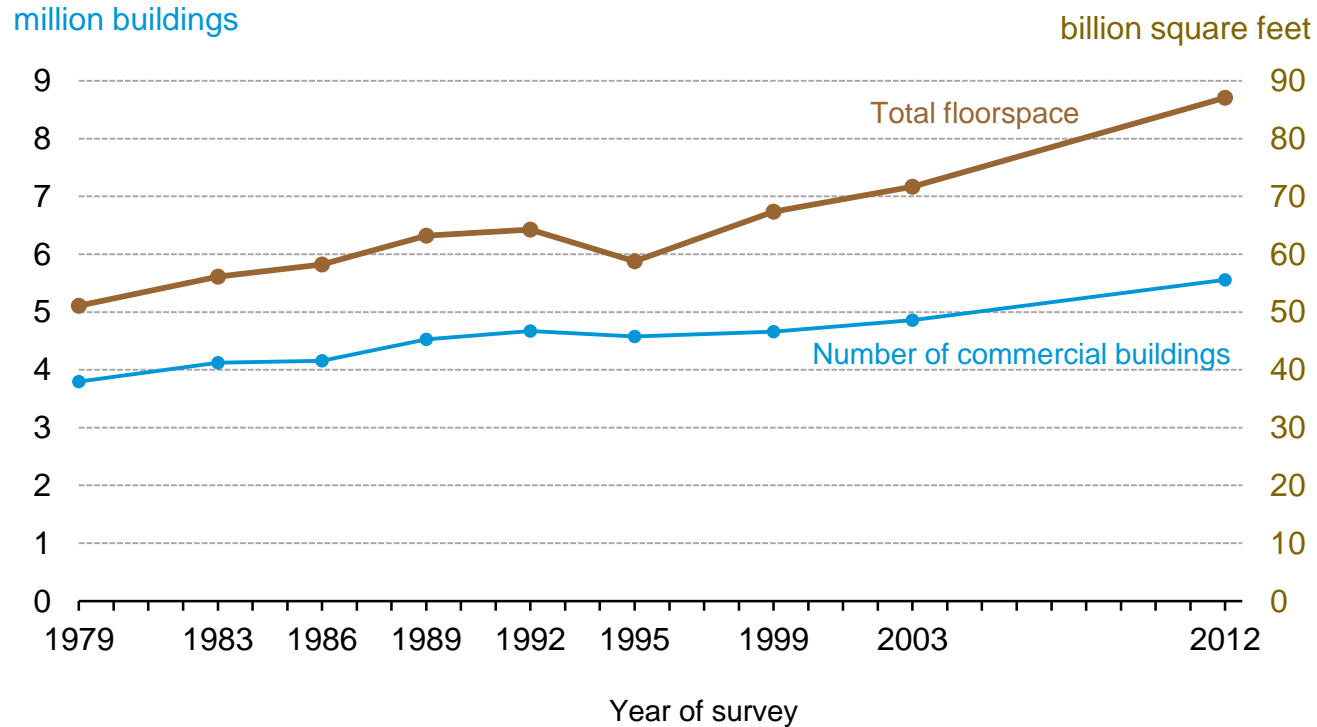
Releases span several years



CBECS uses a two-phase survey process

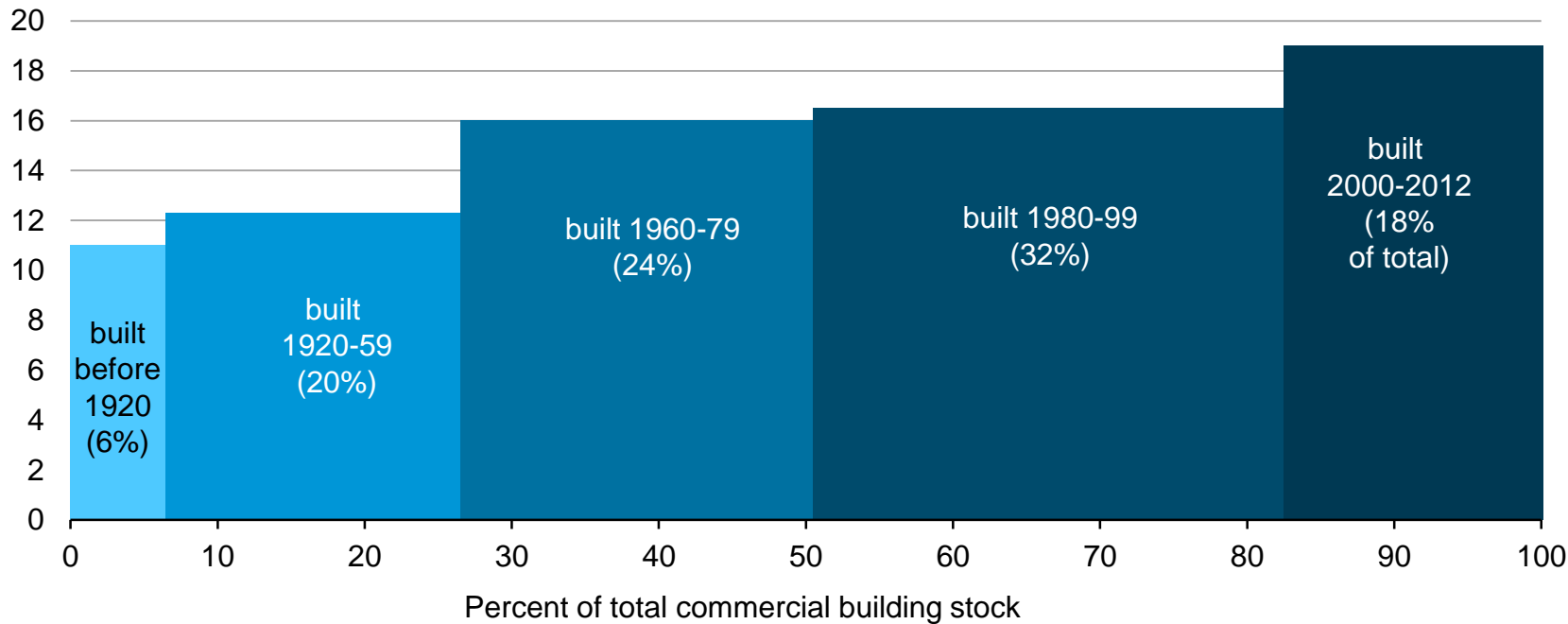
- Phase I: Buildings Survey
 - In-person or telephone interview conducted by a trained interviewer
 - Computer-assisted survey instrument (since 1995)
 - Voluntary
 - Approximately 30-45 minutes in length
 - 2012 field period was ~8 months long
 - 2012 responding sample size = 6,700 buildings
- Phase II: Energy Suppliers Survey (ESS)
 - Follow-up with energy suppliers for about half of the buildings
 - Historically a mail survey; 2012 CBECS was mainly internet data collection
 - Mandatory
 - 2012 field period was ~8 months

In recent years, commercial floorspace has grown more rapidly than the number of buildings

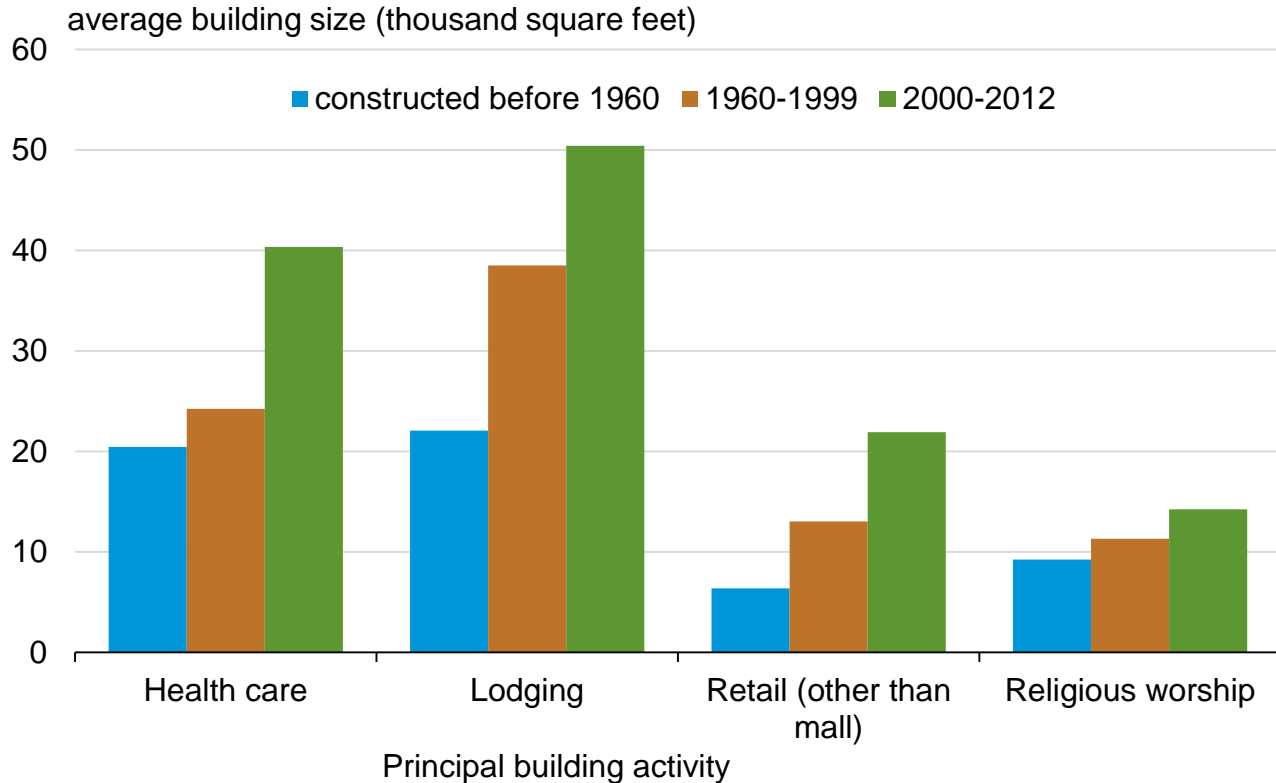


The average size of new commercial buildings increases by building vintage

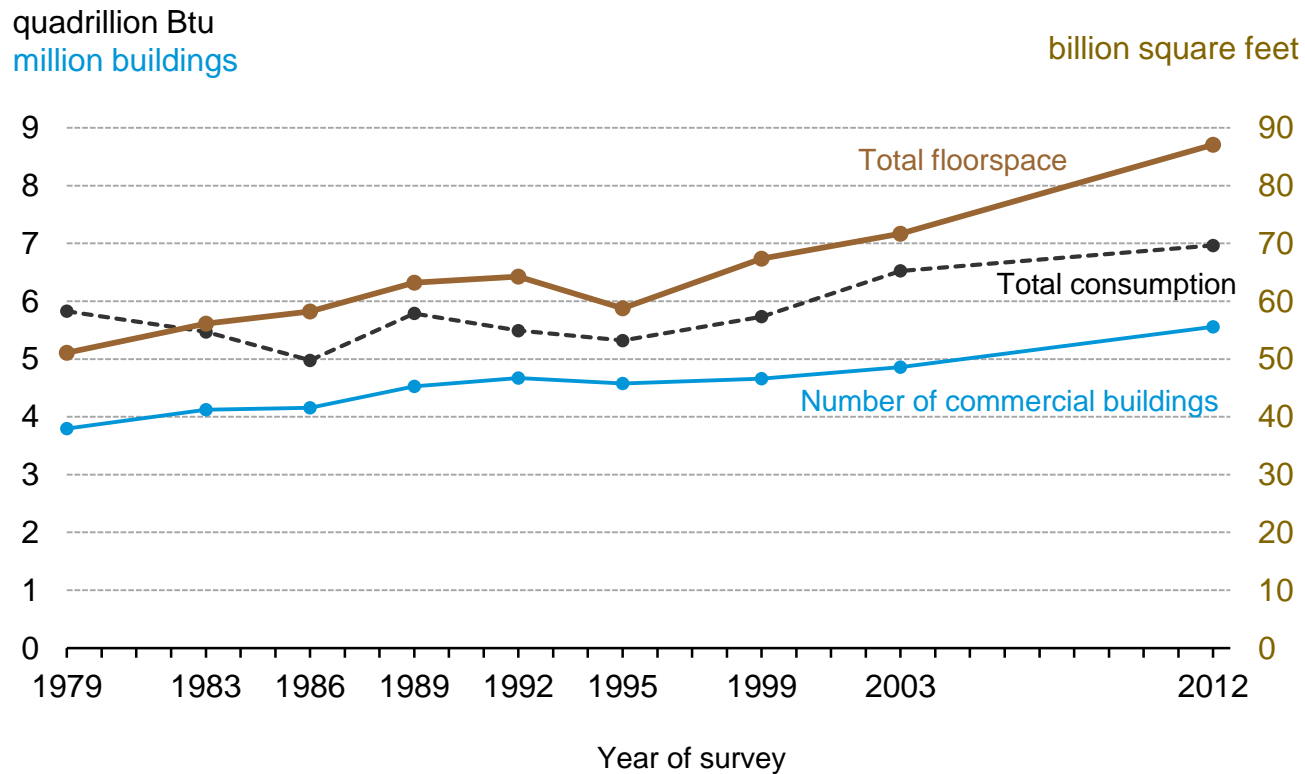
average commercial building size
thousand square feet



Average building size has increased noticeably in several building types



Energy demand in commercial buildings has grown at a slower pace than building stock and floorspace



Percent change
since 2003

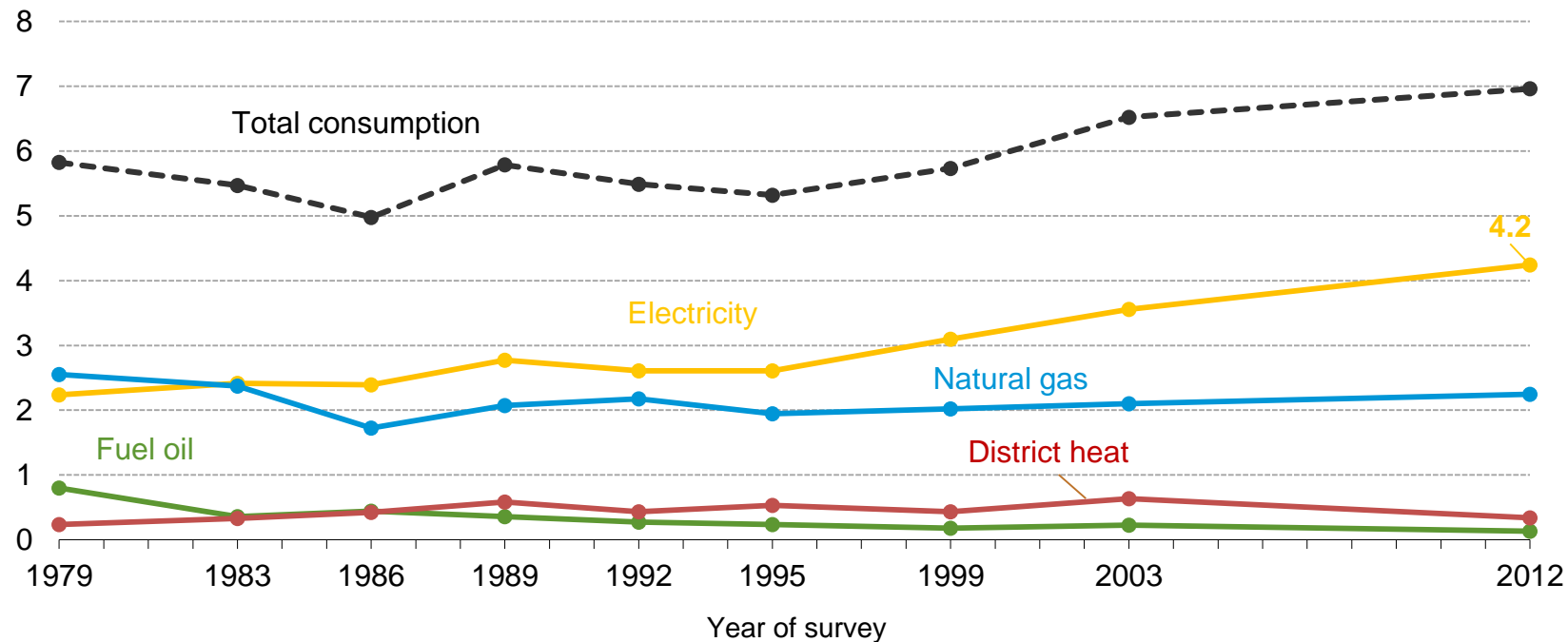
Number of buildings
+14%

Floorspace
+22%

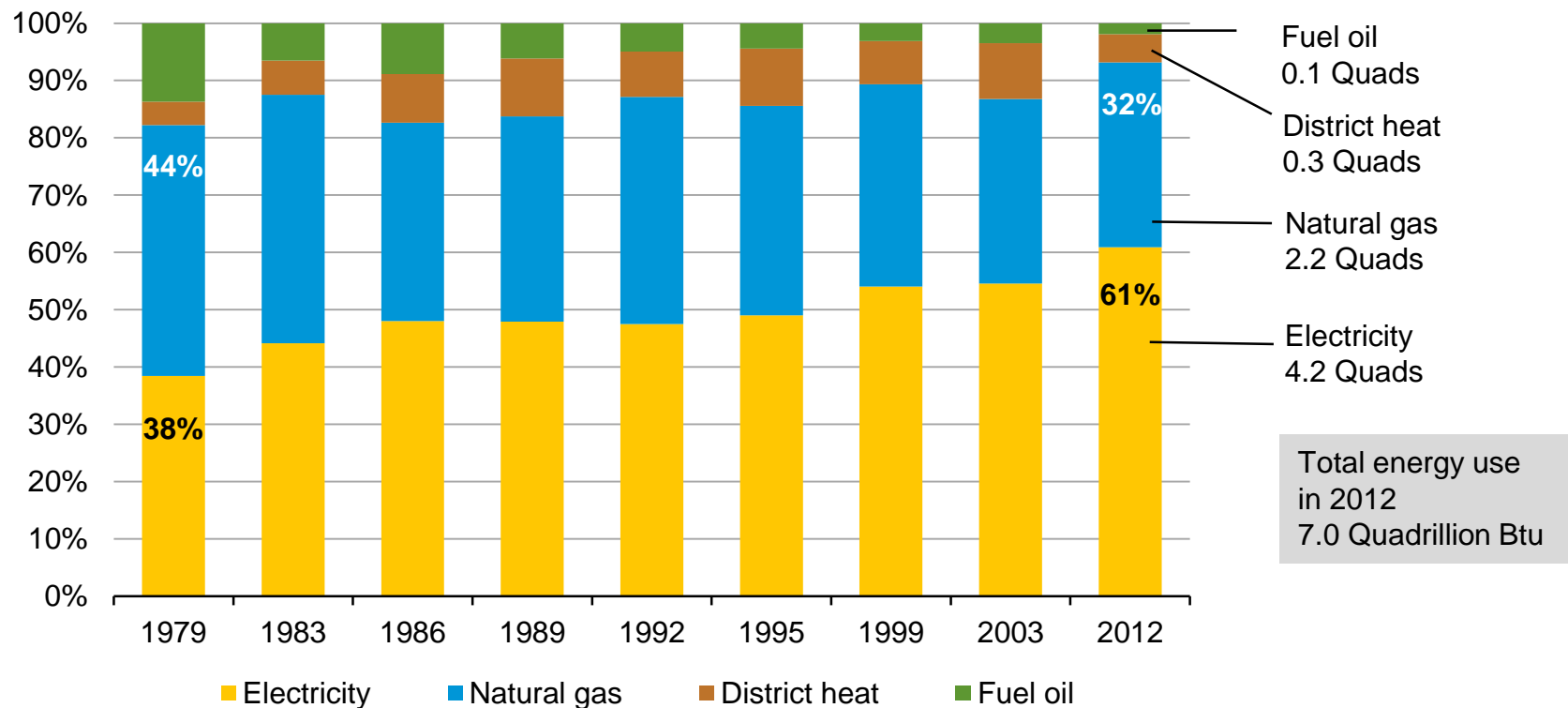
Consumption
+7%

Since 1979, total electricity consumption in commercial buildings has almost doubled

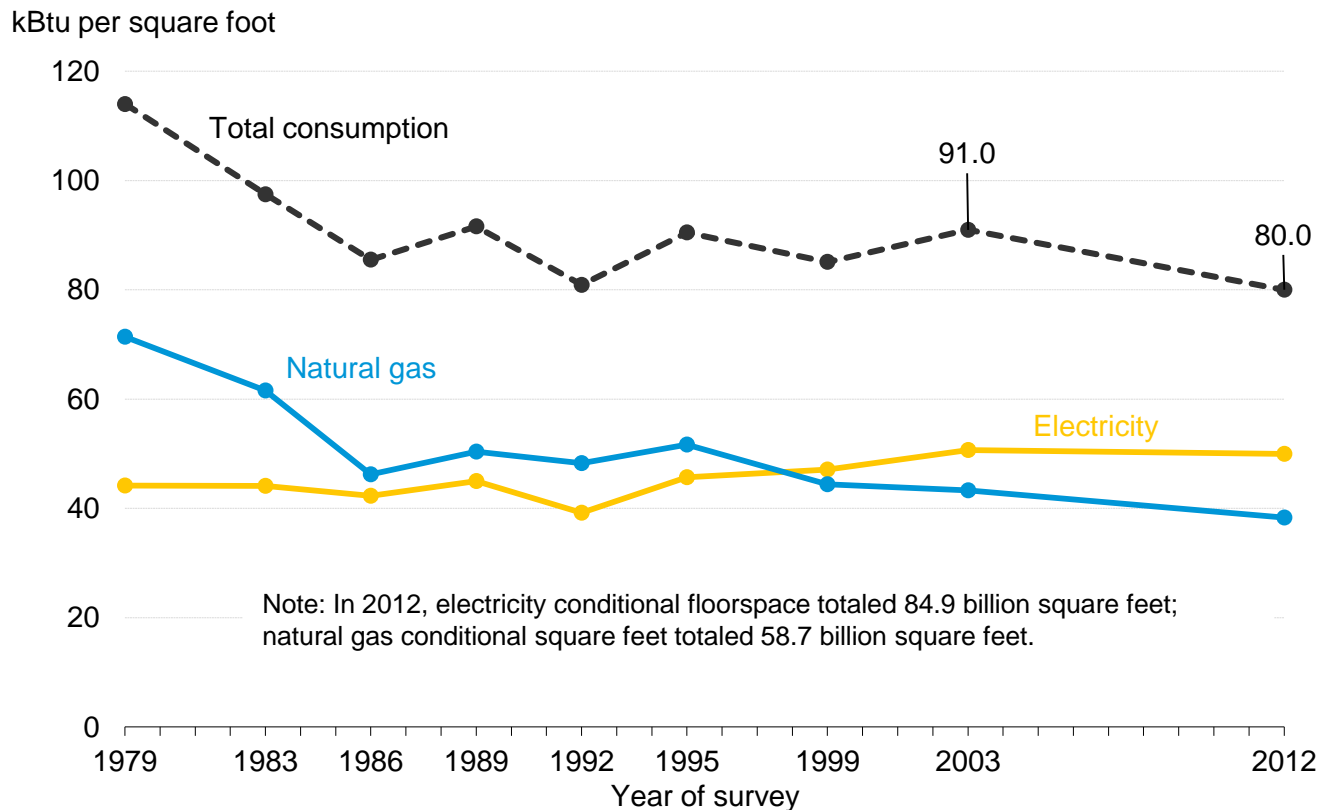
quadrillion Btu



Electricity share is up 23 percentage points from 1979; natural gas share is down 12 percentage points

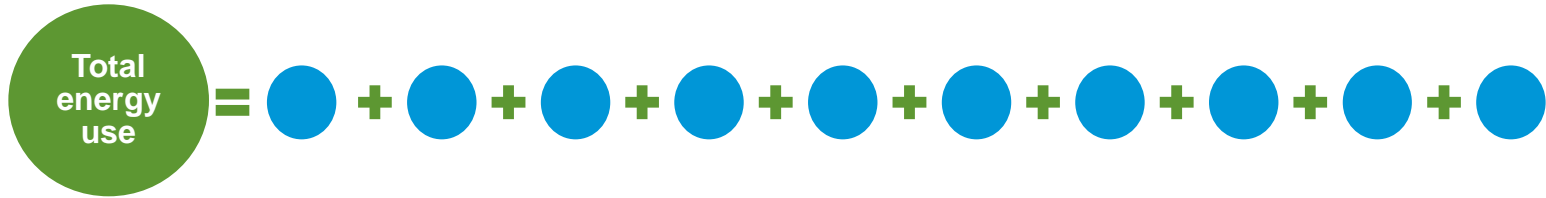


Energy usage per square foot is down significantly from 2003 (-12%)



How do we estimate energy end uses in commercial buildings?

Engineering and statistical consumption models use CBECS characteristics and energy usage data to disaggregate total energy

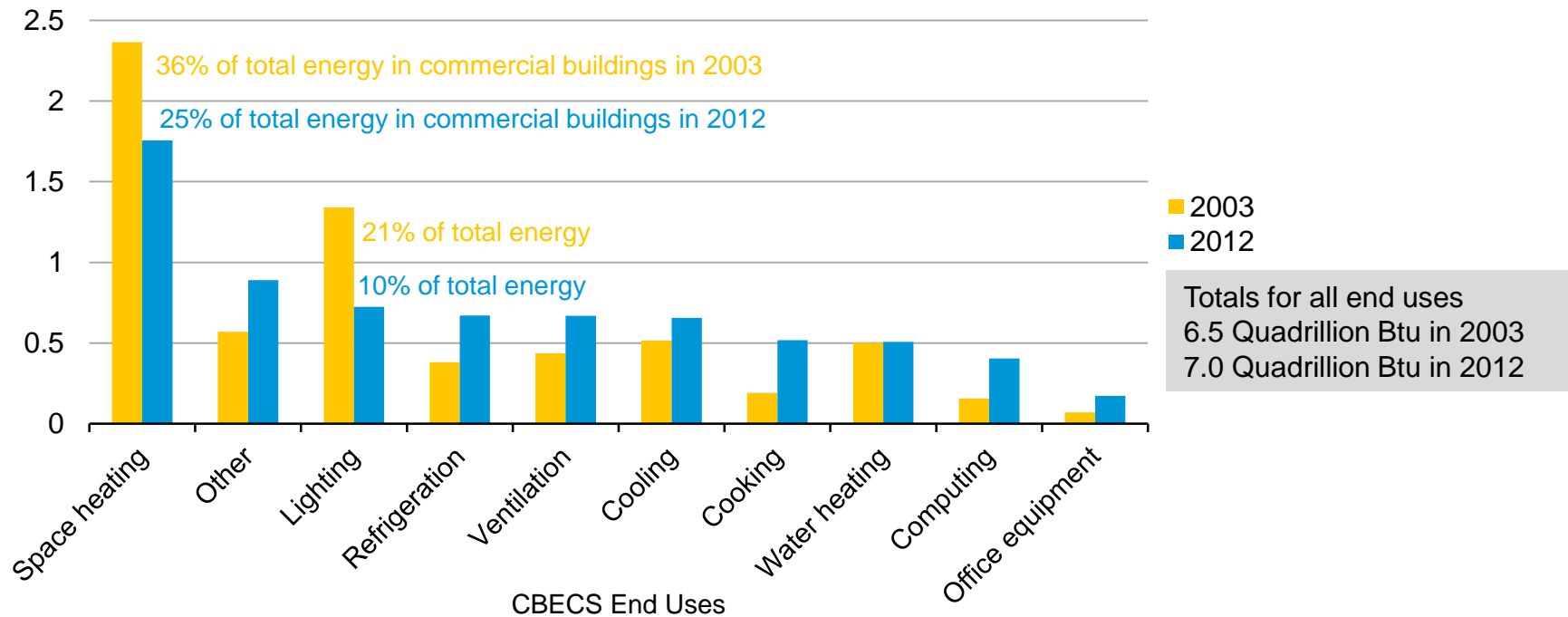


ENERGY SOURCE	Space heating	Space cooling	Ventilation	Water heating	Lighting	Cooking	Refrigeration	Computing	Office equipment	Other
Electricity	X	X	X	X	X	X	X	X	X	X
Natural gas	X			X		X				X
Fuel oil	X			X		X				X
District heat	X			X		X				X

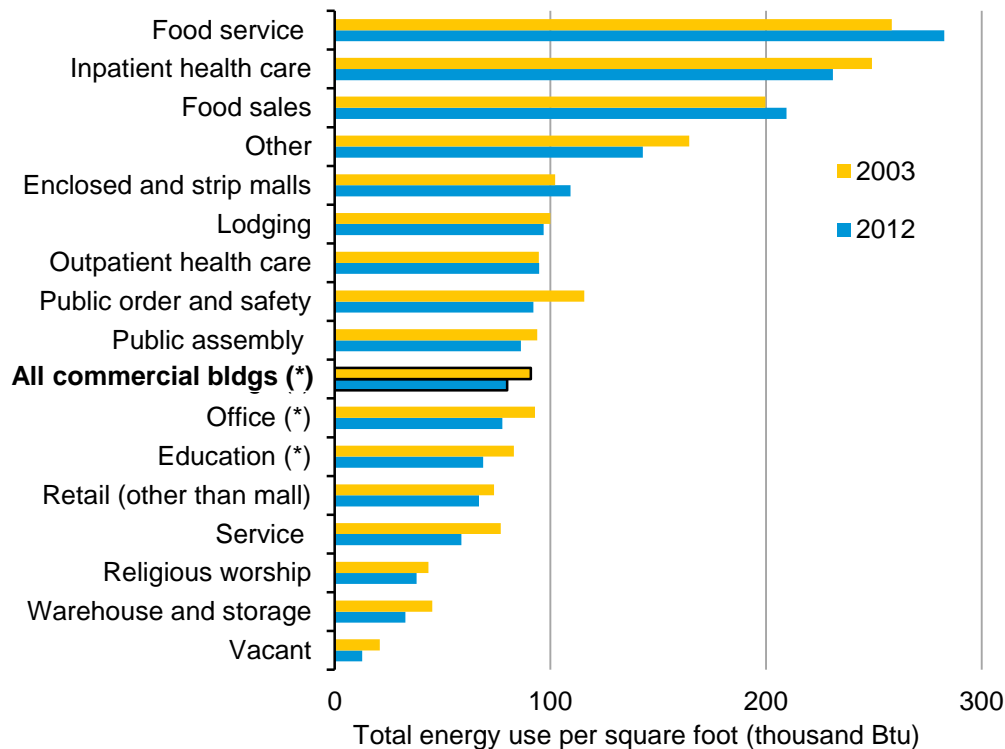
Commercial end uses model: <http://www.eia.gov/consumption/commercial/estimation-enduse-consumption.cfm>

Lighting and space heating contributed the most to reductions in energy intensities

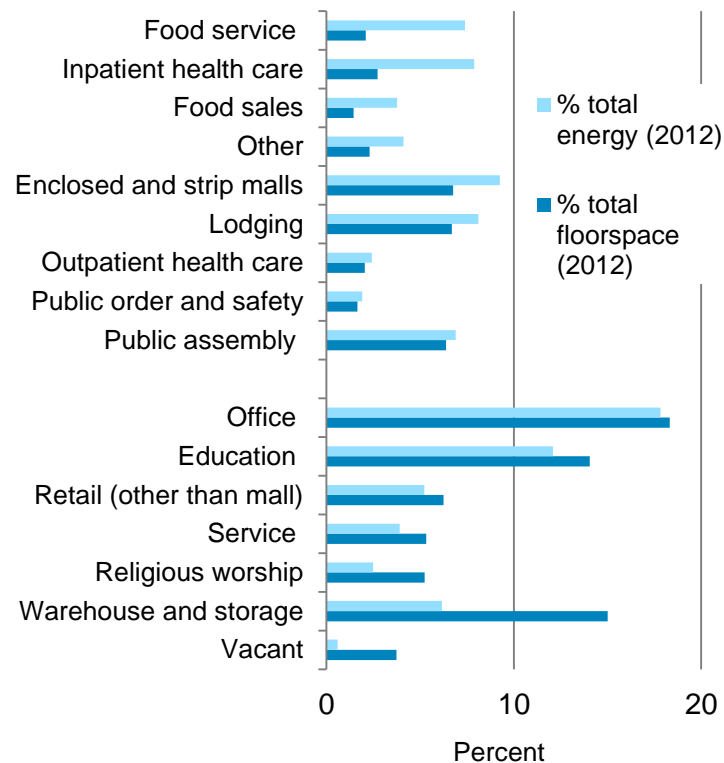
total consumption
quadrillion Btu



Decrease in total energy intensity driven by office and education buildings



(*) Office, education, and commercial buildings overall showed statistically significant decreases from 2003 to 2012



CBECS continues to explore water data collection

- Some data were collected in the previous CBECS at the request of EPA's WaterSense® program
- The 2012 CBECS included questions on total water volume consumed, outside water, and whether it was metered or estimated
- 95% of the CBECS sample cases used water; we have water consumption data for 26% of these
- Water reporting rates were better for large buildings (over 200,000 sq ft); we have data for 41% of those that used water
- Currently working on usage models and deciding what data are publishable

Planning for the next CBECS

- CBECS will provide official benchmark building characteristics and consumption data for **reference year 2017**
- Data collection will begin in early 2018
- Questionnaire design will start this summer and stakeholder input will be gathered starting in late 2016

A question for you – interest in a CBECS microdata workshop?

- Raw data are released (in CSV and SAS formats) after removing names or addresses of individual respondents and masking variables that could be used to link to an individual sampled building

PUBID	REGION	CENDIV	PBA	FREESTN	SQFT	SQFTC	WLCNS	RFCNS	RFCOOL	RFTILT	BLDSHP	GLSSPC	EQGLSS	SUNGLS	NFLOOR	BASEMNT	FLCEILHT	ATTIC	ELEVTR	NELVTR	ESLTR	NESLTR	YRCON	YR	
1	1	2	4	26	1	2,400	2	4	2	2	2	2	1	2	1			8	2					1975	
2	2	3	5	23	1	114,000	7	3	6	1	1	6	2	2	2	1		12	2					1985	
3	3	1	1	15	1	2,550	2	4	4	2	2	2	4	1				12	2					1958	
4	4	3	7	18	1	500,000	8	6	1	2	1	9	5	1	994	1	8	2	1	9	1	4		1983	
5	5	3	7	2	1	30,000	5	3	6	2	1	1	2	2	1	2	0	14	2	1	1	2		1972	
6	6	3	5	6		1,800	2	1	1	2	1				3	1	9	2	2	2	2			995	
7	7	3	7	16	1	800,000	9	1	1	2	1	4	3	2	2	8	1	12	2	1	21	2		1950	
8	8	3	7	1	1	1,400	2	1	1	2	2	2	1	1		1		12	2					1964	
9	9	3	7	2	1	37,500	5	1	4	2	1	2	3	2	3	1		12	2					1980	
10	10	3	5	2	1	600,000	9	6	1	2	1	11	6	1		995	5	10	1	1	14	2		1989	
11	11	4	8	2		10,250	4	1	6	2	1				3	1	12	2	2		2			995	
12	12	3	6	15	1	6,200	3	3	5	2	1	3	1	1		1		8	1					1967	
13	13	3	5	26	1	7,000	3	5	5	2	2	2	2	1		2	0	8	2	2		2		1973	
14	14	3	5	26	1	7,000	3	3	2	2	1	2	3	2	2	1		20	2					1969	
15	15	3	7	14	1	370,000	8	1	6	1	1	11	2	1		2	0	9	2	1	2	2		1998	
16	16	2	4	14	1	104,000	7	1	1	2	1	2	4	3	2	1	3	0	9	2	1	1	2		1961
17	17	2	3	13	1	1,200	2	4	3	2	2	2	1	1				9	1						1976

- Would a CBECS/RECS workshop for data users about how to use the microdata be of interest? In person or webinar? At the EIA conference? Please tell me now, or send me an email: joelle.michaels@eia.gov

Questions?

For more information

Subject matter experts for this presentation:

Joelle Michaels, Survey Manager, Commercial Buildings Energy Consumption Survey
Joelle.Michaels@eia.gov, 202-586-8952

Eileen O'Brien, Lead, Buildings Surveys Statistics Team
Eileen.OBrien@eia.gov, 202-586-1122

Tom Leckey, Director, Office of Energy Consumption and Efficiency Statistics
Thomas.Leckey@eia.gov, 202-586-3548