

Data Visualization CBECS

December 29, 2023

The following series of infographics shows how four different building types consume energy on both a regional and national level. The data used to create them has been gathered from The Commercial Buildings Energy Consumption Survey (CBECS), which is a national-level sample survey of commercial buildings and their energy suppliers conducted quadrennially by the Energy Information Administration (EIA). The survey collects key benchmark information on U.S. commercial buildings, their characteristics, and how they consume energy. It is used by private and public stakeholders to track industry progress and gain a high-level understanding of how similar buildings compare and inform policy decisions. Architects and engineers can also use this information for goal setting and prioritizing energy efficiency measures within the integrated design process for high performance projects.

Information from CBECS is reported on the EIA's website in the form of summary tables, which provide tabular breakdowns of high-level energy consumption statistics based upon general building characteristics. The information is also available as public use microdata spreadsheets that can be downloaded, filtered, and organized with much more flexibility than the summary tables. These spreadsheets contain much more detailed information from the building characteristics survey in its entirety and served as the origin of information for this series of infographics.

It is important to note that the following charts and graphs are representative of the CBECS sample of buildings and are not adjusted for weighted population factors. Additionally, while some of the graphics use the average function to calculate their statistics when sample size is high, most of the charts use the median when dealing with smaller samples due to less common building types and regional climate zones.

For more information on CBECS, please visit <http://www.eia.gov/consumption/commercial/>

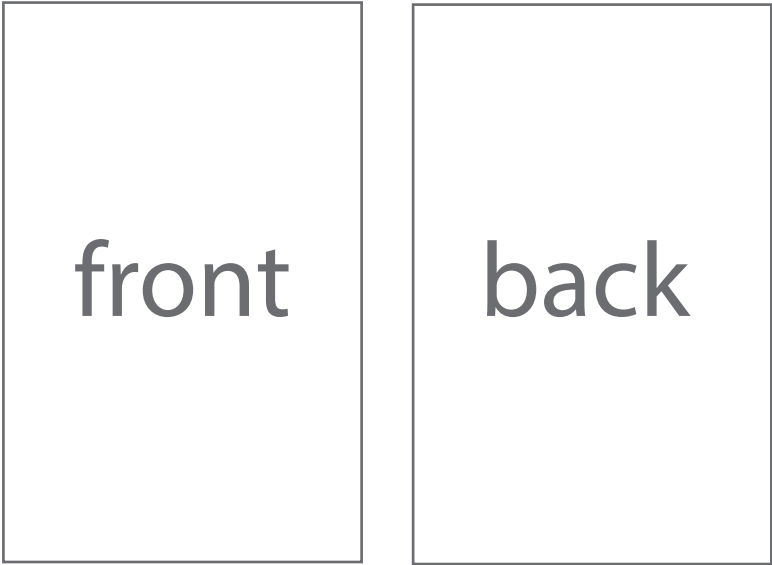
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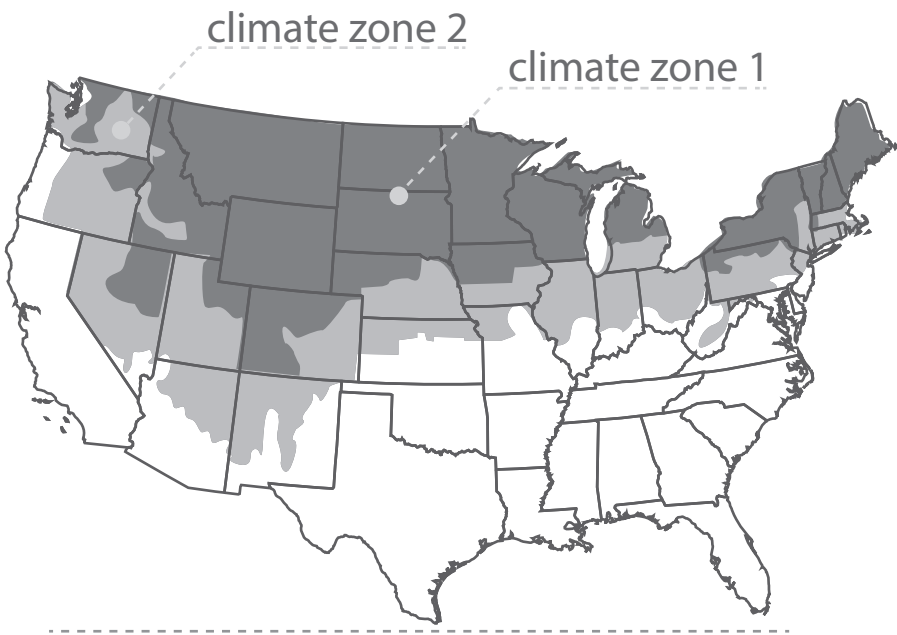


five 11x17
infographics



four building types





climate zones

The infographics break d own information into two categories: “national” statistics and “IPCCR” (Idaho Power Company Climate Region) statistics. The national statistics contain data from the entire national sample set, while the IPCCR statistics include all sample buildings within the CBECS climate zone 1 and 2 regions. These two regions are defined by the National Oceanic and Atmospheric Administration (NOAA) and cover climates with cooling degree days less than 2,000 and heating degree days 5,000 and more. The UI-IDL determined that this range of heating and cooling degree days best correlated to the Idaho Power Company service territories while providing adequate sample sizes for the array of charts and graphs included in following infographics. More information on climate zone methodology can be found here:

http://www.eia.gov/emeu/cbecs/climate_zones_explanation.html

summary EUI charts (kBtu/sf-yr)

see individual infographics for end use breakdown information

front page

National Average EUI – displays the average energy use intensity (EUI) for the national CBECS sample of said building type. Measured in kBtu/SF/year.

IPC Climate Region EUI – displays the EUI of the CBECS sample within the Idaho Power Company climate region (IPCCR) for said building type. If the chart or graph's title does not say "national," the graphic used data filtered specifically to the IPCCR.

National Square Footage - the total square footage of all the buildings of said building type, not just the CBECS sample, according to the latest data from the EIA.

National Energy Consumption - the total energy consumption in kBtus of all the buildings of said building type, not just the CBECS sample, according to the latest data from EIA. These first four graphics are the only pieces of data that use the entire national sample.

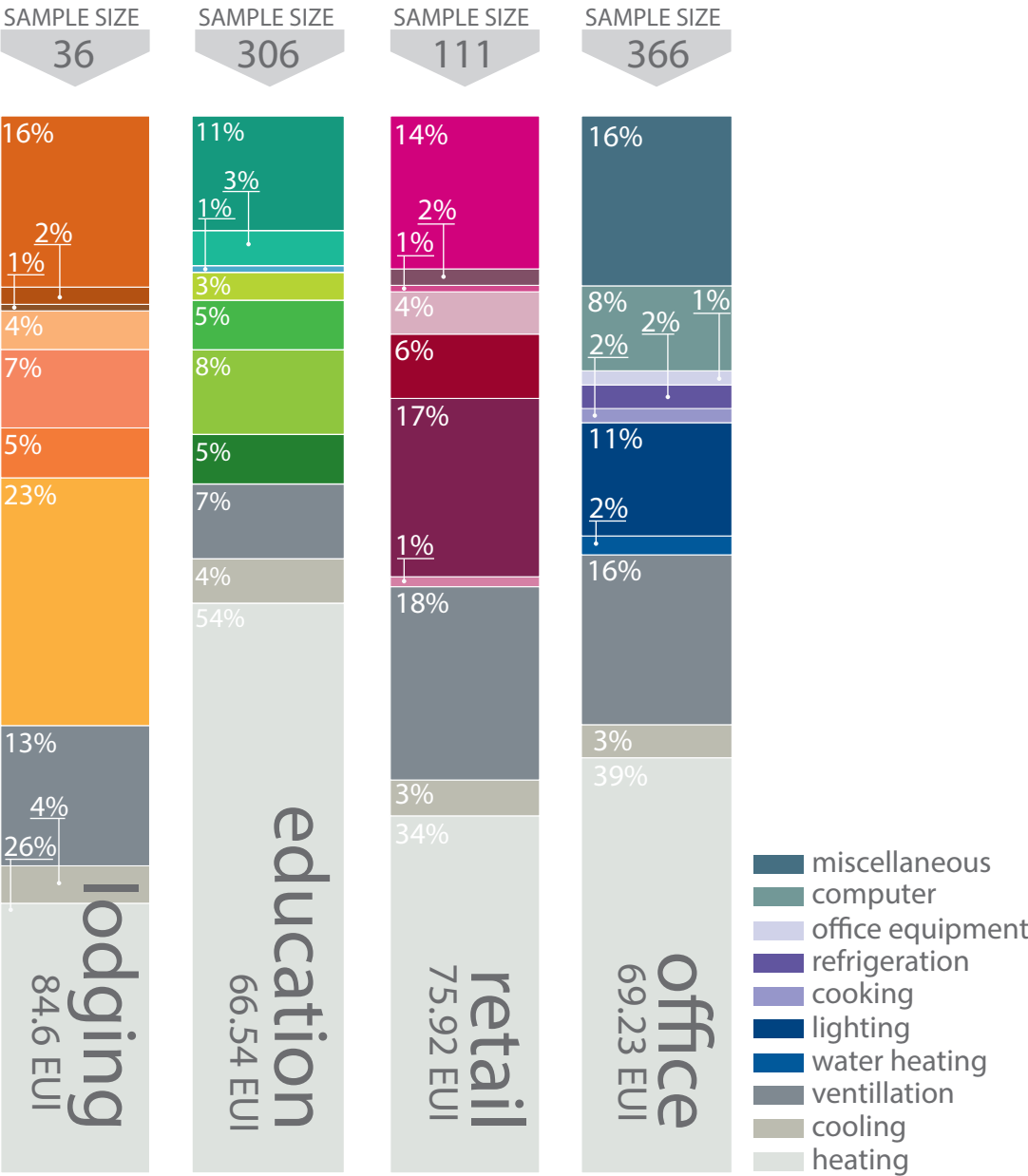
IPCCR % of Buildings with Renovations - this series of bar charts shows multiple pieces of information specific to the IPCCR. In general, the graphic shows the percentage of the sample that has renovated one or more of the following systems: HVAC, lighting, windows, or insulation. Each one of those categories is shown individually in terms of what percentage of the sample has upgraded that particular system. The combinations of different upgrades are not shown for simplicity.

National Building Activity Breakdown - this pie chart shows the percentage breakdown of activity subcategories that make up said building type.

IPCCR Utility Breakdown - this quadruple donut chart shows the median percentage breakdown of gas/electricity energy consumption and utility cost. The utility cost is broken down further into annual utility cost per fuel type and cost per square foot.

IPCCR Disaggregated EUI - this bar chart is designed to show the median EUI of the IPCCR and the breakdown by percentage of the different energy end uses that comprise that EUI.

Scale - the front of each double-sided infographic poster contains an EUI scale that runs along the right side of the page. Multiple national building examples within the IPPCR land on the scale according to their respective EUIs. Additionally, the scale includes anonymized Idaho buildings from a study conducted by the UI-IDL in 2009.



middle page

IPCCR EUI by HVAC Characteristics - the most complex graphic in the series, this set of nightingale style pie charts communicates a multitude of information about how the sample's different HVAC systems consume energy. The different petals of the pie charts represent the breakdown of different HVAC types or characteristics, while the length of the segment outward from the center of the chart indicates the median EUI of that section. Finally, the segments also show the disaggregated energy end use breakdown through concentric rings of varying widths within each petal.

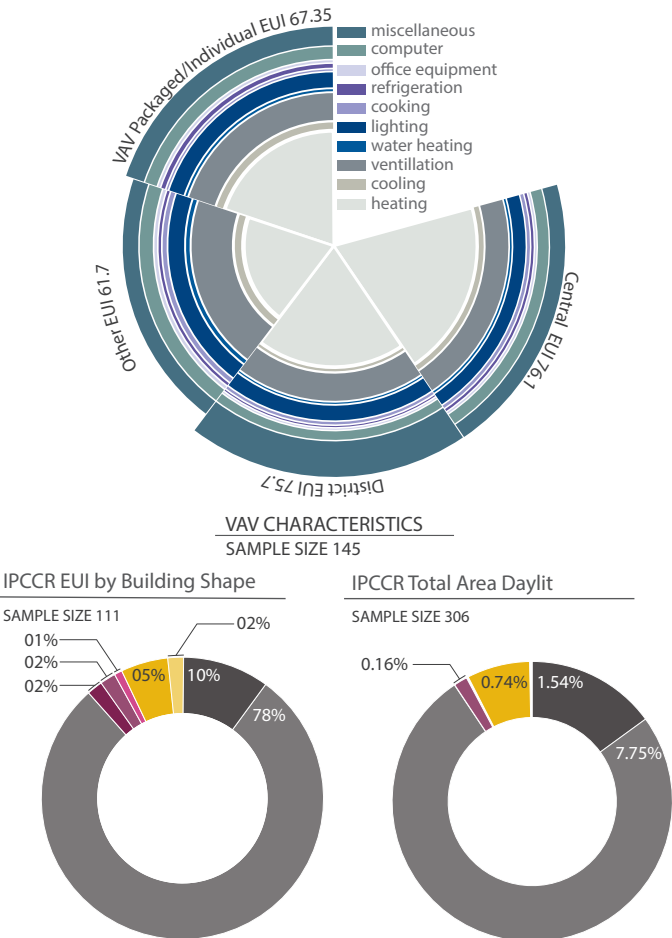
Buildings with EMS - this pie displays the number of buildings that have some type of building energy management system (EMS). The EUI is also shown for the parts of the sample that have an EMS system, the part that lacks an EMS, and for the buildings that did not respond to the survey.

Buildings with Economizers - this pie chart displays the number of buildings that have some type of building energy management system (EMS). The EUI is also shown for the parts of the sample that have an EMS system, the part that lacks an EMS, and for the buildings that did not respond to the survey.

IPCCR EUI By Building Size - known as a "marimeko" chart, this rectangular diagram shows percentage distributions on two different axes. The horizontal axis shows multiple square footage ranges, their distribution percentage within the sample, and their median EUI. The vertical axis shows the disaggregated end use breakdown of each square footage range according to the same color scheme for that building type.

IPCCR by Building Shape - CBECS also gathers data on the shape of all buildings surveyed. This graphic displays that information for each shape's median EUI on a pie chart.

IPCCR Total Area Daylit - CBECS also gathers data on the shape of all buildings surveyed. This graphic displays that information for each shape's total daylit area on a pie chart.



back page

IPCCR by Vintage / End Use - this line chart also contains two types of information on the energy consumption characteristics of the CBECS sample according to age. A small, color-coded bar chart in the upper right-hand corner of the graphic shows the median EUI for each age range. The color of each range coordinates with the points on the line graph, organized according to each end use.

IPCCR Lighting - the analysis of a series of graphs pertaining to lighting control strategies, lighting systems, daylighting, and the relation between building sample sizes.

Number of Lighting Control Strategies - this vertical bar chart displays the number of light control strategies used in buildings.

Lighting Control Strategies - this waterfall chart displays the amount of lighting control strategies used in relation to the amount not used based on type.

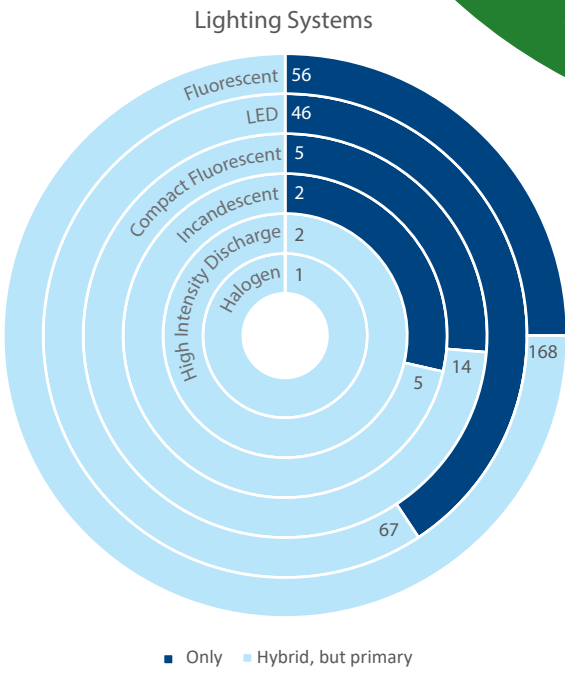
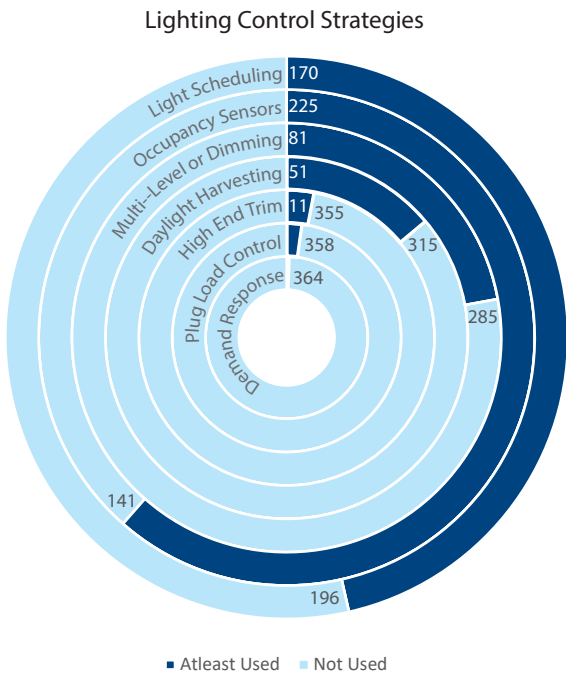
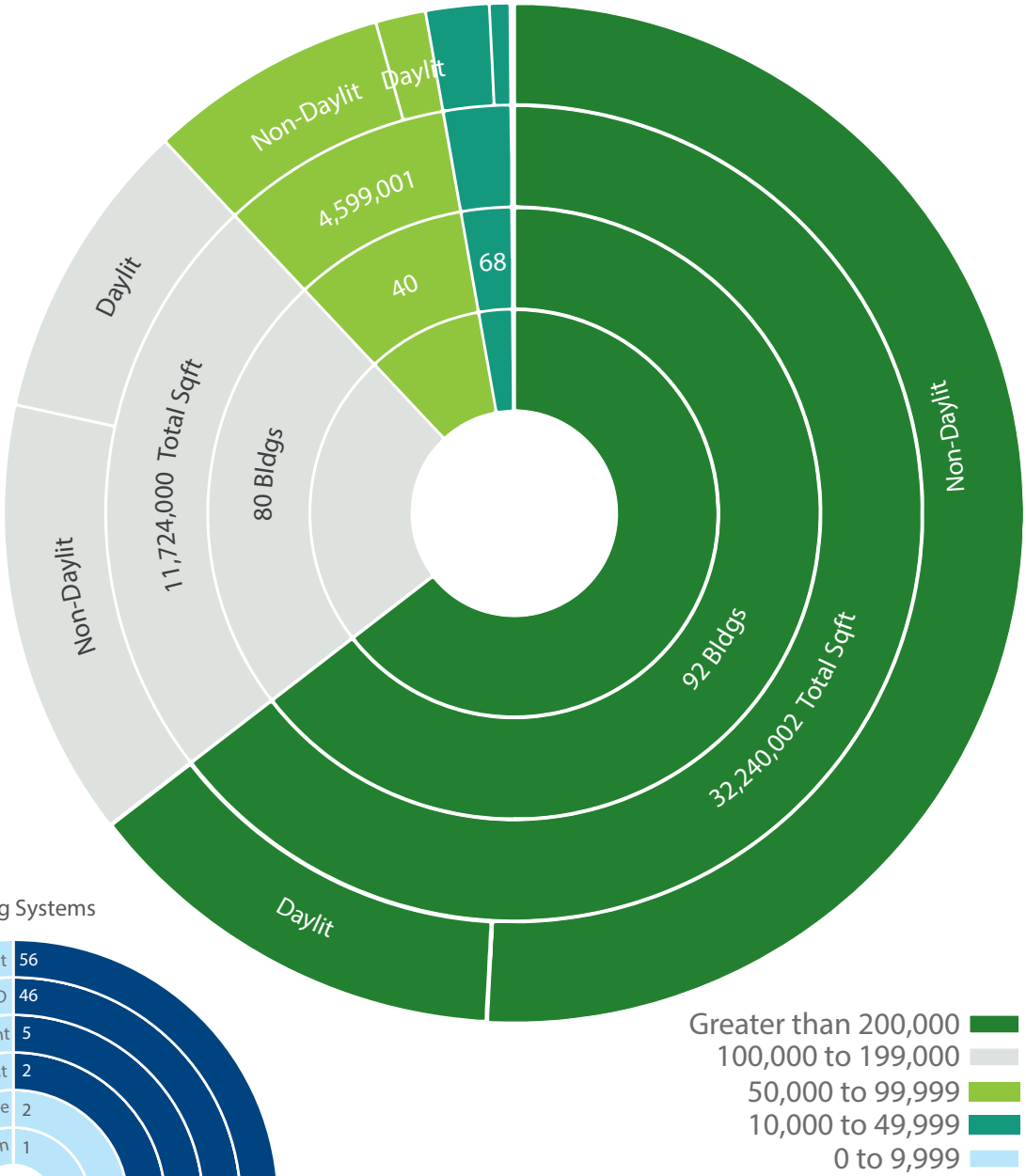
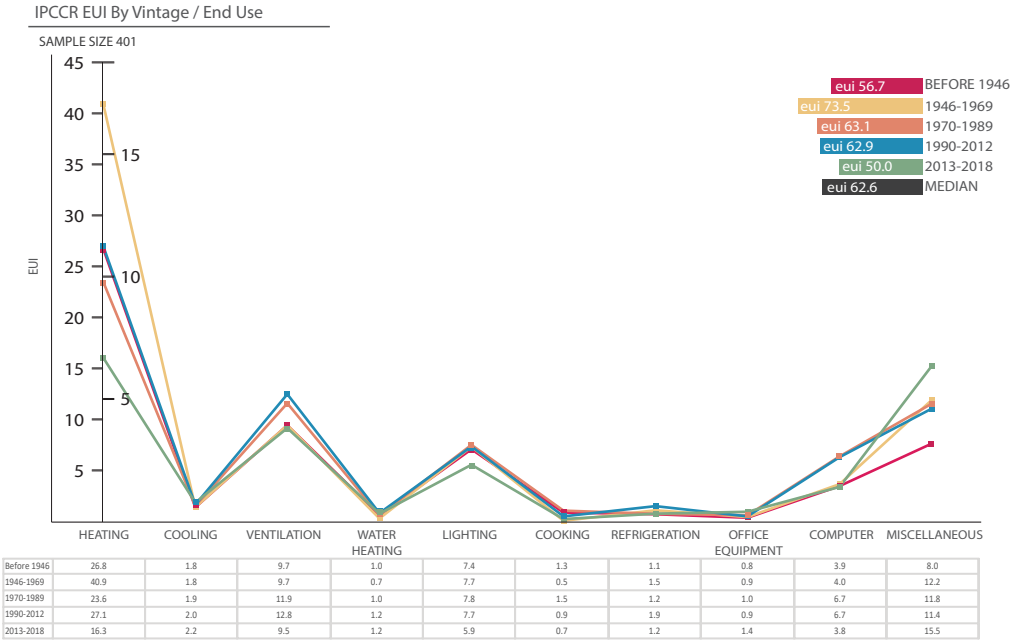
Lighting Systems - This graphic demonstrates the varying types of lighting systems, used and hybrid, encompassing the individual sum within each assorted lighting system.

Total Square Footage - within this graph the total square footage is demonstrated between the area utilizing daylight and area that is not.

All-Daylight Harvesting - this graphic shows how many buildings and what percentage of the sample that actively use daylight harvesting.

Daylit-Daylight Harvesting - this graphic shows how many buildings and what percentage of the sample have floorplans that are 50% or more daylit based on the International Energy Conservation Code's definition of a daylight zone and are actively use daylight harvesting.

Daylighting Area Sunburst - the final graphic of each series, this sunburst chart contains four categories of information pertaining to the lighting use from the CBECS sample according to number of buildings, total square footage measured, and in relation to the square footage what of that is Daylit versus Non-Daylit. A small, color-coded bar chart in the upper left-hand corner of the graphic shows the median EUI for each age range. The color of each range coordinates with the points on the line graph, organized according to each end use.



survey history

1992 survey	1995 survey	1999 survey	2003 survey	2012 survey	2018 survey
6,380 buildings	6,313 buildings	6,639 buildings	7,288 buildings	6,720 buildings	6,436 buildings
82% response rate	86% response rate	87% response rate	91% response rate	70.3% response rate	54.7% response rate