

Data Visualization CBECS

created by:



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December 29, 2012

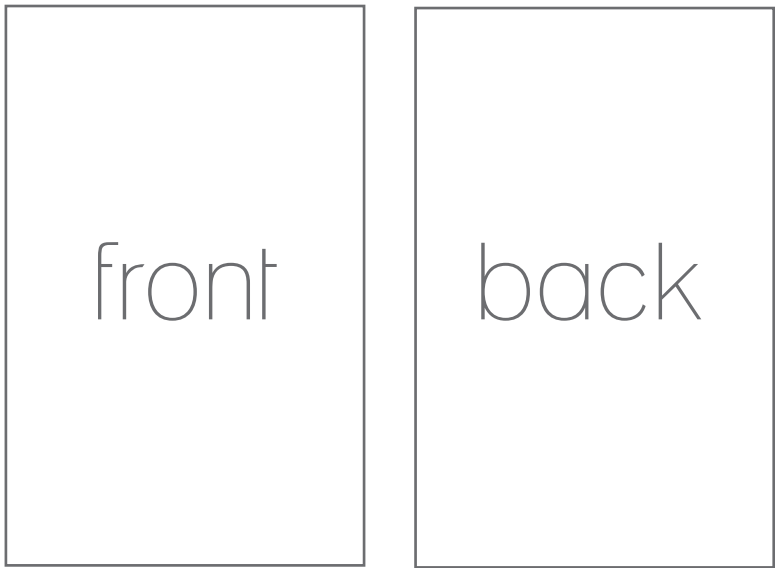
The following series of infographics shows how four different building types consume energy on both a regional and national level. The data used to create them has been gathered from The Commercial Buildings Energy Consumption Survey (CBECS), which is a national-level sample survey of commercial buildings 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/>

five 11x17 infographics



four building types



chart descriptions

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.

50% or More Daylit – 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.

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 IPCCR 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. The full report can be found on the UI-IDL website here:

<http://idlboise.com/papers/energy-use-indices-selected-idaho-buildings>

back page

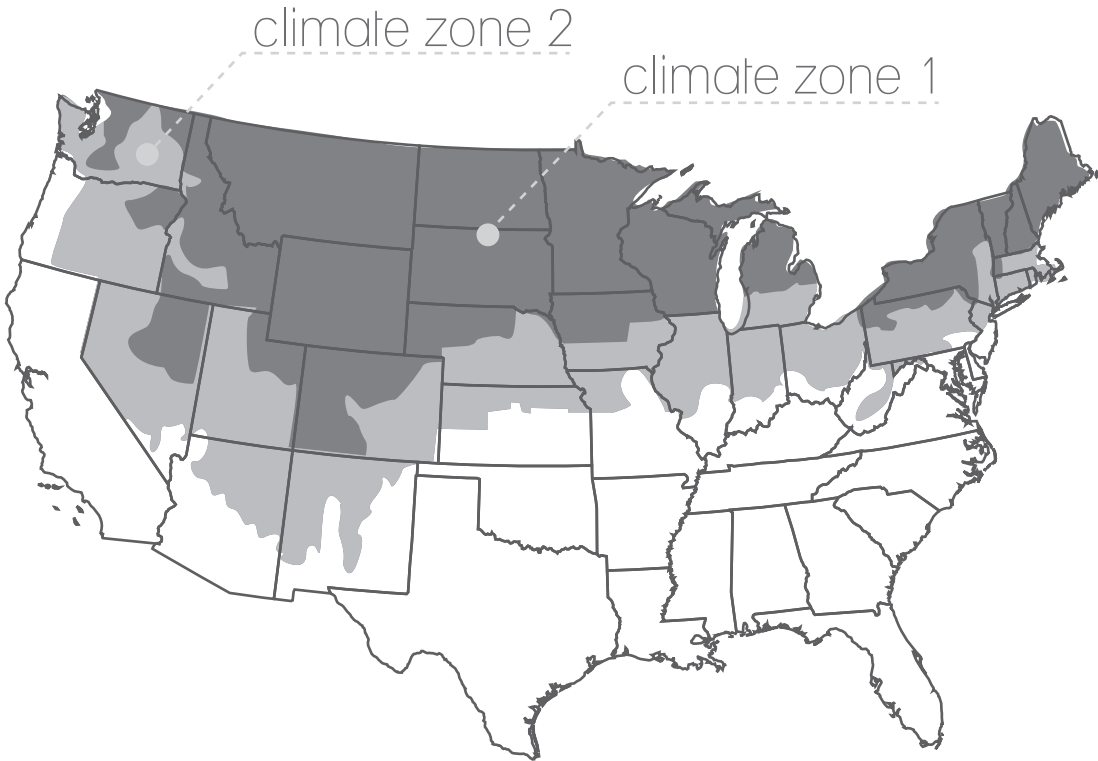
IPCCR EUI by HVAC Characteristics - the most complex graphic in the series, this set of wind-rose style pie charts communicates a multitude of information about how the sample's different HVAC systems consume energy. The different petals of the pie charts represent the breakdown of different HVAC types 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 horizontal bar chart displays the amount 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 vertical bar chart.

IPCCR by Vintage / End Use - the final graphic of each series, 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.



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

survey history

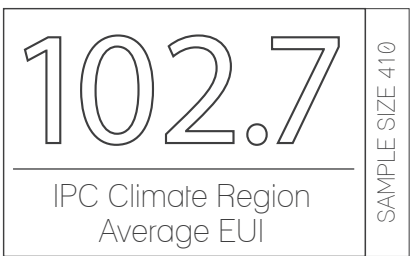
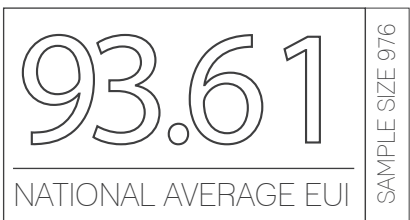
1992 survey	1995 survey	1999 survey	2003 survey
6,380 buildings	6,313 buildings	6,639 buildings	7,288 buildings
82% response rate	86% response rate	87% response rate	91% response rate

summary EUI charts (kBtu/sf-yr)

see individual infographics for end use breakdown information

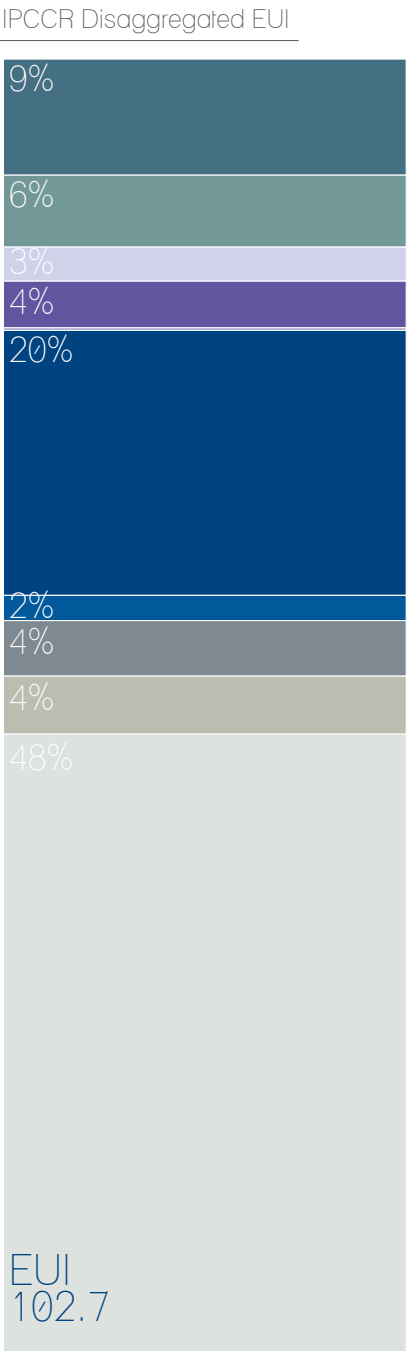


CBECS: OFFICE



37 out of 410

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating



The CBECS classifies buildings according to their “principal building activity (PBA)” at the time when the survey is completed. The PBA is defined as the primary business, commerce, or function within each building. For projects with multiple activity classifications, the activity that occupies the most floorspace ultimately defines the usage type category. Buildings are also classified into more specific sub-categories of activities, which are reflected in the “National Office Activity Breakdown” chart below.

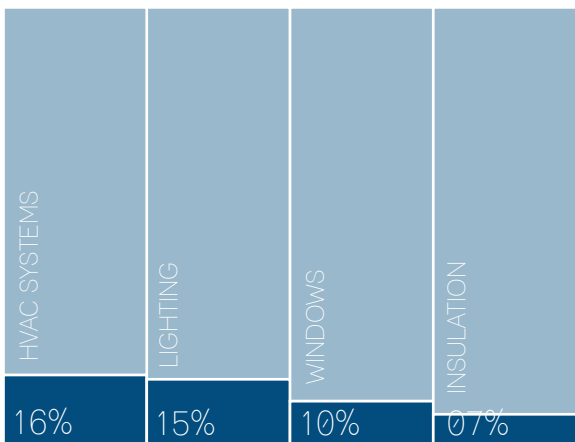
The CBECS website specifically defines the office principal building activity as “Buildings used for general office space, professional office, or administrative offices. Medical offices are included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).”

More information on building activity definitions can be found on the CBECS website located here:

http://www.eia.gov/emeu/cbecs/building_types.html#Office

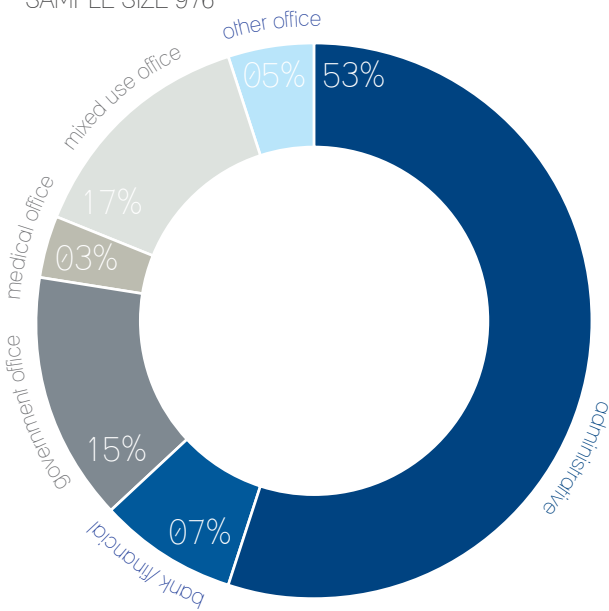
IPCCR % of Buildings with Renovations

SAMPLE SIZE 410



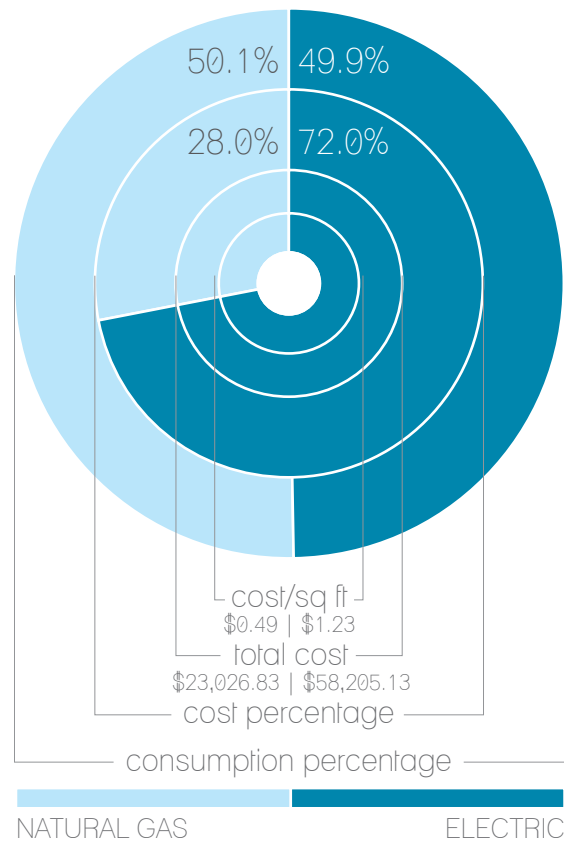
National Office Activity Breakdown

SAMPLE SIZE 976



IPCCR Utility Breakdown

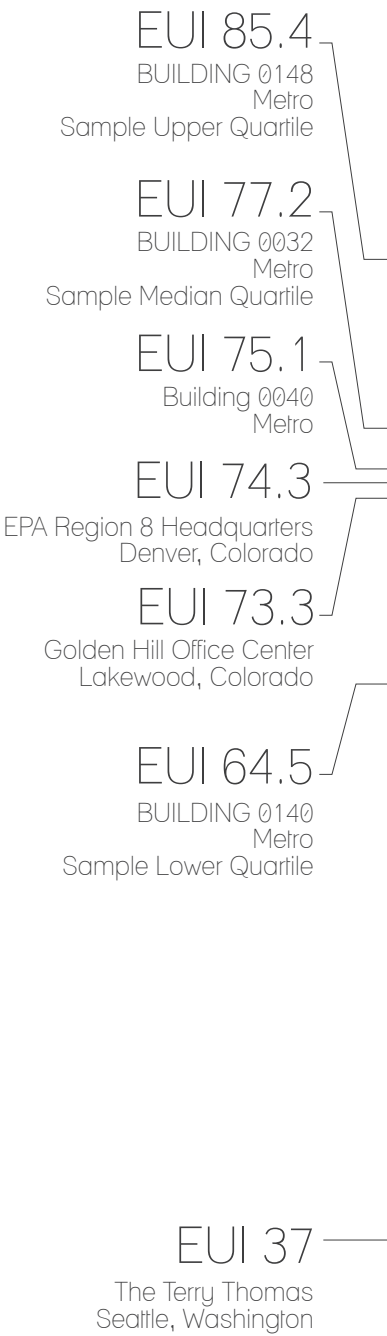
SAMPLE SIZE 263



created by:

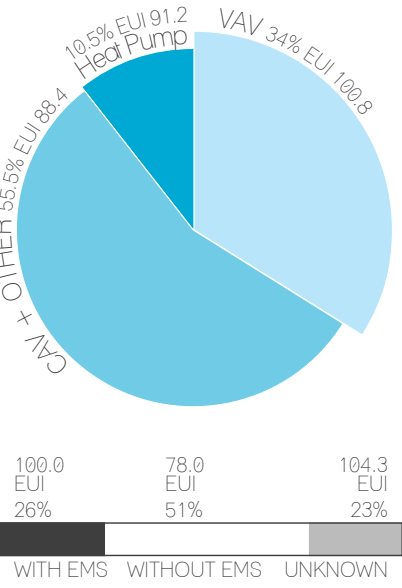


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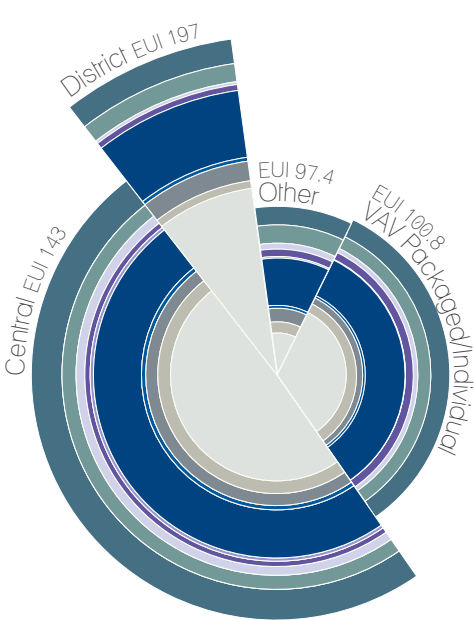


IPCCR EUI by HVAC Characteristics

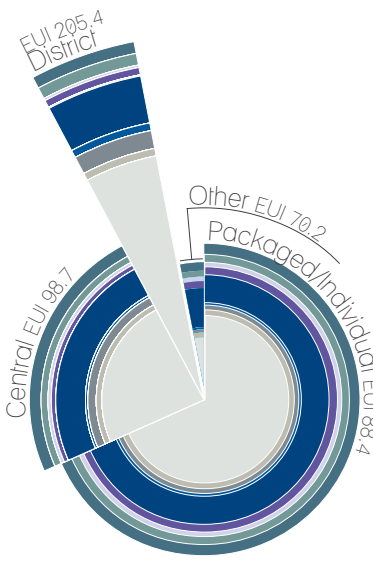
SAMPLE SIZE 382



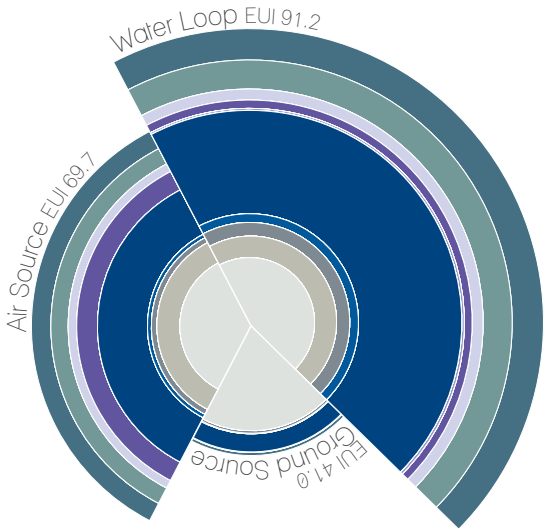
BUILDINGS WITH EMS
SAMPLE SIZE 382



VAV CHARACTERISTICS
SAMPLE SIZE 130



CAV + OTHER CHARACTERISTICS
SAMPLE SIZE 212

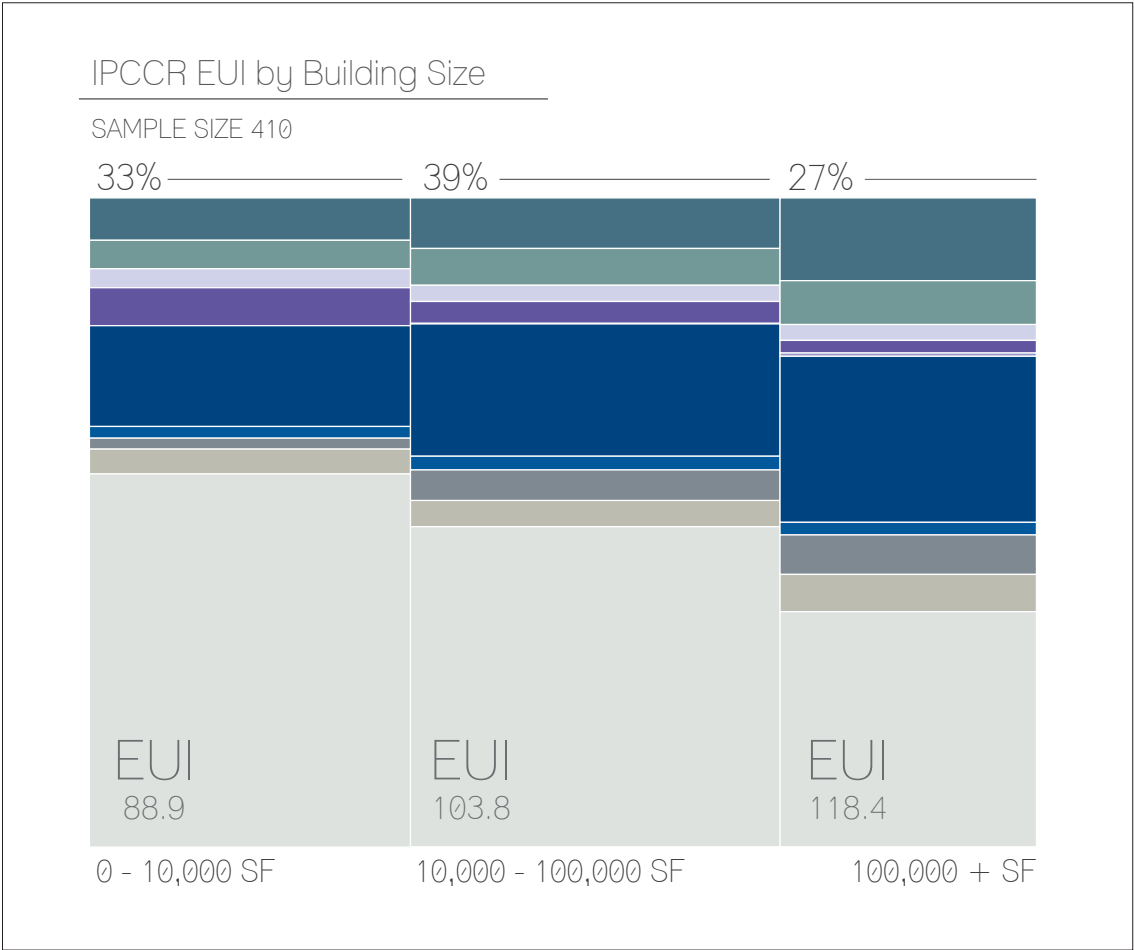
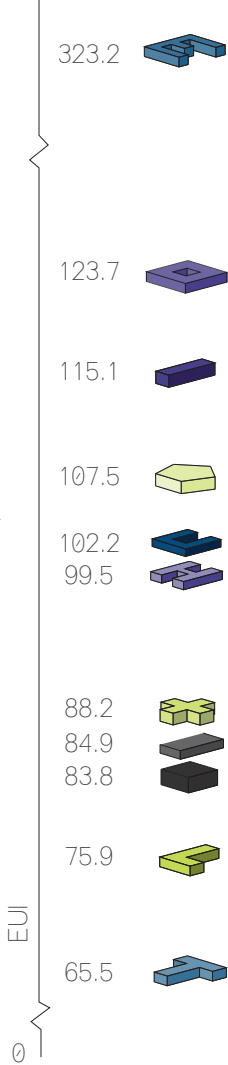
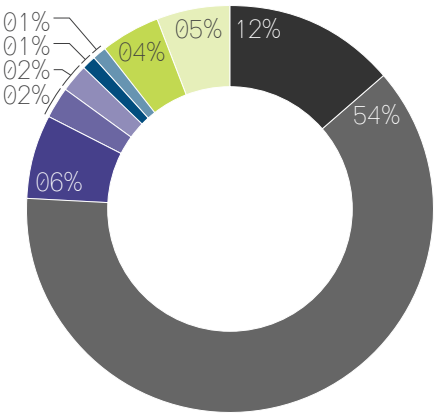


HEAT PUMP CHARACTERISTICS
SAMPLE SIZE 40

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

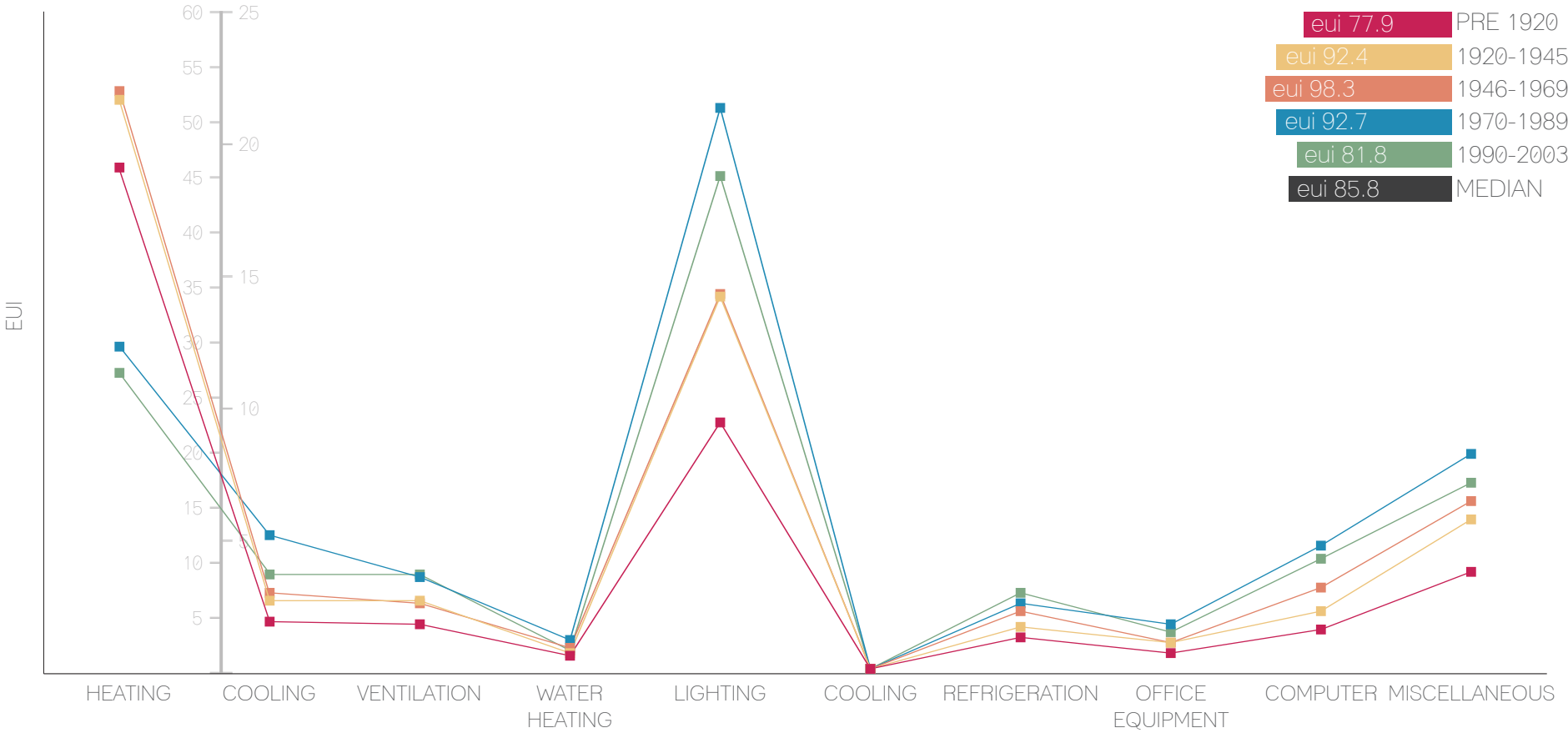
IPCCR EUI by Building Shape

SAMPLE SIZE 360

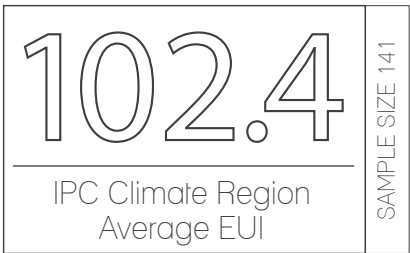
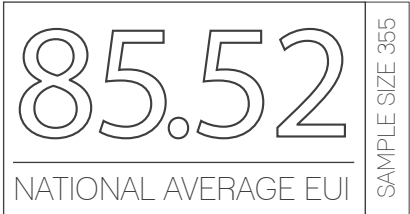


IPCCR EUI By Vintage / End Use

SAMPLE SIZE 401



CBECS: RETAIL

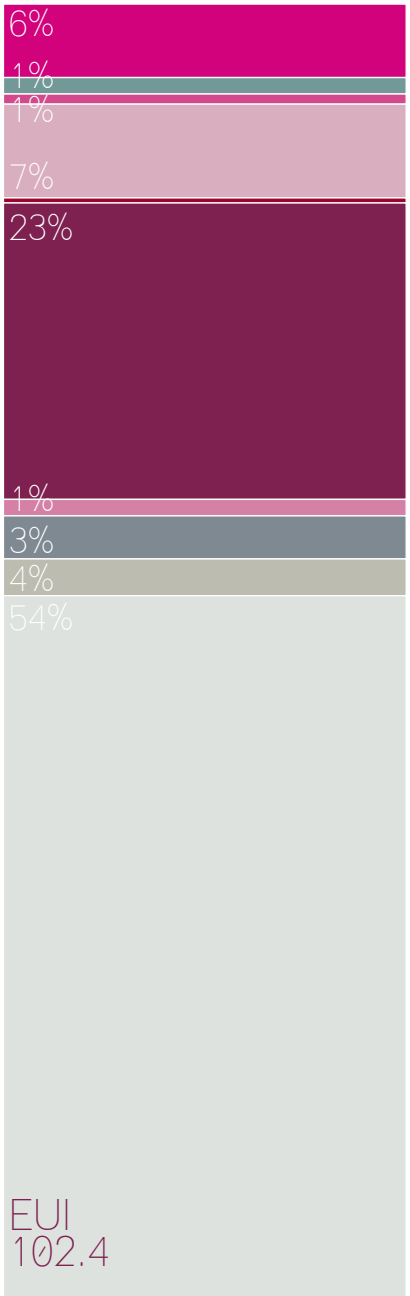


00%, 50% OR MORE DAYLIT

0 out of 141

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

IPCCR Disaggregated EUI



The CBECS classifies buildings according to their “principal building activity (PBA)” at the time when the survey is completed. The PBA is defined as the primary business, commerce, or function within each building. For projects with multiple activity classifications, the activity that occupies the most floorspace ultimately defines the usage type category. Buildings are also classified into more specific sub-categories of activities, which are reflected in the “National Retail Activity Breakdown” chart below.

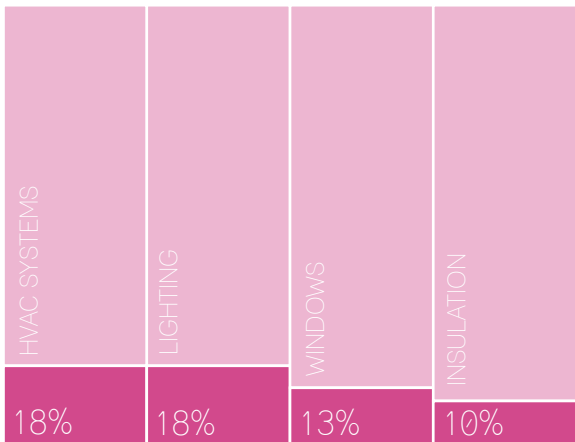
The CBECS website specifically defines the retail PBA (referred to as “mercantile”) as “Buildings used for the sale and display of goods other than food.”

More information on building activity definitions can be found on the CBECS website located here:

http://www.eia.gov/emeu/cbecs/building_types.html#Office

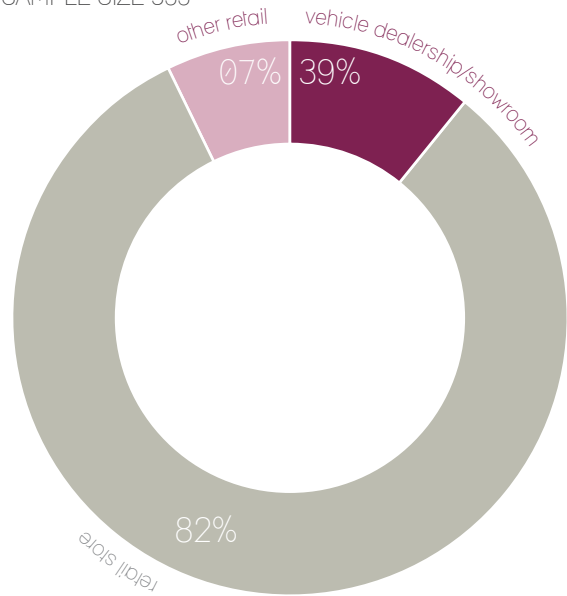
IPCCR % of Buildings with Renovations

SAMPLE SIZE 141



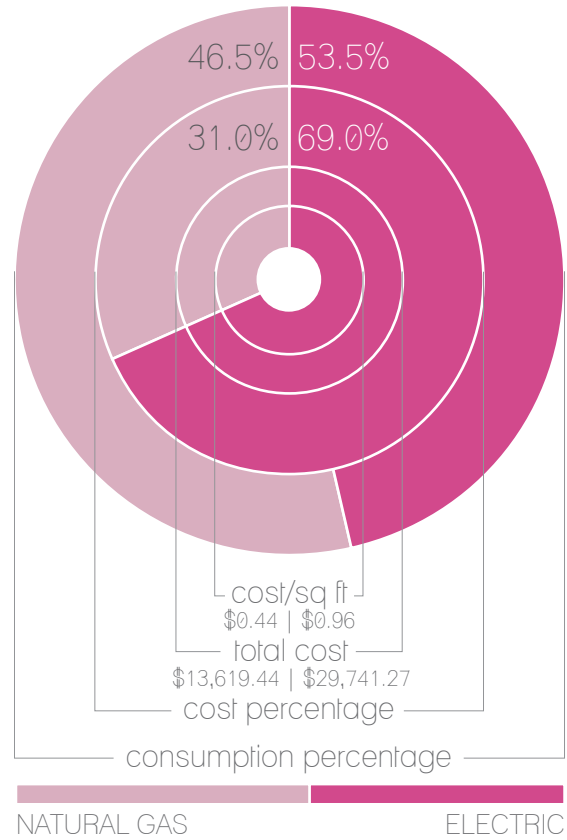
National Retail Activity Breakdown

SAMPLE SIZE 355



IPCCR Utility Breakdown

SAMPLE SIZE 103



created by:

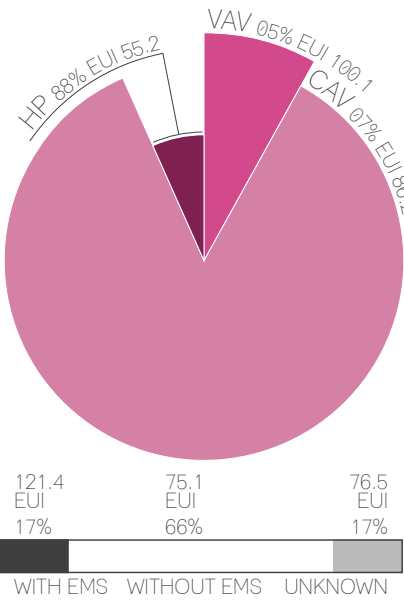


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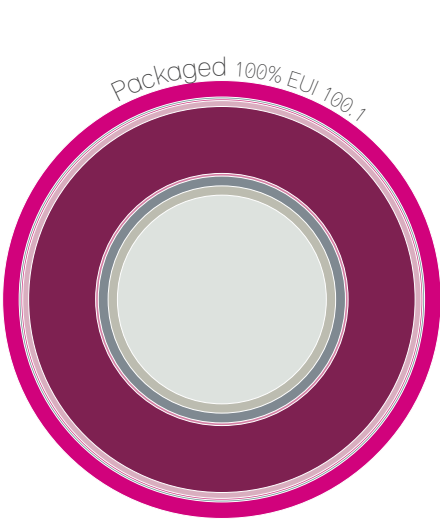


IPCCR EUI by HVAC Characteristics

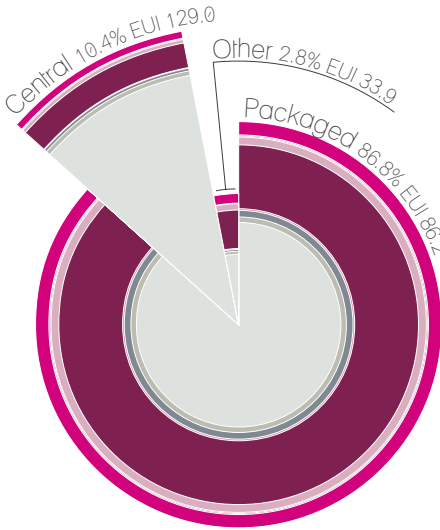
SAMPLE SIZE 106



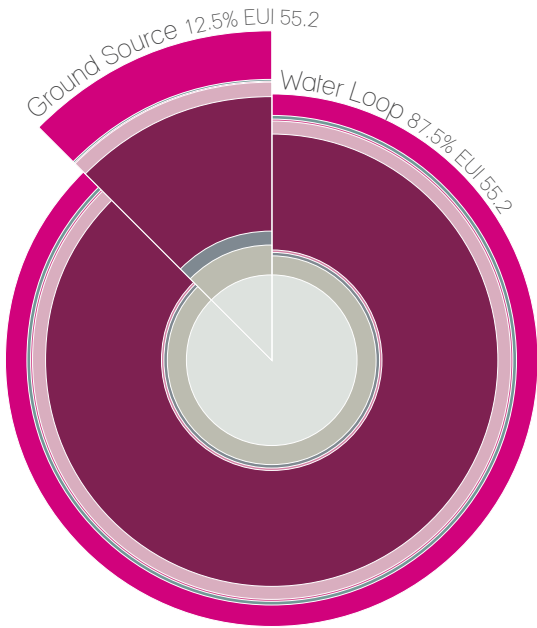
BUILDINGS WITH EMS
SAMPLE SIZE 138



VAV CHARACTERISTICS
SAMPLE SIZE 10



CAV + OTHER CHARACTERISTICS
SAMPLE SIZE 106

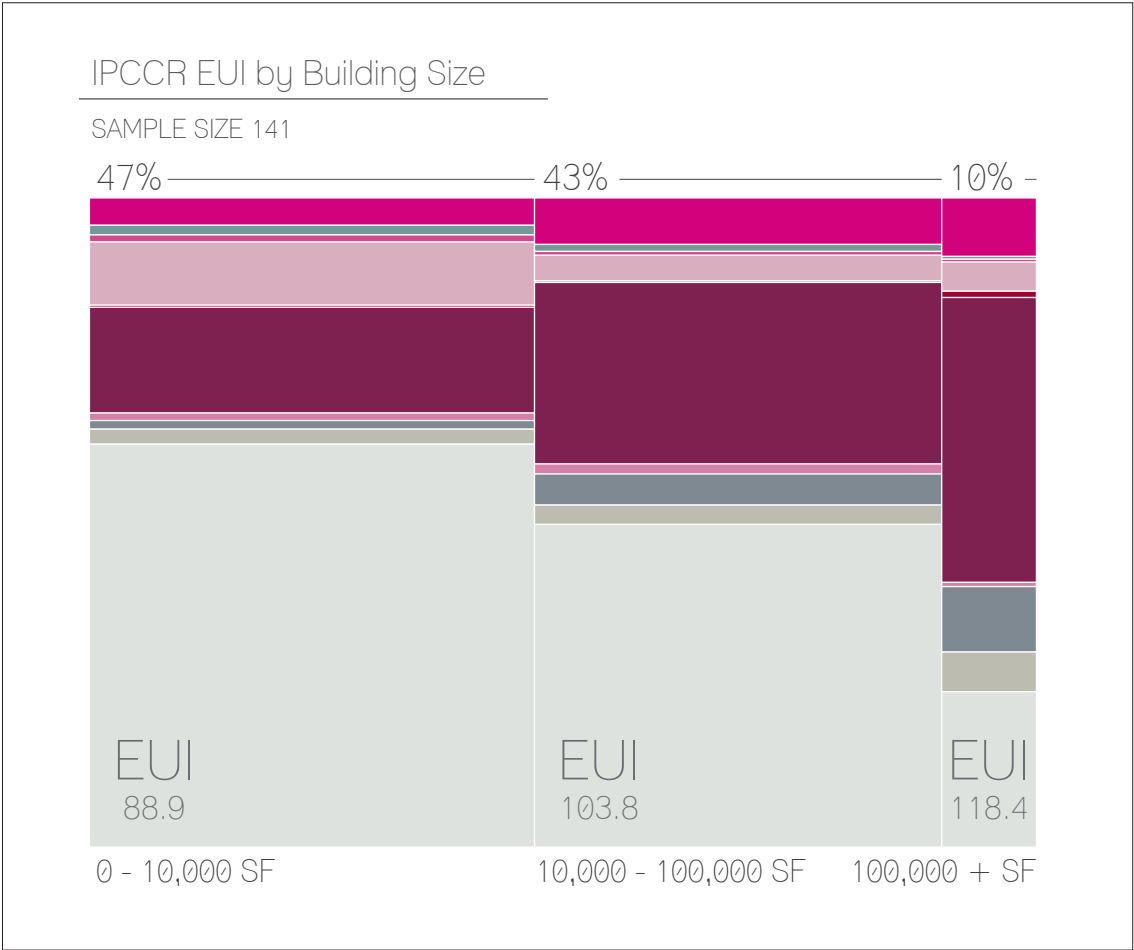
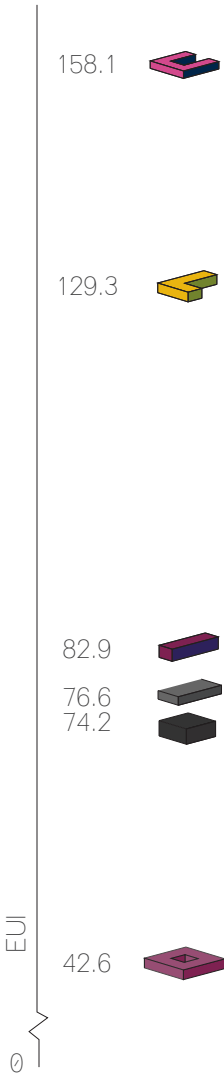
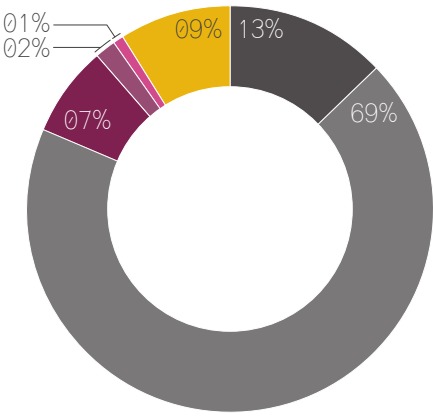


HEAT PUMP CHARACTERISTICS
SAMPLE SIZE 8

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

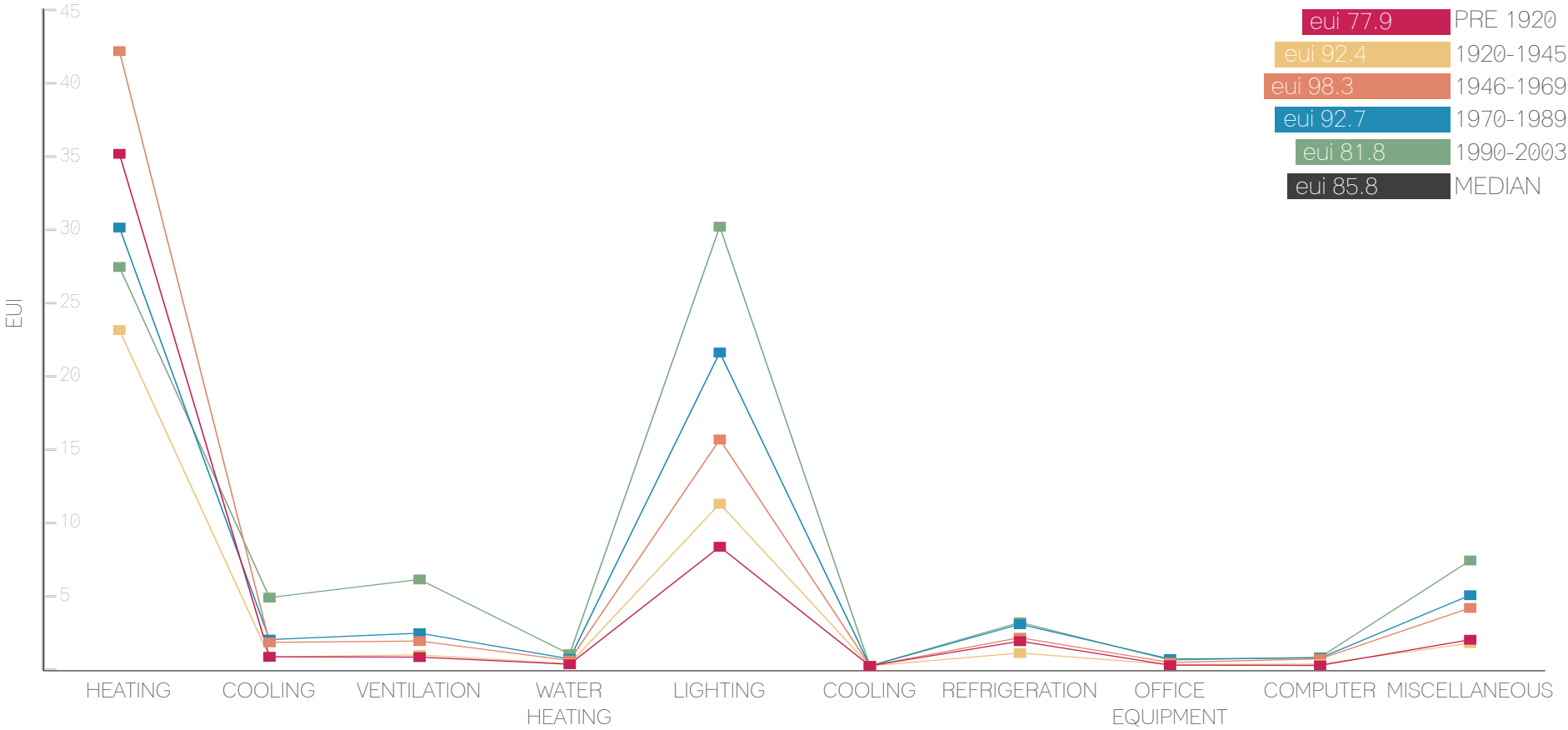
IPCCR EUI by Building Shape

SAMPLE SIZE 124

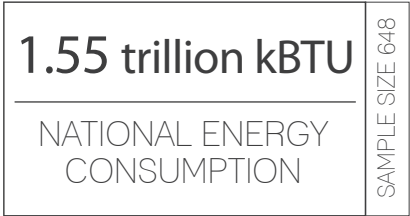
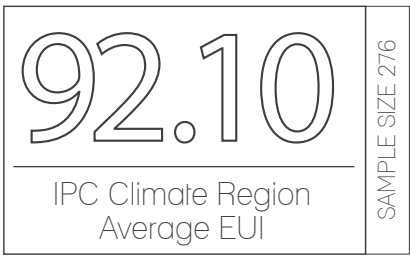
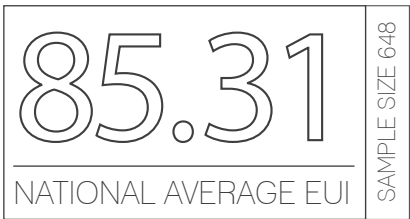


IPCCR EUI By Vintage / End Use

SAMPLE SIZE 401



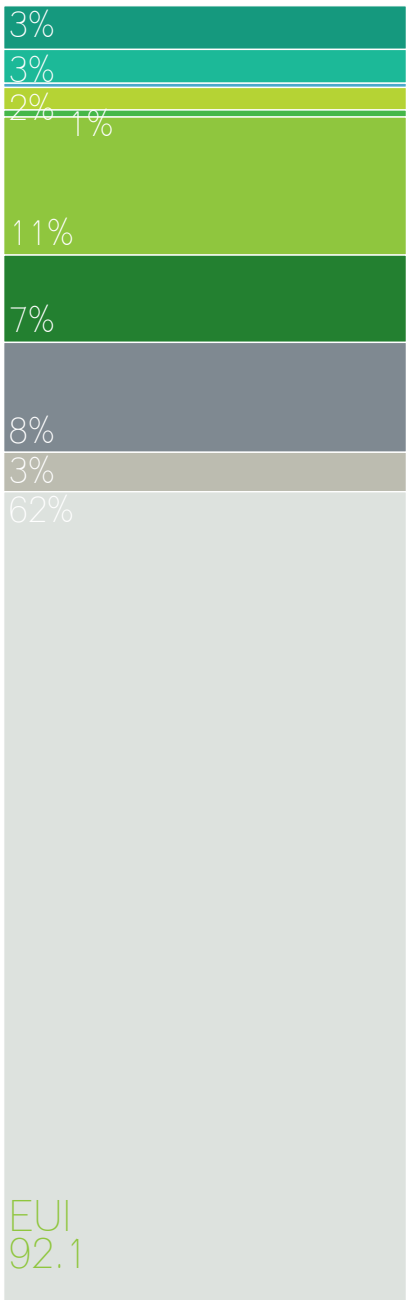
CBECS: EDUCATION



38 out of 276

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

IPCCR Disaggregated EUI



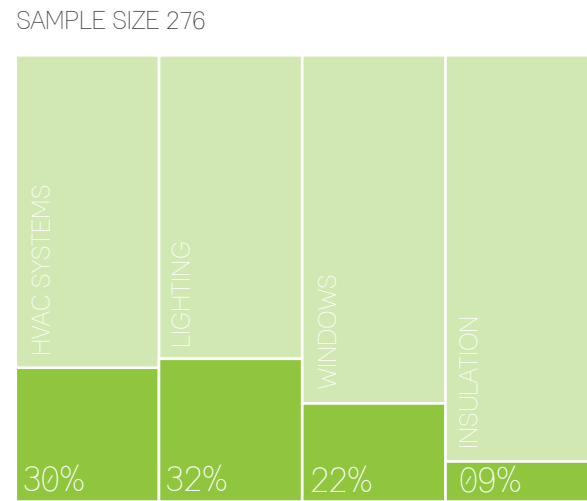
The CBECS classifies buildings according to their “principal building activity (PBA)” at the time when the survey is completed. The PBA is defined as the primary business, commerce, or function within each building. For projects with multiple activity classifications, the activity that occupies the most floorspace ultimately defines the usage type category. Buildings are also classified into more specific sub-categories of activities, which are reflected in the “National Office Activity Breakdown” chart below.

The CBECS website specifically defines the education PBA as “Buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not classroom are included in the category relating to their use. For example, administration buildings are part of “Office,” dormitories are “Lodging,” and libraries are “Public Assembly.”

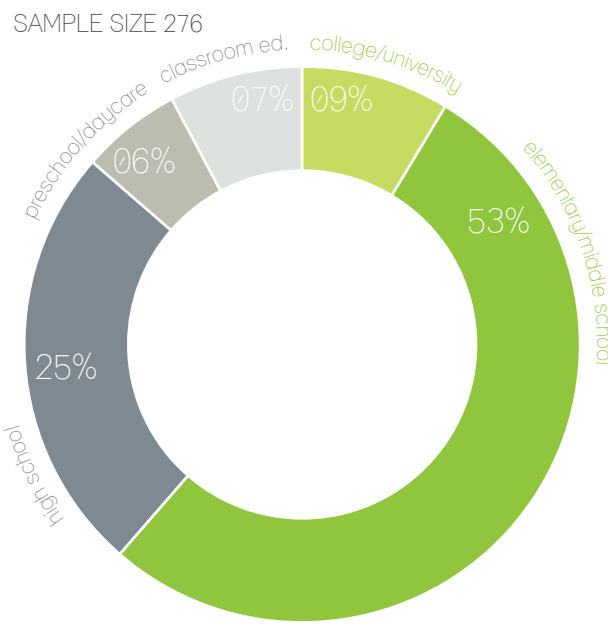
More information on building activity definitions can be found on the CBECS website located here:

http://www.eia.gov/emeu/cbecs/building_types.html#Office

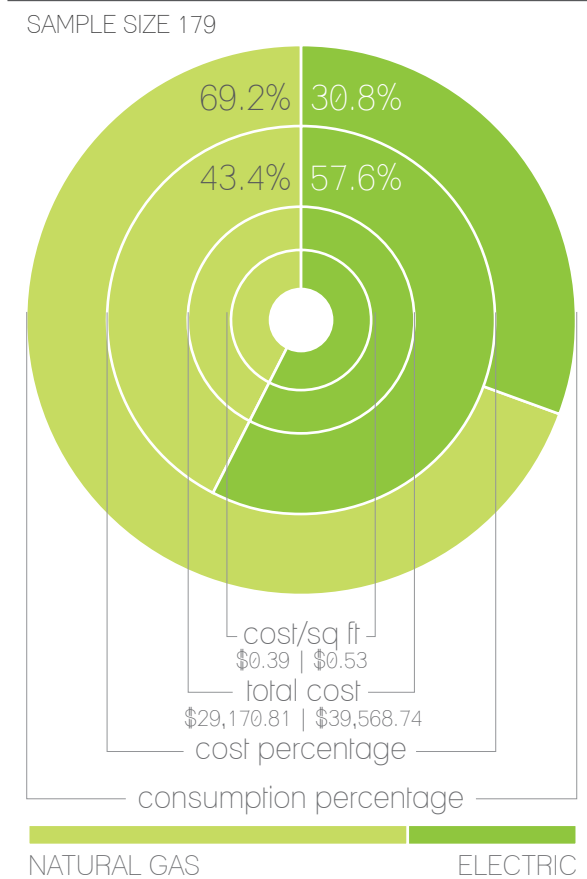
IPCCR % of Buildings with Renovations



National Education Activity Breakdown



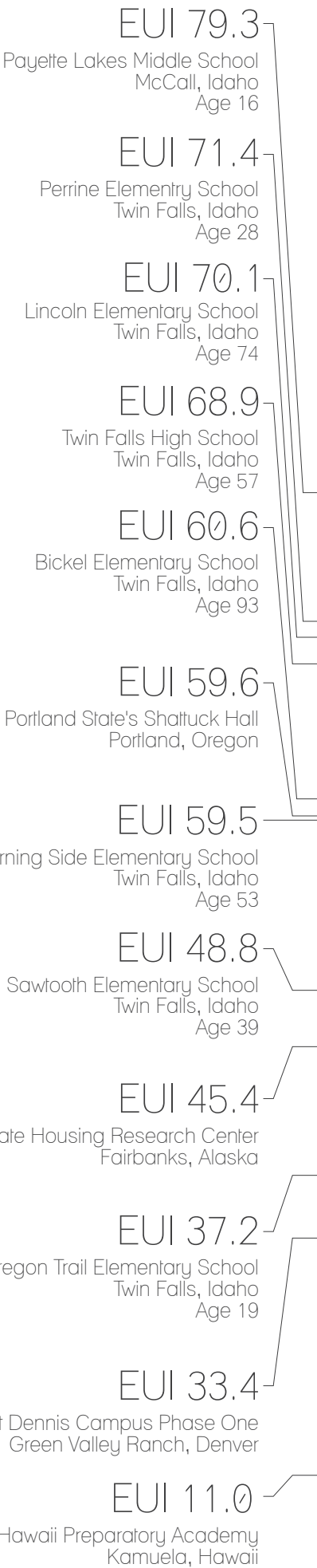
IPCCR Utility Breakdown



created by:

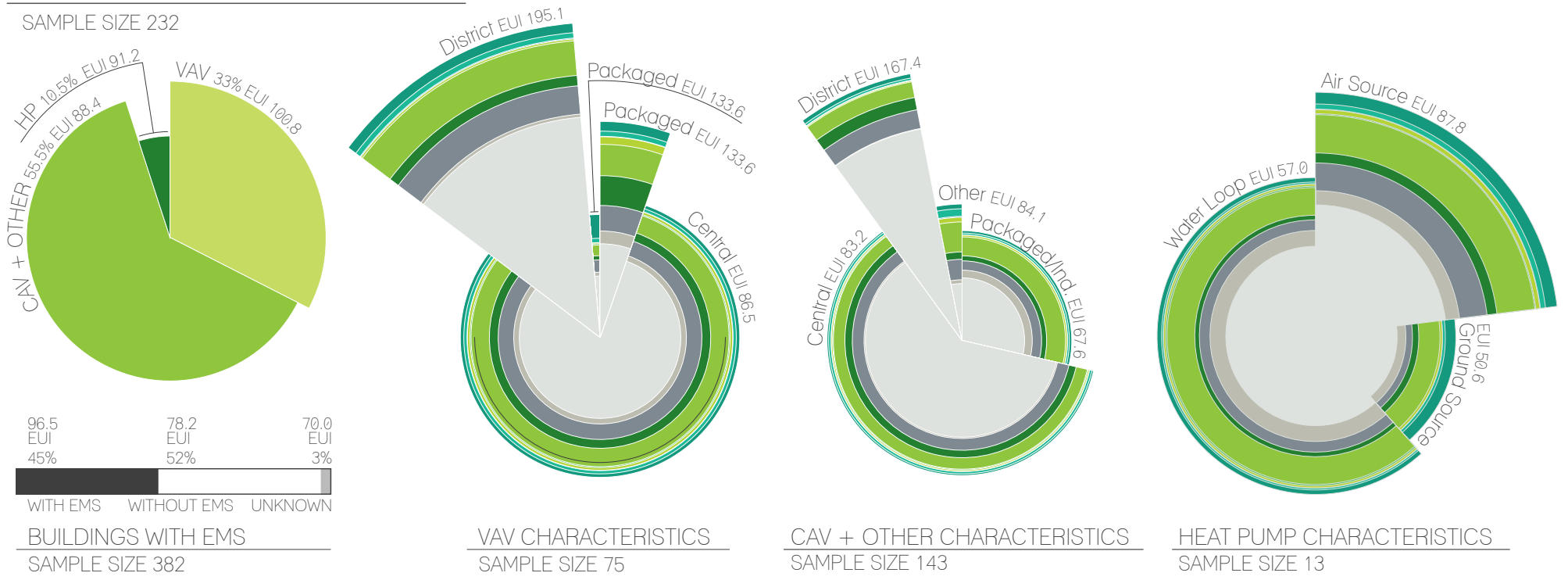


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IPCCR EUI by HVAC Characteristics

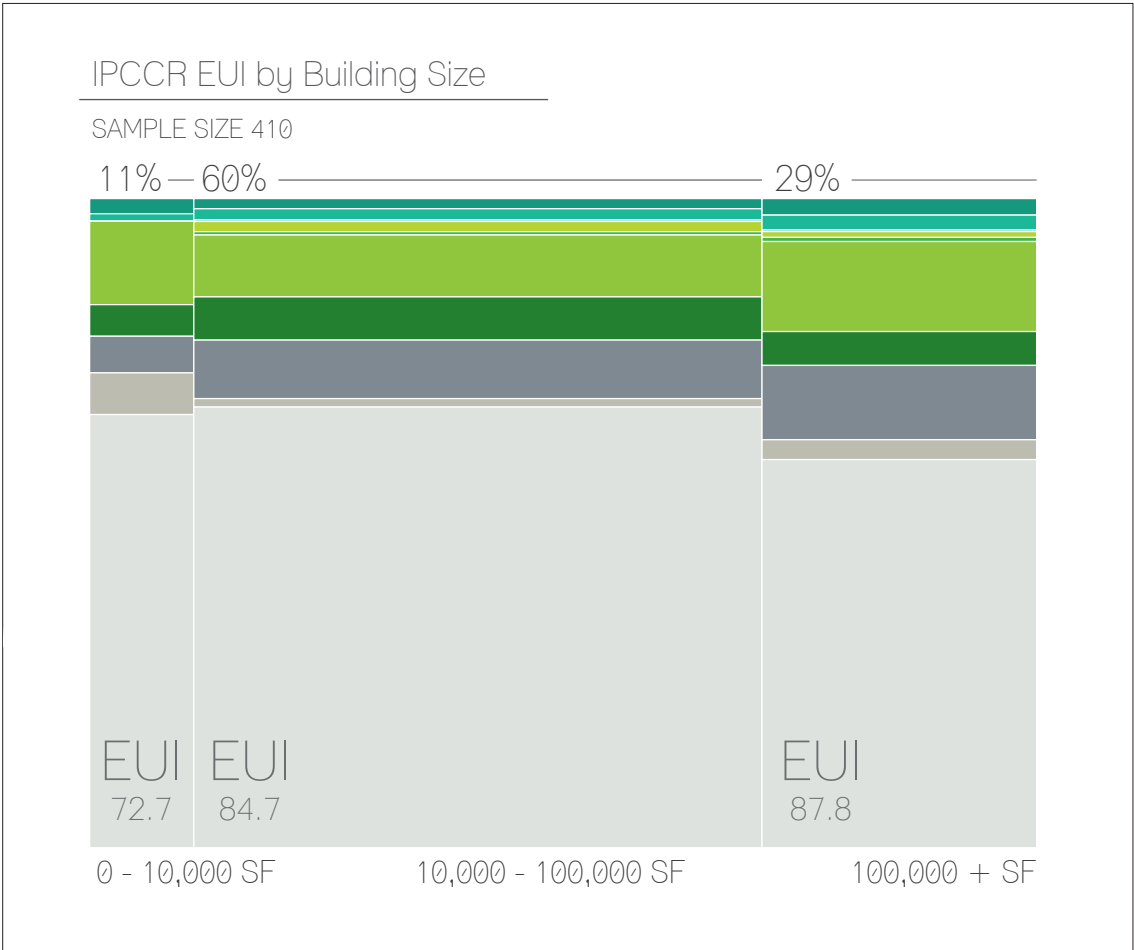
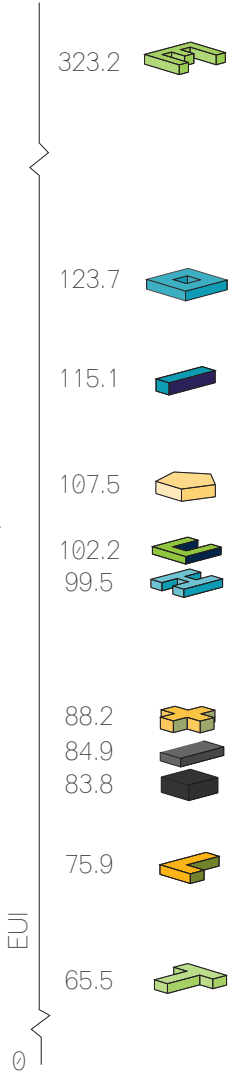
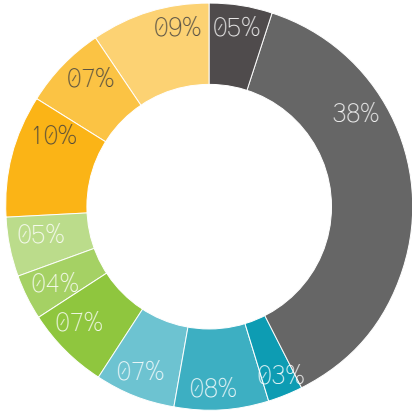
SAMPLE SIZE 232



- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

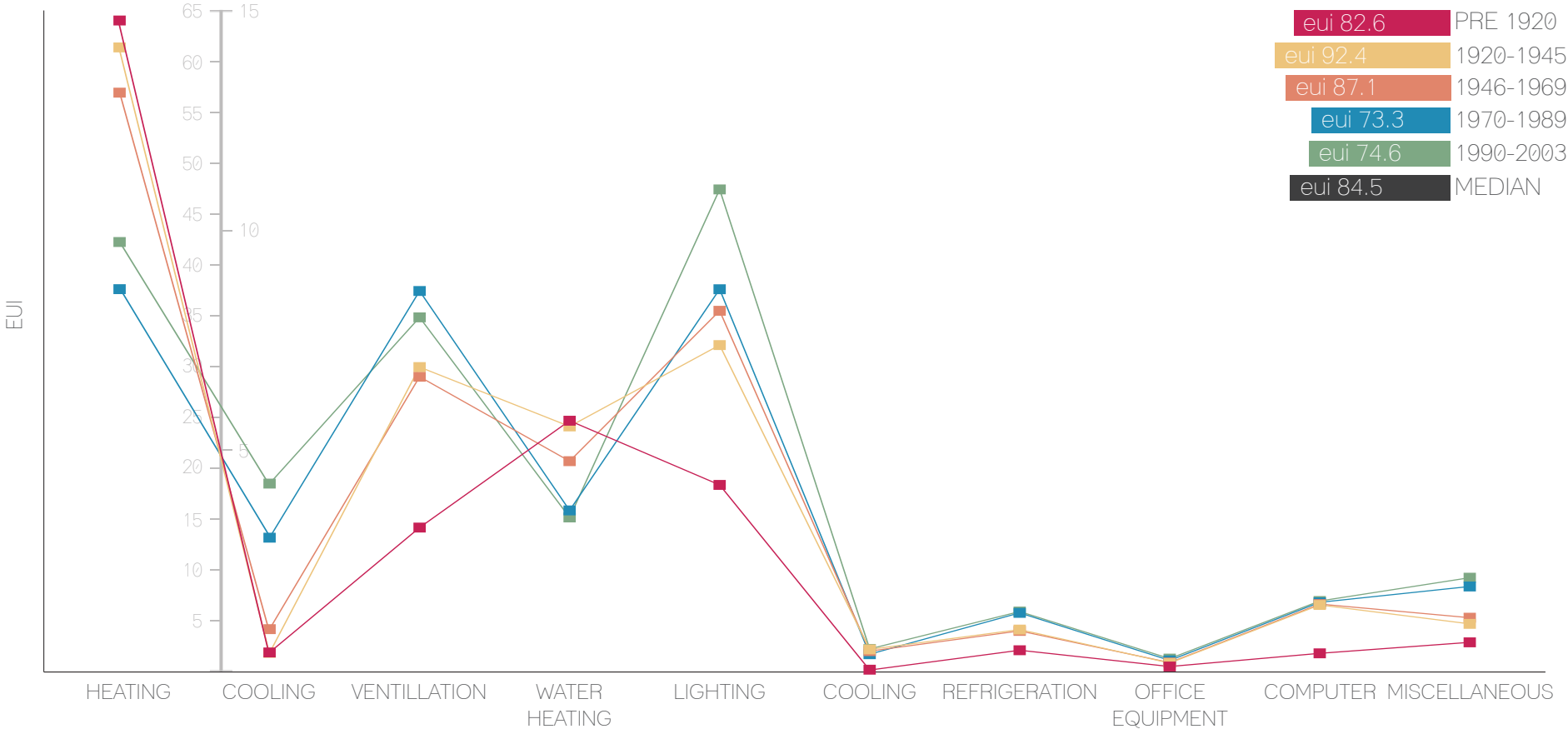
IPCCR EUI by Building Shape

SAMPLE SIZE 360

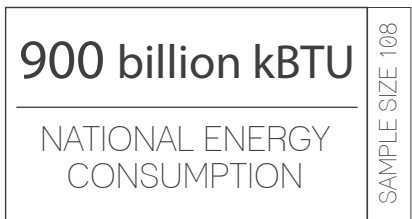
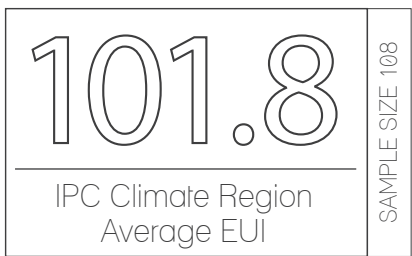
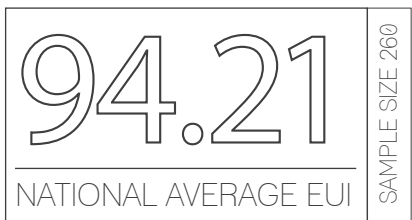


IPCCR EUI By Vintage / End Use

SAMPLE SIZE 276



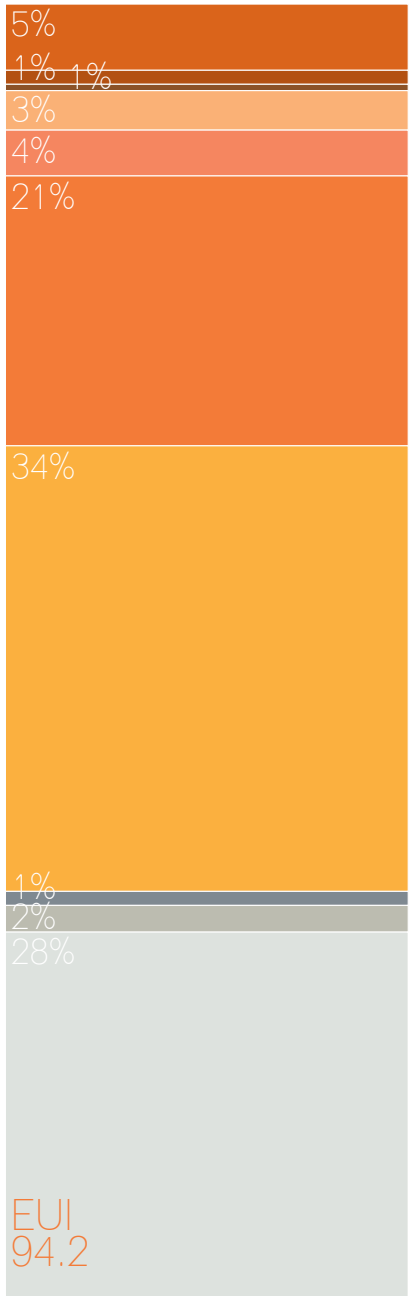
CBECS: LODGING



34 out of 108

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

IPCCR Disaggregated EUI



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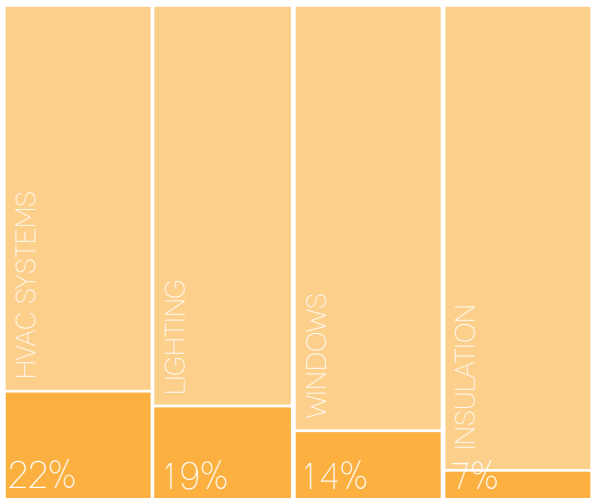
The CBECS website specifically defines the lodging principal building activity as “Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.”

More information on building activity definitions can be found on the CBECS website located here:

http://www.eia.gov/emeu/cbeecs/building_types.html#Office

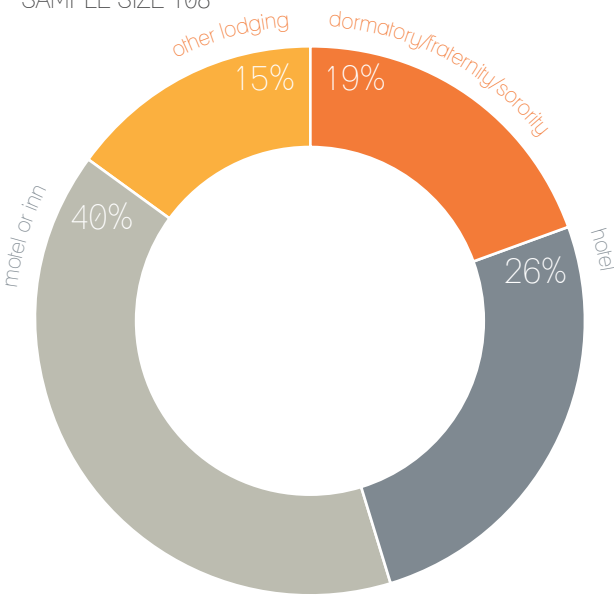
IPCCR % of Buildings with Renovations

SAMPLE SIZE 108



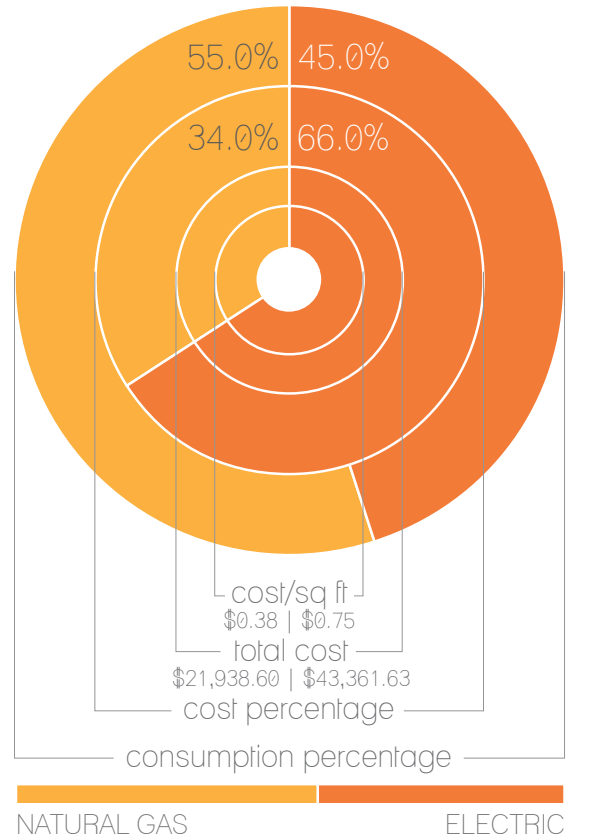
National Lodging Activity Breakdown

SAMPLE SIZE 108



IPCCR Utility Breakdown

SAMPLE SIZE 66



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EUI 80.3
IDL EUI STUDY: BUILDING 0057
Southern
Sample Upper Quartile

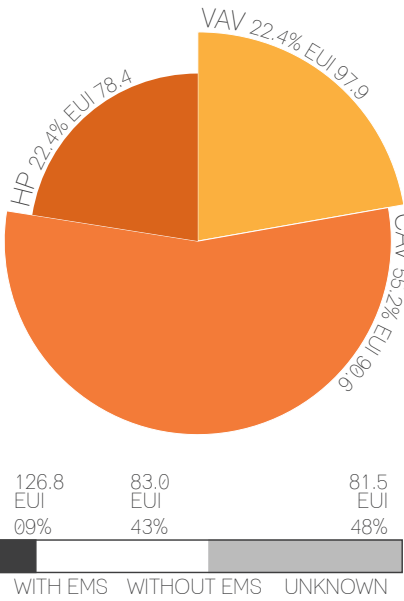
EUI 72.9
Roberts Hall at Lewis & Clark College
Portland, Oregon

EUI 44.1
IDL EUI STUDY: BUILDING 0052
Southern
Sample Lower Quartile

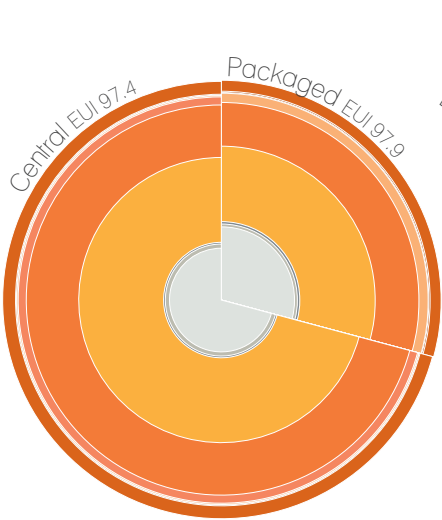
EUI 30.4
Bremerton BEQ
Bremerton, Washington

IPCCR EUI by HVAC Characteristics

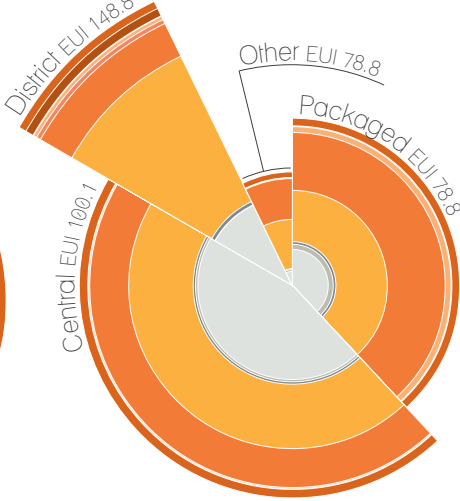
SAMPLE SIZE 76



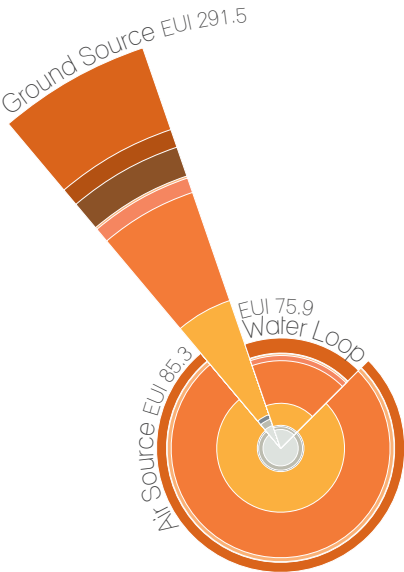
BUILDINGS WITH EMS
SAMPLE SIZE 88



VAV CHARACTERISTICS
SAMPLE SIZE 17



CAV + OTHER CHARACTERISTICS
SAMPLE SIZE 42

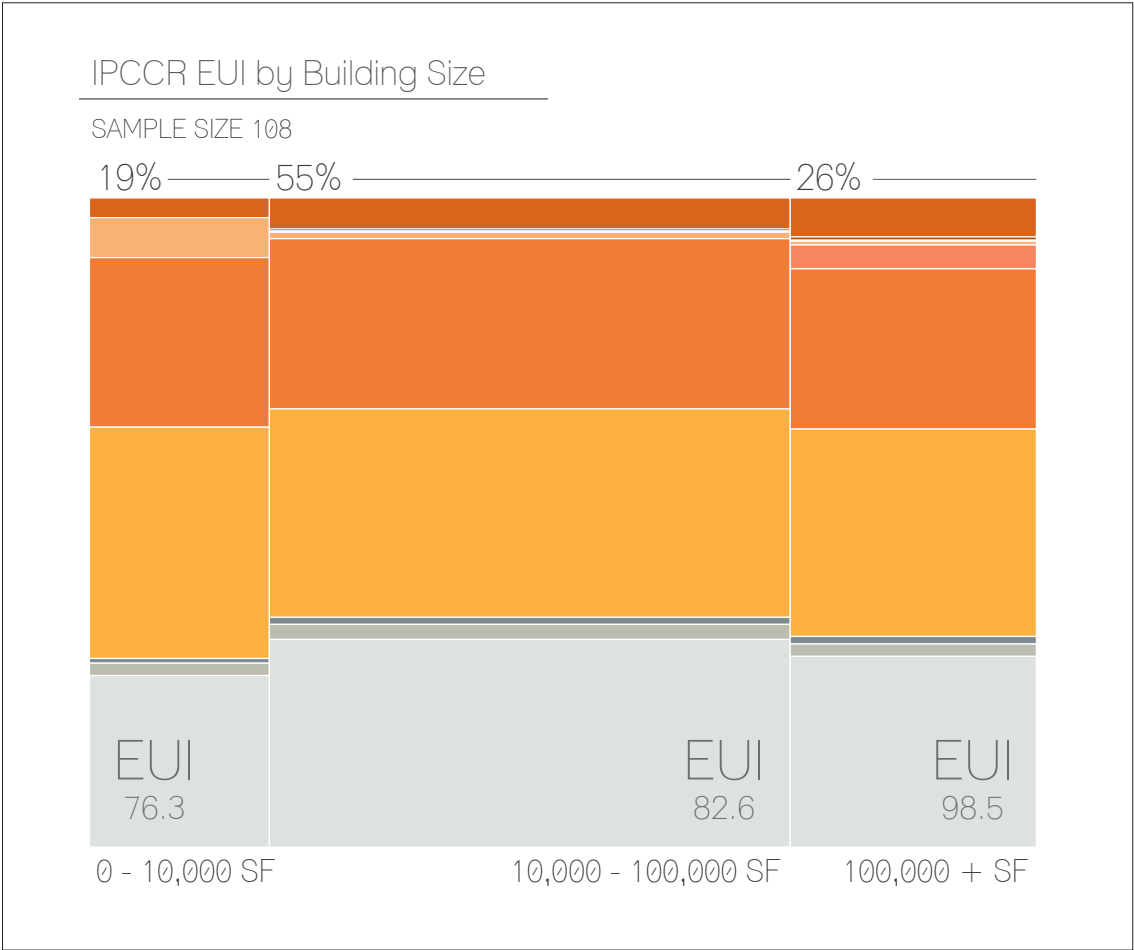
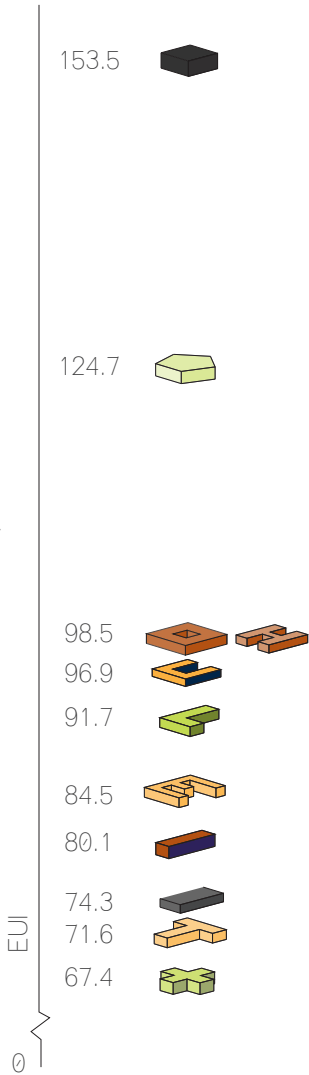
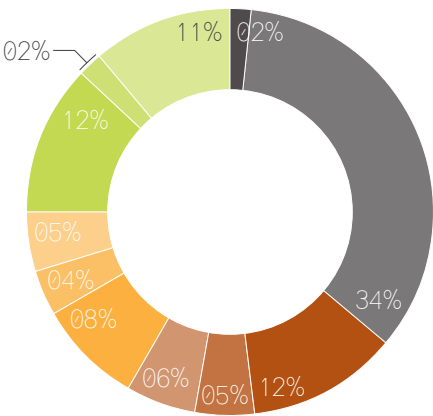


HEAT PUMP CHARACTERISTICS
SAMPLE SIZE 17

- miscellaneous
- computer
- office equipment
- refrigeration
- cooking
- lighting
- water heating
- ventillation
- cooling
- heating

IPCCR EUI by Building Shape

SAMPLE SIZE 108



IPCCR EUI By Vintage / End Use

SAMPLE SIZE 108

