

Leveraging Benchmarking Data for Behavior Change

Lessons from Seattle



BECC 2016

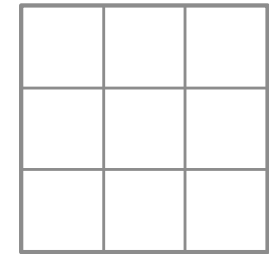
October 20, 2016

BENCHMARKING IN SEATTLE

- Commercial, multifamily, and municipal
- Buildings of 20,000+ square feet
- Phased in by 2012



3,300+
buildings



260 Million
square feet



76
Median
ENERGY STAR
Score



99%
Compliance

BENCHMARKING THEORY

- 1) Buildings report energy use in Portfolio Manager
- 2) Portfolio manager generates EUI and ENERGY STAR Score



4) Behavior change!

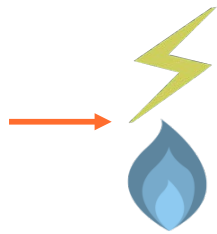
3) Building stakeholders engage with results

THEORY INTO PRACTICE

1) Buildings report energy use in Portfolio Manager

2) Portfolio manager generates EUI and ENERGY STAR Score

2.5) Seattle & EMI collect, clean, correct, and communicate results



ENERGY STAR®
PortfolioManager®



SEATTLE OFFICE OF
**Sustainability
& Environment**



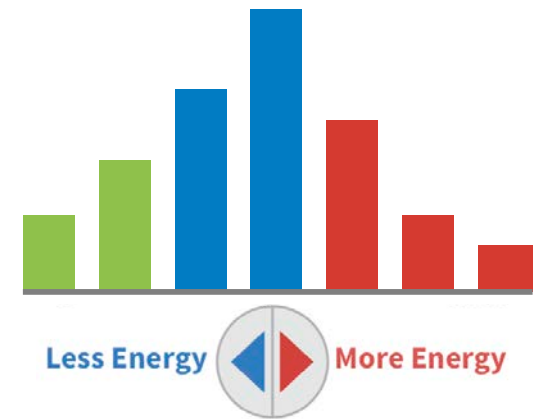
4) Behavior change!



3) Building stakeholders engage with results

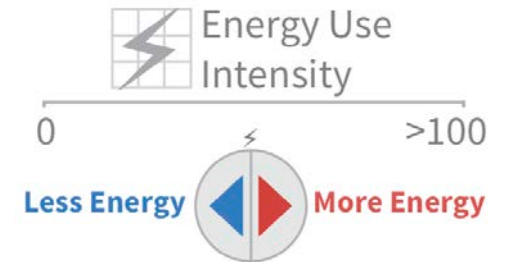
BENCHMARKING & BEHAVIOR

- Descriptive Social Norms
 - Benchmarking allows comparison of an individual to a population
 - Prompt poor performers to take actions to improve
 - **Requires us to communicate relative building efficiency to stakeholders**

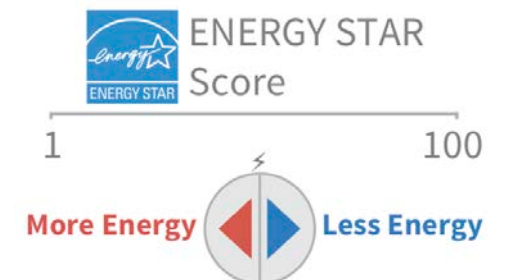


KEY ENERGY EFFICIENCY METRICS

- **EUI (Energy Use Intensity)**
 - Energy per square foot per year
 - kBtu/sf



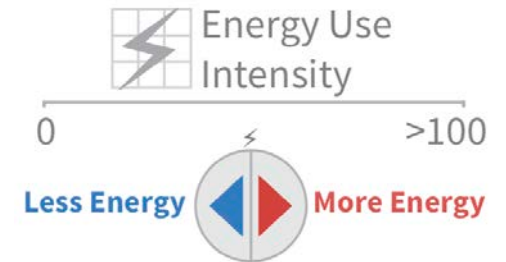
- **ENERGY STAR Score**
 - Modeled percentile of energy usage based on EUI and building & space characteristics
 - 1-100 score



ENERGY METRIC LIMITATIONS

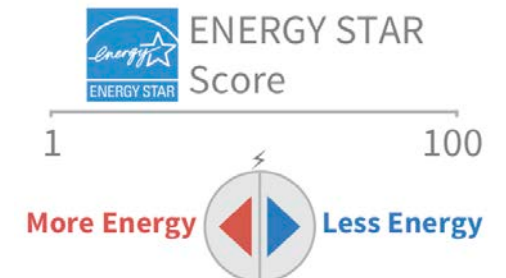
- **EUI: Energy Use Intensity**

- Abstract units
- No reference point for what is a “good” EUI



- **ENERGY STAR Score**

- Requires detailed building data
- Underlying data infrequently updated
 - Median ENERGY STAR score is currently **76** in Seattle

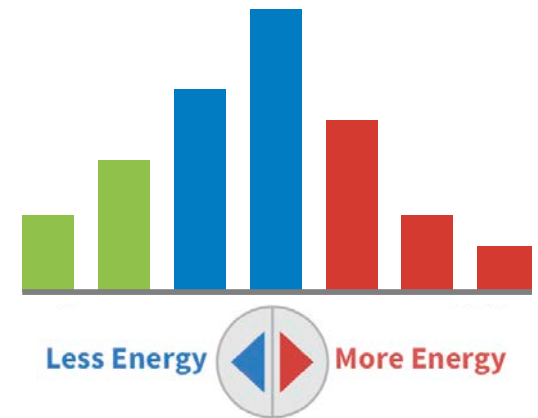


ADDRESSING METRIC LIMITATIONS

- Present energy metrics **relative to other buildings.**

Requires data to be...

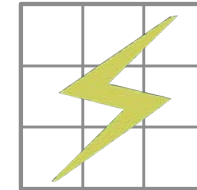
1. **Accurate:** errors are identified and excluded
2. **Relevant:** buildings compared only to peers
3. **Visual:** comparisons are more easily interpretable



ACCURACY: KEY DATA

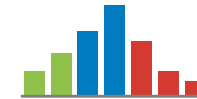
1. EUI: Energy and Floor Area

- All energy types included
- All meters included
- Correct building floor area



2. Building type categorization

- Correct primary space

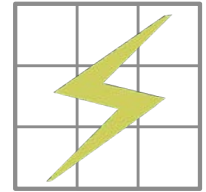


3. Secondary spaces

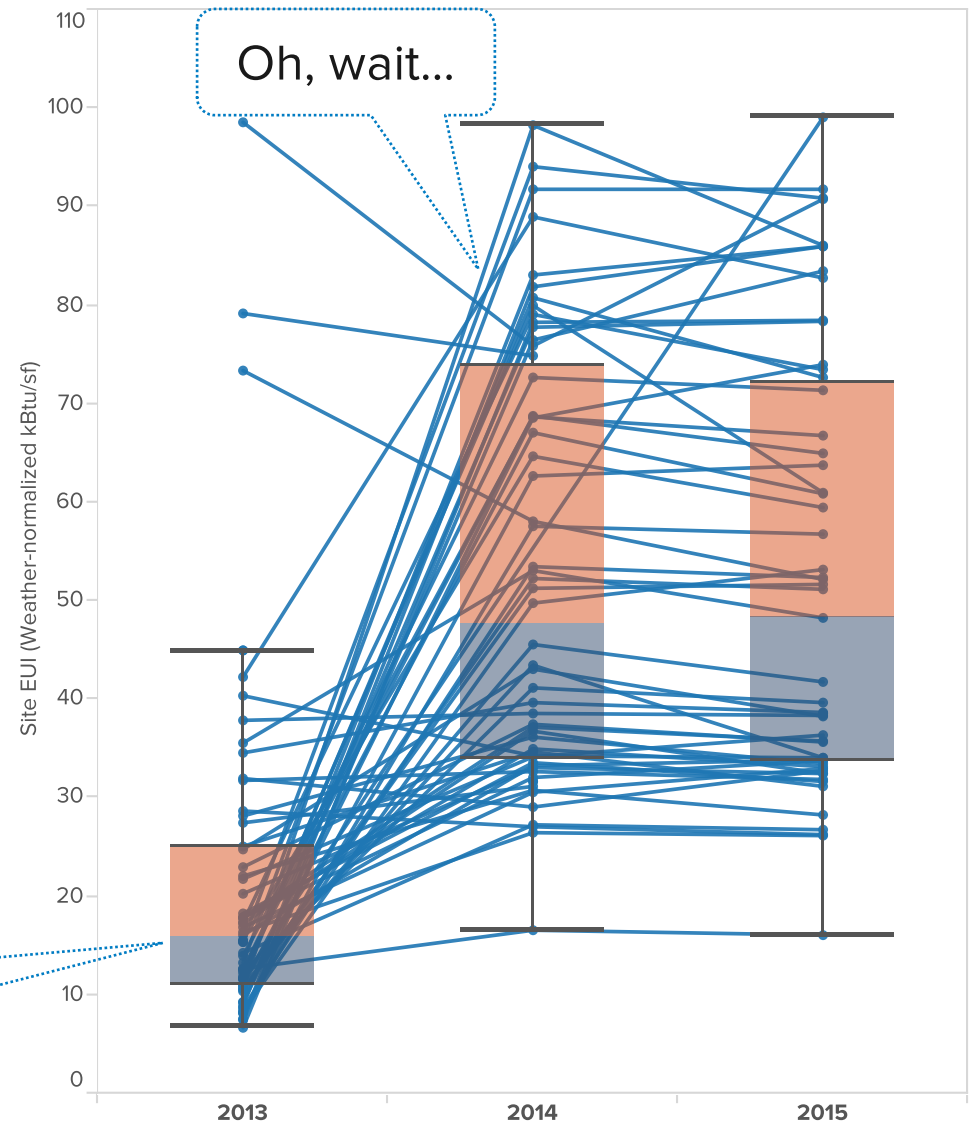
- Included and correctly identified



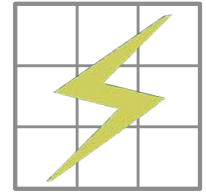
ACCURATE EUI: ENERGY



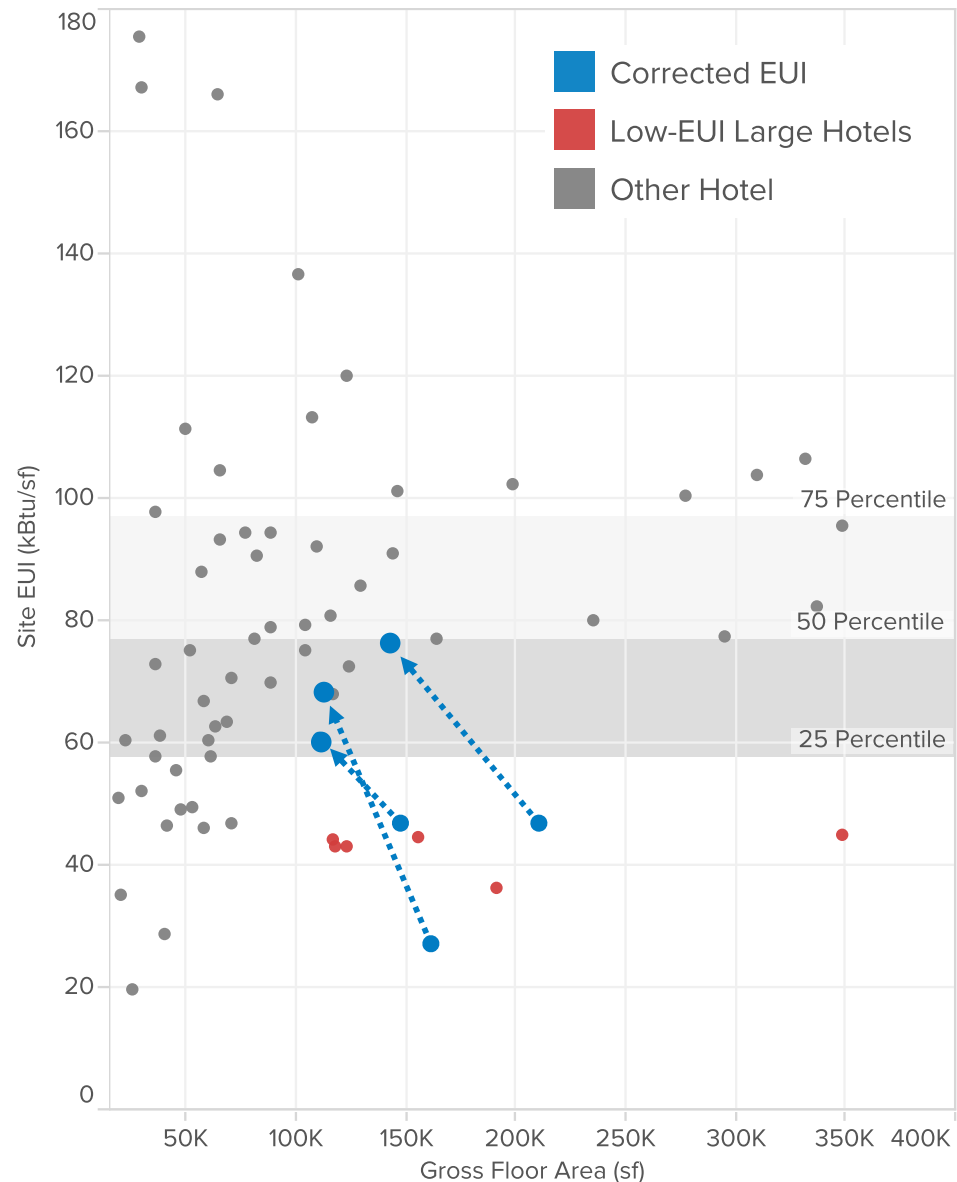
- Are all energy types and meters included?
 - Natural gas and steam are easily omitted
 - Buildings **missing natural gas** in at least one year are shown



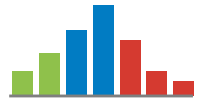
ACCURATE EUI: FLOOR AREA



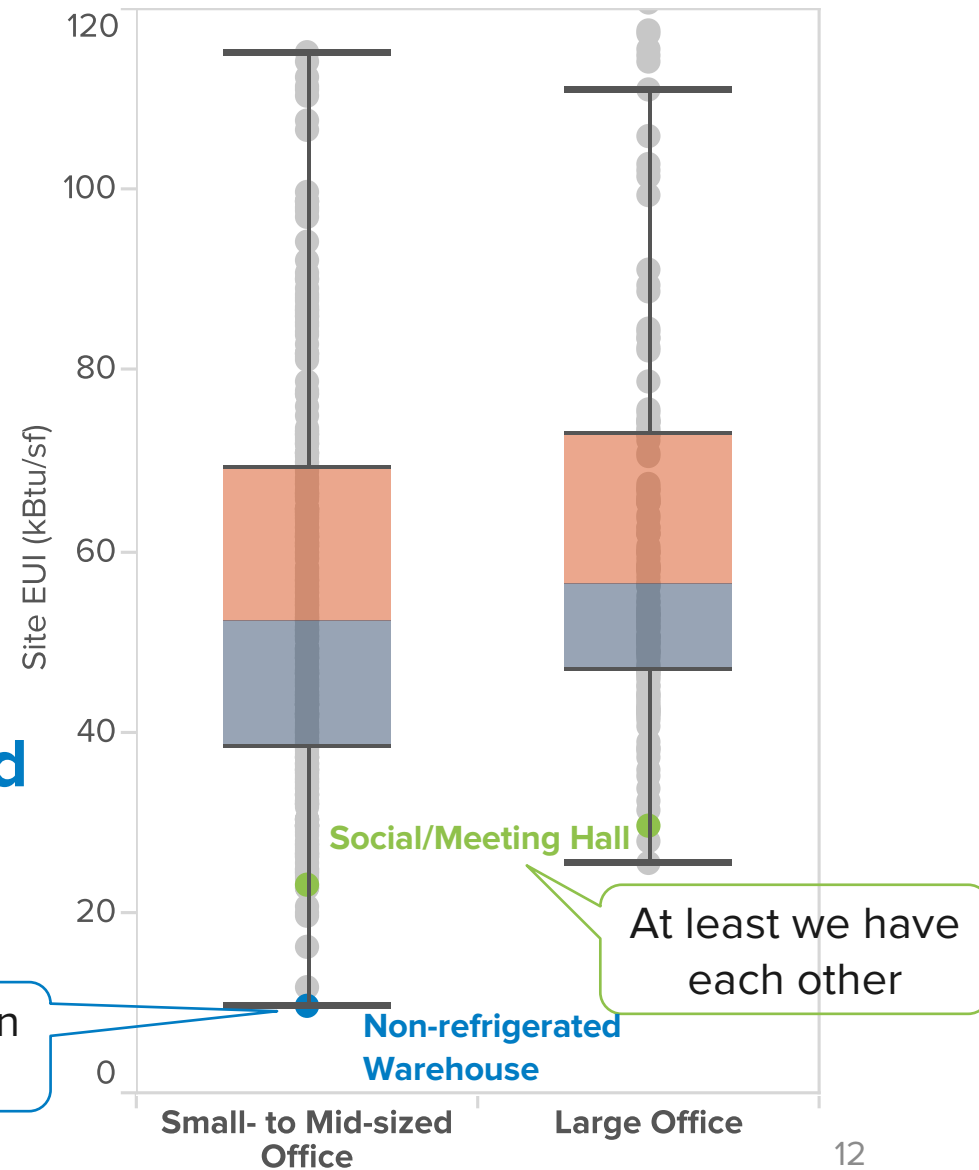
- Is the floor area correct?
 - Investigation of **large hotels with low EUIs**
 - **Three hotels** that responded to outreach were including parking in gross floor area



ACCURATE BUILDING TYPE



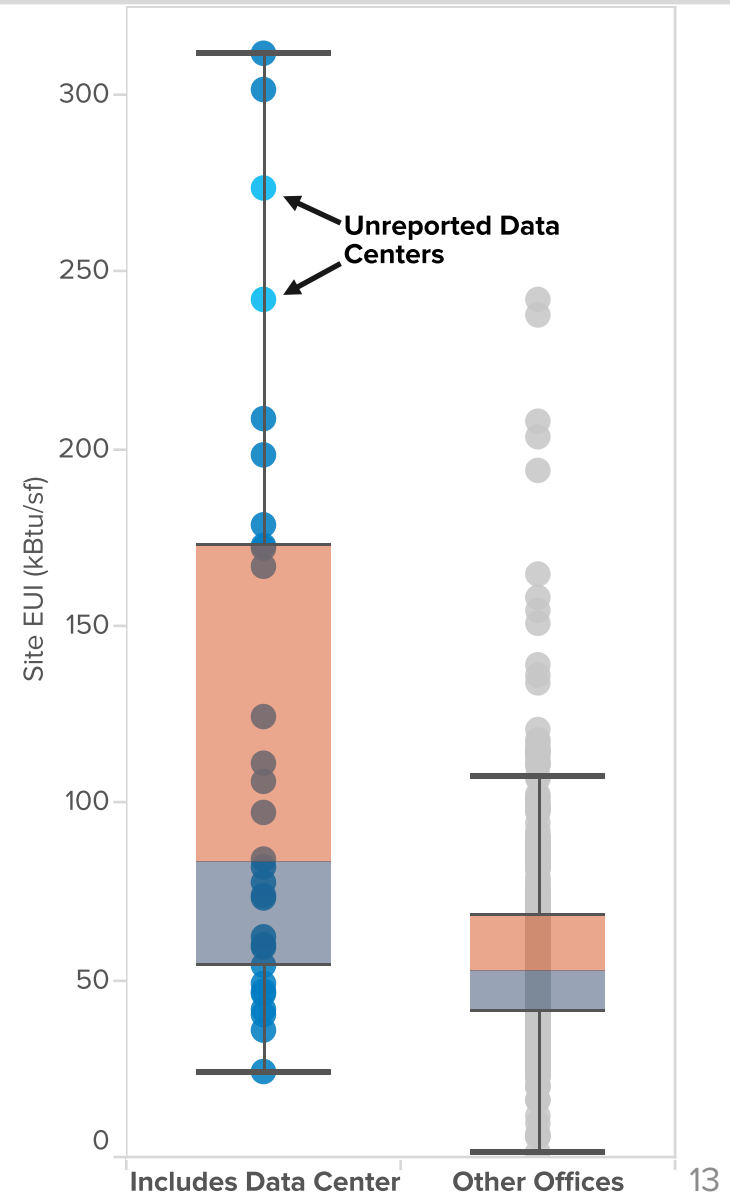
- Investigation of low-EUI offices revealed incorrectly categorized buildings
 - Event spaces (**Social/Meeting Hall**)
 - Self-selected property type was **Non-refrigerated Warehouse**, but space type was office!



ACCURATE SPACES

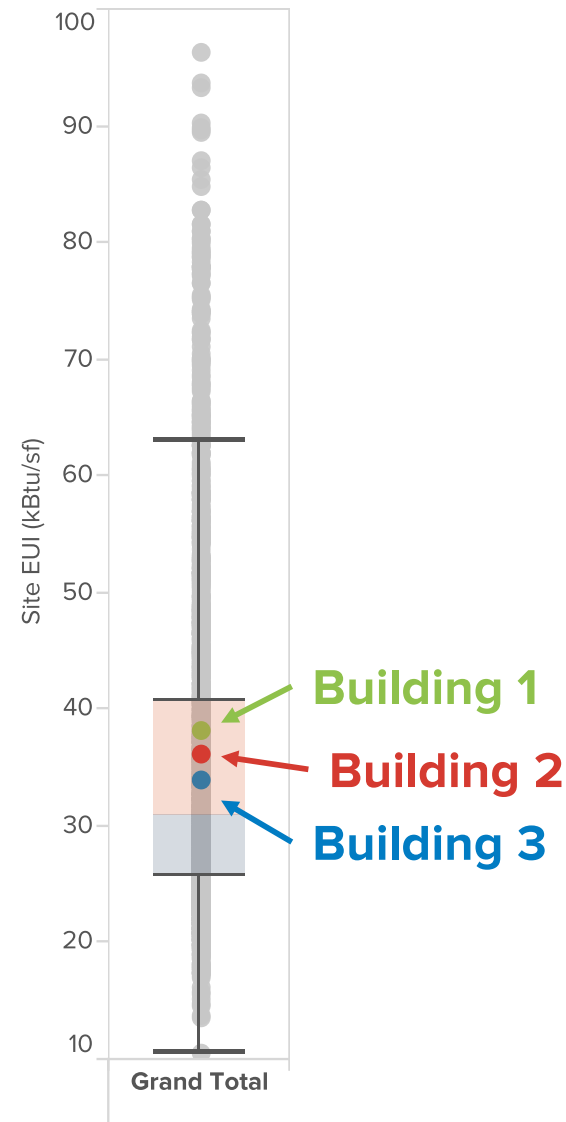


- Data centers explain highest-use office buildings
 - Not all were included in Portfolio Manager
 - Both buildings received ENERGY STAR scores of **1**, the worst possible



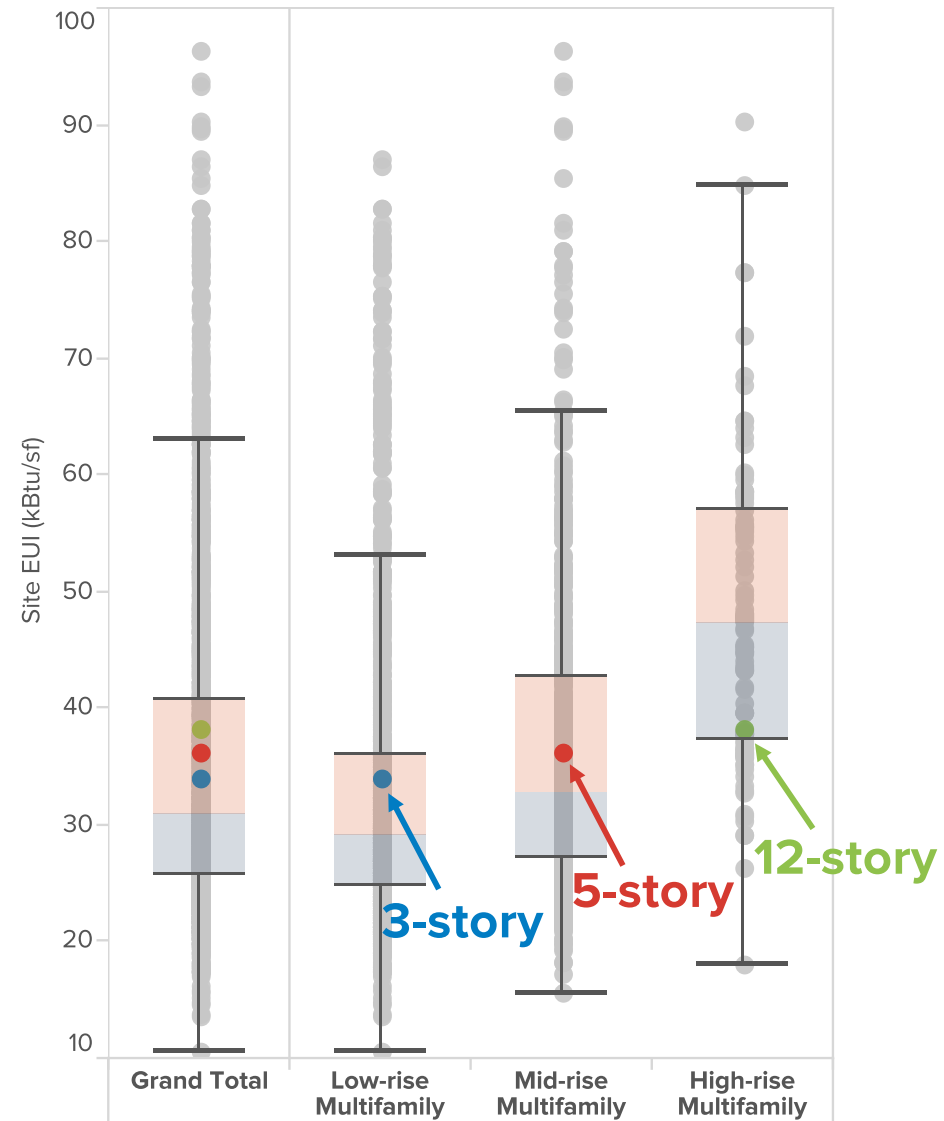
MAKE IT RELEVANT: MULTIFAMILY

- **Trick question:** Which of these buildings is **least** efficient?



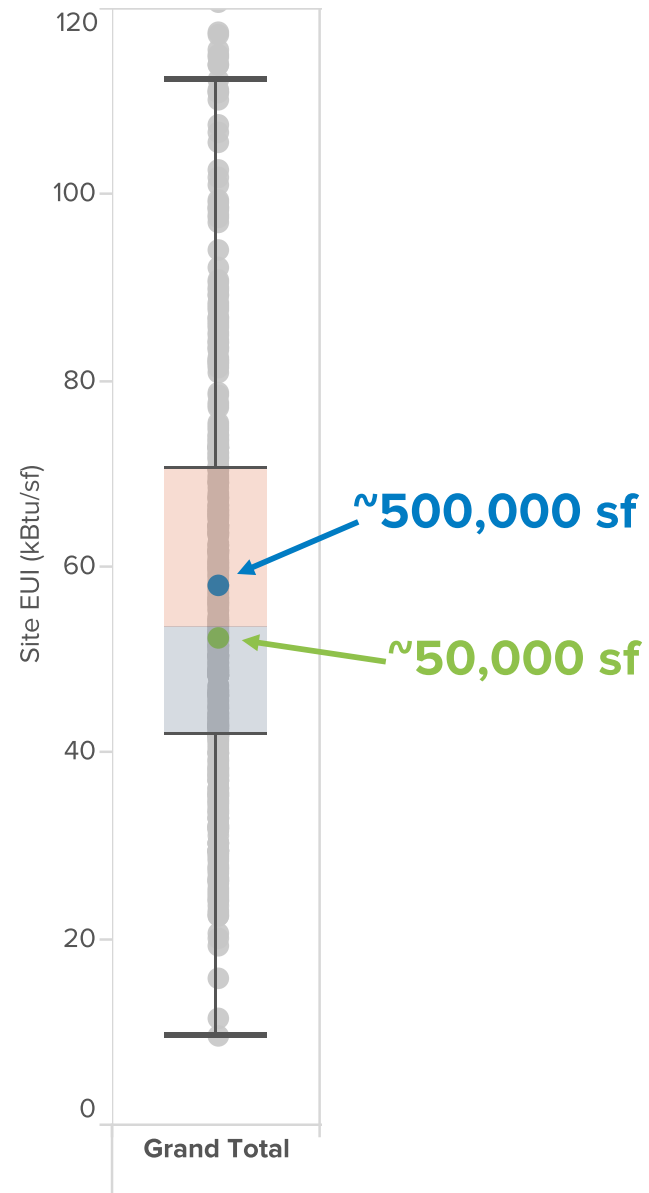
MAKE IT RELEVANT: MULTIFAMILY

- Does it make sense to compare a **3-story** building with an **5-story** building?
- With a **12-story** building?



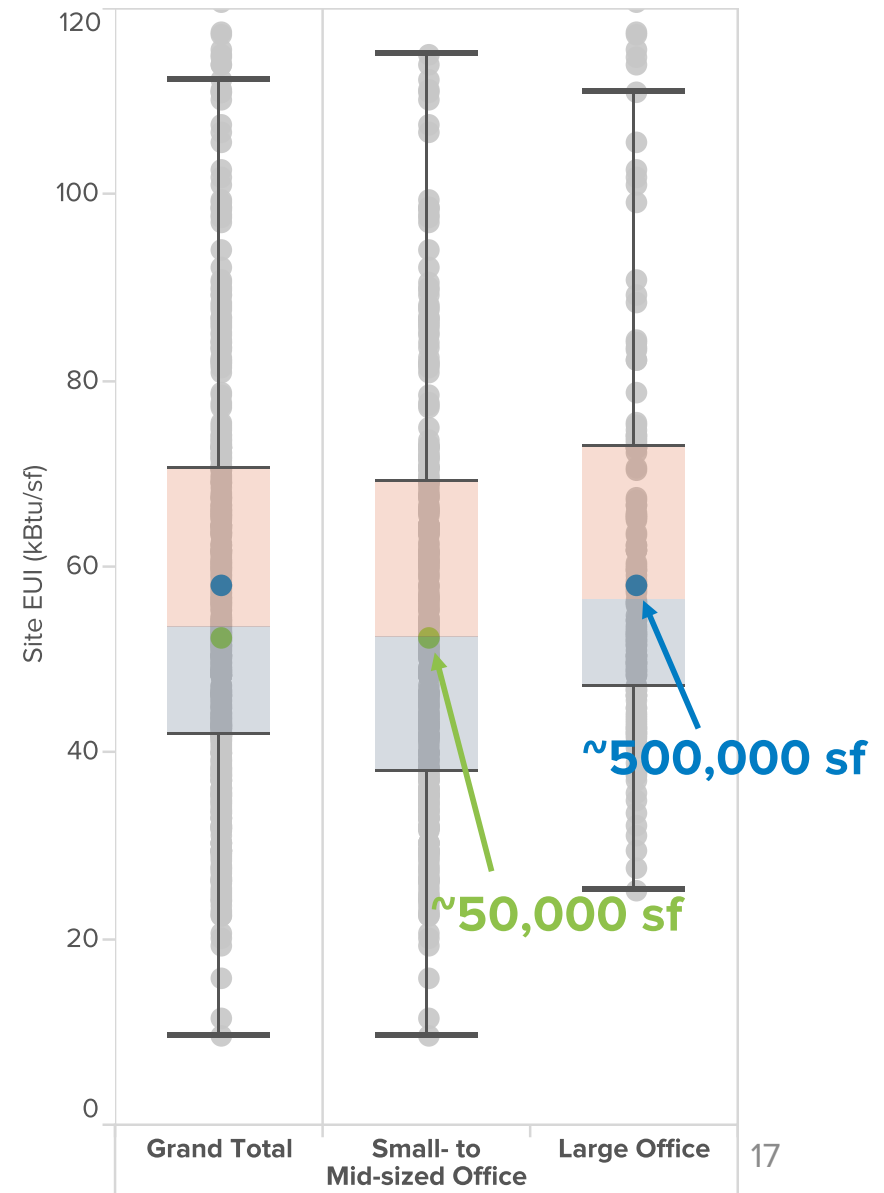
MAKE IT RELEVANT: OFFICES

- “Why is my **50,000 square foot** office building being compared with a **500,000 square foot** building?”



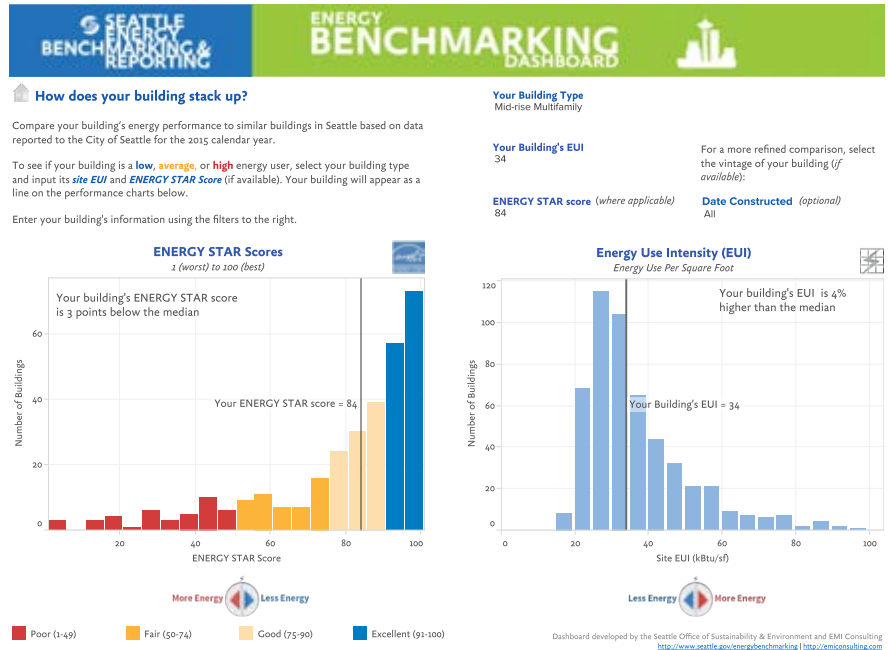
MAKE IT RELEVANT: OFFICES

- “Why is my **50,000 square foot** office building being compared with a **500,000 square foot** building?”



VISUALIZE IT

- So far, we have:
 1. Cleaned data to make it **accurate**
 2. Identified **relevant** peer groups for most common buildings
- Time to **visualize!**
 - Tableau dashboard
 - Stakeholders input their building's info





How does your building stack up?

Compare your building's energy performance to similar buildings in Seattle based on data reported to the City of Seattle for the 2015 calendar year.

To see if your building is a **low**, **average**, or **high** energy user, select your building type and input its **site EUI** and **ENERGY STAR Score** (if available). Your building will appear as a line on the performance charts below.

Enter your building's information using the filters to the right.

Your Building Type
Mid-rise Multifamily

Your Building's EUI
34

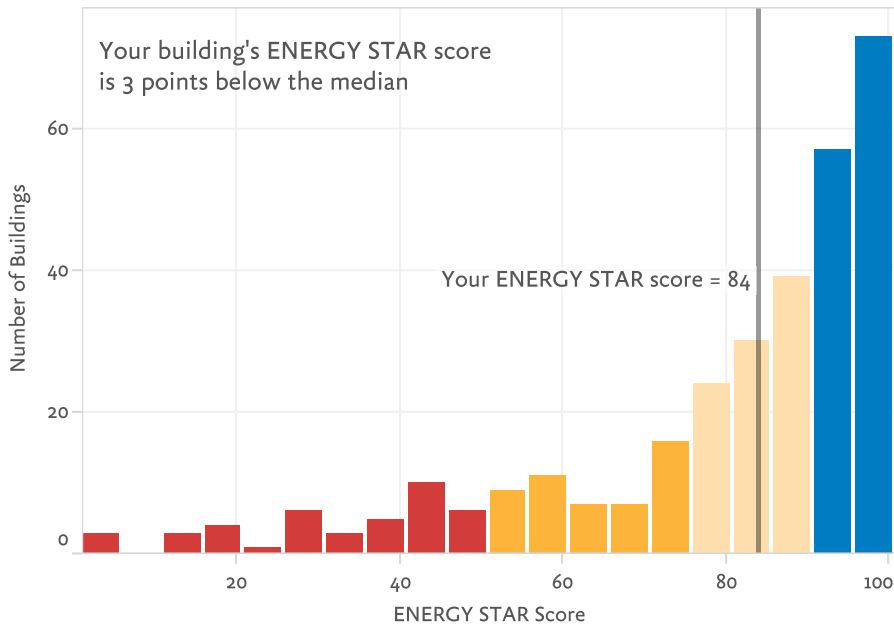
ENERGY STAR score (where applicable)
84

For a more refined comparison, select the vintage of your building (if available):

Date Constructed (optional)
All

ENERGY STAR Scores

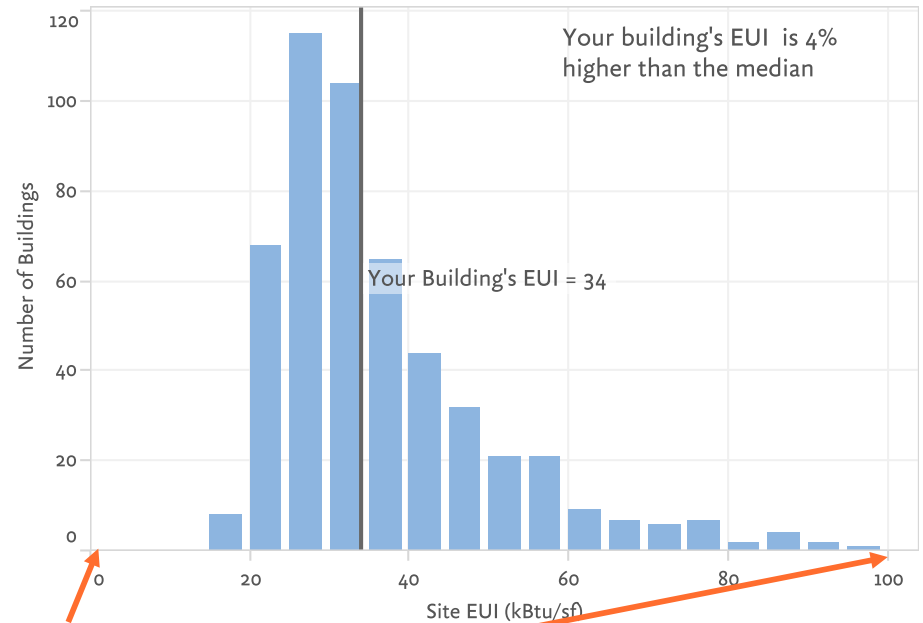
1 (worst) to 100 (best)



■ Poor (1-49)
 ■ Fair (50-74)
 ■ Good (75-90)
 ■ Excellent (91-100)

Energy Use Intensity (EUI)

Energy Use Per Square Foot



1) Accurate: errors are removed



How does your building stack up?

Compare your building's energy performance to similar buildings in Seattle based on data reported to the City of Seattle for the 2015 calendar year.

To see if your building is a **low**, **average**, or **high** energy user, select your building type and input its **site EUI** and **ENERGY STAR Score** (if available). Your building will appear as a line on the performance charts below.

Enter your building's information using the filters to the right.

Your Building Type
Mid-rise Multifamily

Your Building's EUI
34

ENERGY STAR score (where applicable)
84

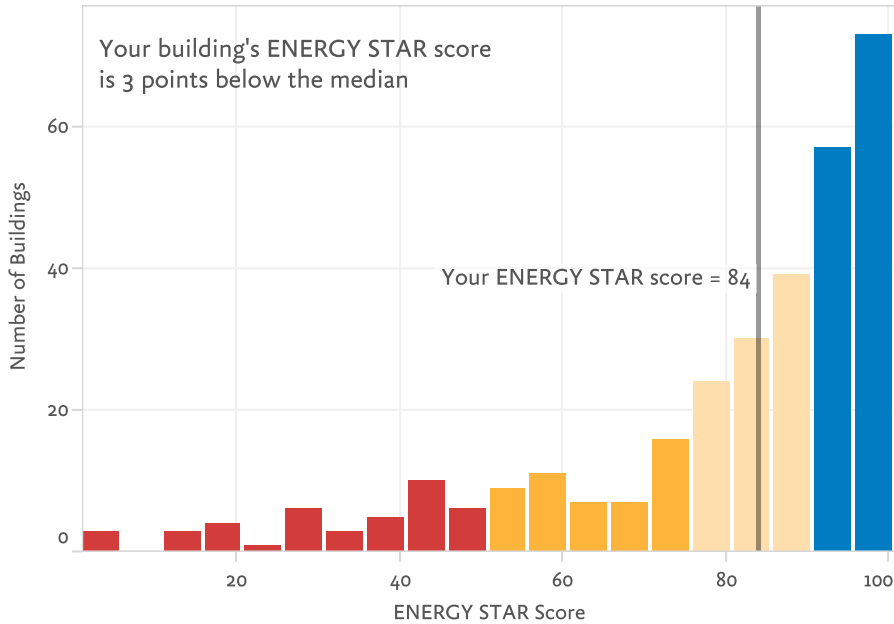
2) Relevant: Compared to peer buildings

For a more refined comparison, select the vintage of your building (if available):

Date Constructed (optional)
All

ENERGY STAR Scores

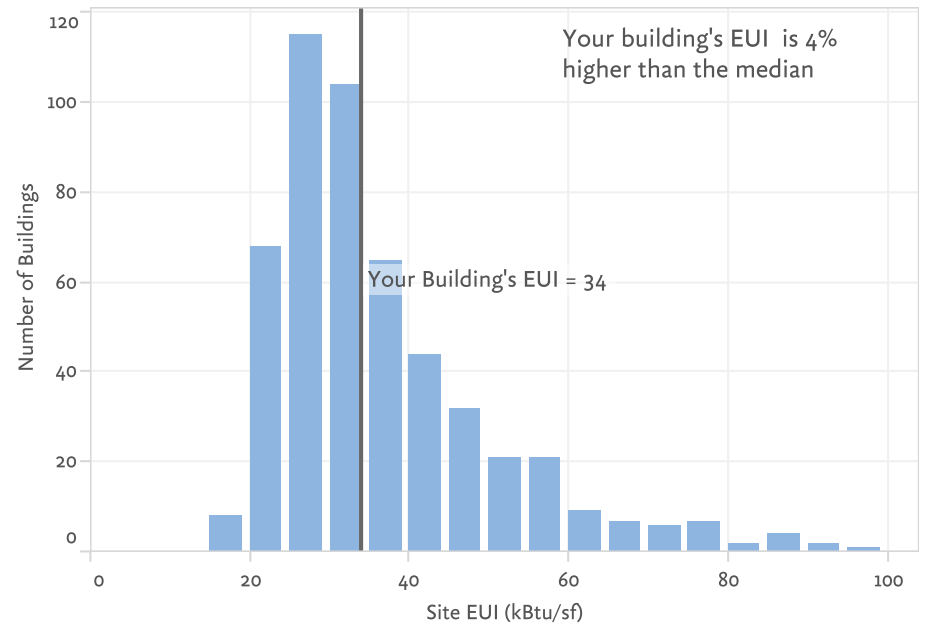
1 (worst) to 100 (best)



■ Poor (1-49)
 ■ Fair (50-74)
 ■ Good (75-90)
 ■ Excellent (91-100)

Energy Use Intensity (EUI)

Energy Use Per Square Foot





How does your building stack up?

Compare your building's energy performance to similar buildings in Seattle based on data reported to the City of Seattle for the 2015 calendar year.

To see if your building is a **low**, **average**, or **high** energy user, select your building type and input its **site EUI** and **ENERGY STAR Score** (if available). Your building will appear as a line on the performance charts below.

Enter your building's information using the filters to the right.

Your Building Type
Mid-rise Multifamily

Your Building's EUI
34

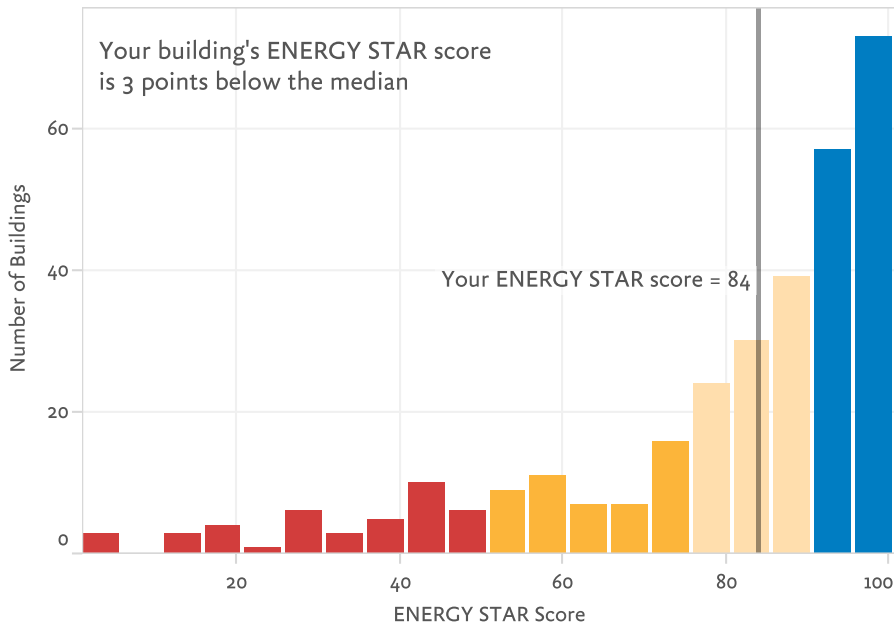
ENERGY STAR score (where applicable)
84

For a more refined comparison, select the vintage of your building (if available):

Date Constructed (optional)
All

ENERGY STAR Scores

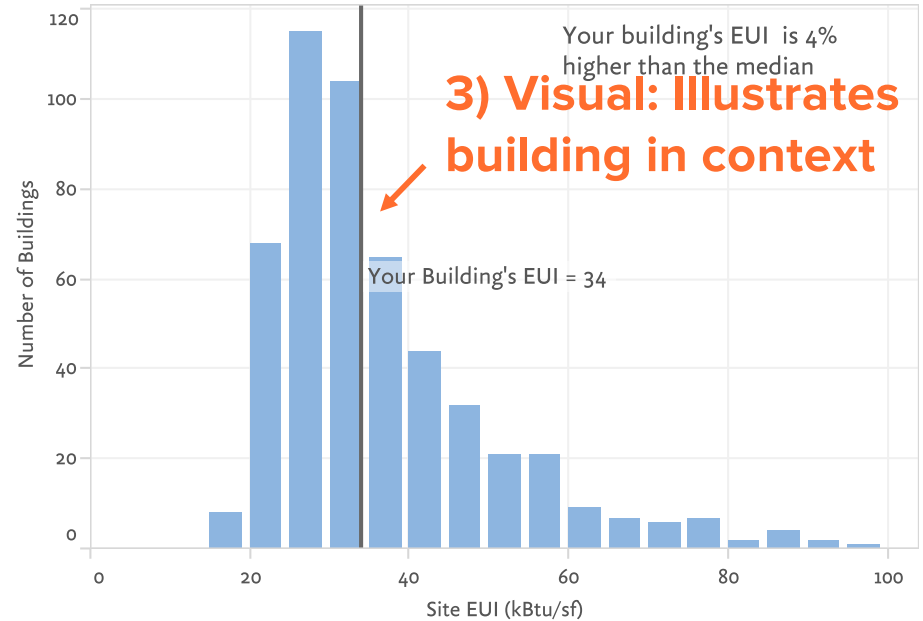
1 (worst) to 100 (best)



■ Poor (1-49)
 ■ Fair (50-74)
 ■ Good (75-90)
 ■ Excellent (91-100)

Energy Use Intensity (EUI)

Energy Use Per Square Foot



MORE INFORMATION

- Seattle Office of Sustainability
 - Energy Benchmarking website:
www.seattle.gov/environment/buildings-and-energy/energy-benchmarking-and-reporting
- Erik Lyon, EMI Consulting
 - elyon@emiconsulting.com
 - 206.388.0988

Thanks!

