

CITY OF PORTLAND

# 2015 BUILDING ENERGY PERFORMANCE REPORTING RESULTS

SEPTEMBER 2016

YEAR ONE



Bureau of Planning and Sustainability  
Innovation. Collaboration. Practical Solutions.

City of Portland, Oregon



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## SUMMARY

The City of Portland and Multnomah County 2015 Climate Action Plan targets a 40 percent reduction in carbon emissions below 1990 levels by 2030. To reach this goal, the plan includes a key objective to reduce the total energy use of existing buildings by 25 percent. Since commercial buildings are responsible for one-quarter of Portland's carbon emissions, improving energy performance in the building sector is critical to achieving Portland's carbon emissions reduction targets.

In April 2015, Portland City Council adopted the Commercial Building Energy Performance Reporting Ordinance to benchmark, measure and advance progress toward the City's climate goals for existing buildings. The ordinance requires commercial buildings 50,000 square feet and larger to use the U.S. Environmental Protection Agency's ENERGY STAR® Portfolio Manager® benchmarking tool for tracking energy performance metrics and reporting this information annually to the City starting with calendar year 2015. For 2016, the building size threshold drops to 20,000 square feet to cover approximately 80 percent of the conditioned commercial floor area in Portland.

To help building owners and managers comply with the new requirements, the City of Portland worked with Energy Trust of Oregon and the Northwest Energy Efficiency Alliance to provide free ENERGY STAR Portfolio Manager workshops, a step-by-step compliance guide and an Energy Reporting Help Desk for customized assistance. Additionally, Portland's three energy utilities — NW Natural, Pacific Power, and Portland General Electric — enhanced their customer services, enabling building owners and managers to easily obtain whole-building energy use data for the entire 2015 calendar year.

The reported data were reviewed by the City, and subsequent analysis was conducted by the Sustaining Urban Places Research (SUPR) Lab with support from the Institute for Sustainable Solutions at Portland State University. The analysis focused on energy performance and carbon emissions by building type and several other relevant characteristics.

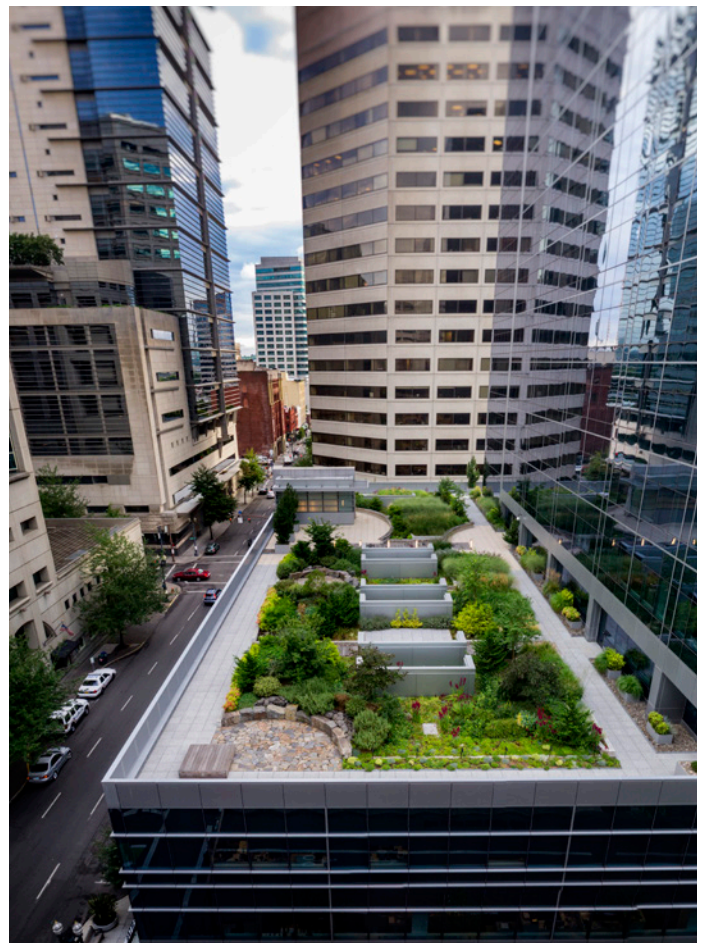
The analysis identifies many opportunities for improving energy performance across the commercial building stock. For each building type, the lowest performing buildings use two, three or even four times as much energy per square foot as the most efficient buildings.

This report describes the energy performance data collection, analysis and results for the first year of commercial reporting. Given better awareness of energy performance, building owners, managers, tenants and other stakeholders can make more informed decisions to reduce energy use and carbon emissions.

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### HIGHLIGHTS FROM 2015 ENERGY REPORTING:

1. 413 commercial buildings were expected to report. Submittals were received by the City of Portland for 340 of those buildings, resulting in a compliance rate of 82 percent.
  2. Building age was not found to be a determinant of energy performance, as office buildings built from the 1910s through the 1930s performed well in comparison to newer offices.
  3. In aggregate, the results suggest that Portland's commercial buildings perform better than national averages.
- 



*Offices had the highest energy performance compared to other commercial building types.*

## BENCHMARKING METRICS

Similar to 15 other U.S. cities with building benchmarking laws, Portland's Energy Performance Reporting Program relies on Portfolio Manager to collect and report energy performance information annually. Portfolio Manager was first launched in 1999 and is now used for more than 400,000 buildings across the country. Portfolio Manager is the industry standard for energy benchmarking, helping building owners track and understand their relative energy use in comparison to other buildings nationally.

In addition to reporting annual carbon emissions, Portfolio Manager generates two main outputs to measure building energy performance: **Site Energy Use Intensity (EUI)** and **ENERGY STAR score**. Together these performance metrics provide nationally acceptable diagnostics for identifying and tracking improvements in energy efficiency.

### KEY PERFORMANCE METRICS DEFINED

**Site EUI** is a building's total annual energy use (electricity plus natural gas) divided by its gross floor area. EUI indicates the overall building energy performance and is measured in kBtu/sf (one thousand British thermal units per square foot). Higher EUIs show greater energy use, while lower EUIs indicate better performance.

The Portfolio Manager **ENERGY STAR score** compares a building's energy use to other U.S. buildings on a scale of 1 (least efficient) to 100 (most efficient). A 50 represents the national median and buildings with 75 or higher may be eligible to earn ENERGY STAR certification. As of August 2016, 90 buildings in Portland have achieved this certification distinguishing their exemplary energy efficiency.

## COMPLIANCE AND DATA QUALITY

For 2015, Portland's Energy Performance Reporting Program applied to commercial buildings containing a gross floor area of at least 50,000 square feet, where no more than 50 percent of that square footage is used for housing, nursing home, parking, primary and secondary education, industrial, warehouse or worship purposes. Case-by-case exemptions from program requirements were considered for new construction,

unoccupied buildings, permitted demolitions and other extenuating circumstances. In total, 11 buildings received exemptions because whole building energy data was not available for the entire 2015 calendar year.

Based on Multnomah County tax assessment records and City of Portland building information, 413 commercial buildings were identified for first year energy reporting. As of July 31, 2016, the City received Portfolio Manager reports for 340 of these buildings — a compliance rate of 82 percent. For the analysis, a number of buildings were removed from the data set due to various data quality issues outlined below:

- No Site EUI available.
- Exceptionally high Site EUI with a likely error identified.
- Missing electric or natural gas consumption.
- Extra reports received that were not expected.
- Default building use values reported.

After removing the above errors from the data, a subset of 266 buildings and 13 institutional campuses covering 55.5 million square feet was selected for statistical analysis by Portland State University. City of Portland staff are following up with the other buildings to either validate or correct those buildings' data in Portfolio Manager. City staff are also contacting the owners of record for the buildings that did not submit energy reports but appear to be covered by Portland's benchmarking requirements.



First year energy reports were received for 340 of Portland's largest commercial buildings.

# BUILDING CHARACTERISTICS

Office buildings cover the most floor area, followed by universities, hotels, hospitals, medical offices, retail spaces and grocery stores, as displayed in Figure 1. The “other” category refers to a variety of other building types that can be reported through Portfolio Manager but are not eligible for a comparative ENERGY STAR score, such as auto dealerships, convention centers, gyms, health clubs, laboratories, museums, police stations, prisons, shopping malls, sports arenas and theaters.

The floor area displayed in Figure 1 does not include attached building garages, except in the case of institutions that report the floor area across an entire campus of buildings.

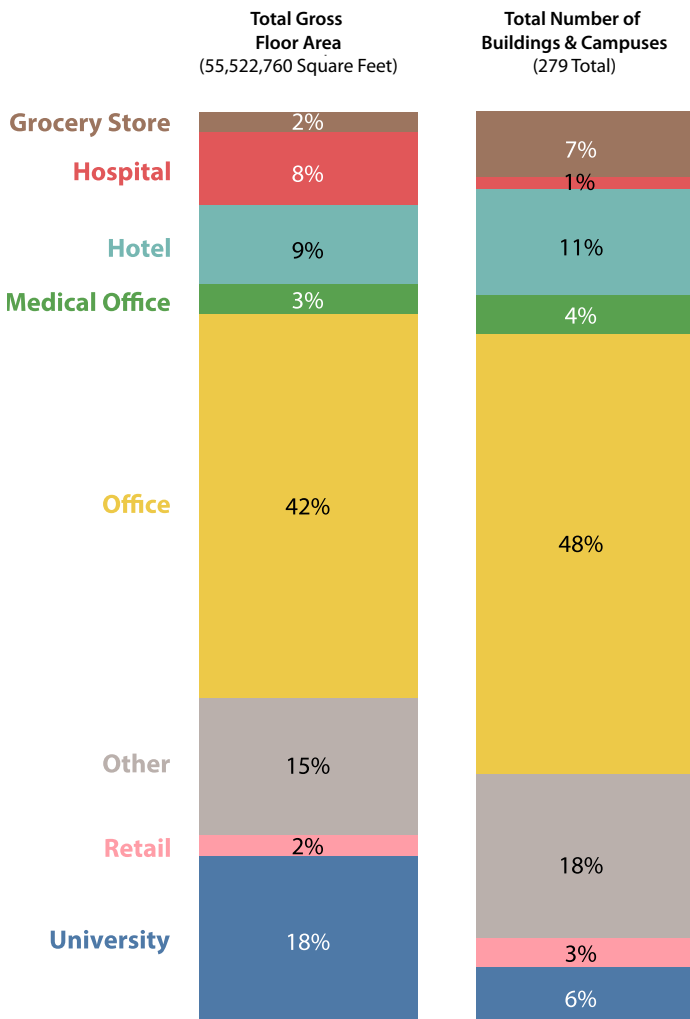


Figure 1: Percentage of Buildings & Floor Area by Building Type

The campus-wide reporting option was available for colleges, universities, hospitals and institutions where a single energy meter served the campus. Fourteen institutional campuses elected to submit at a campus-wide level.

Office buildings and universities are the building types responsible for the most carbon emissions, as shown in Figure 2. Based on Portfolio Manager estimates, the 279 buildings and campuses included in this analysis emitted 485,000 metric tons of carbon pollution.

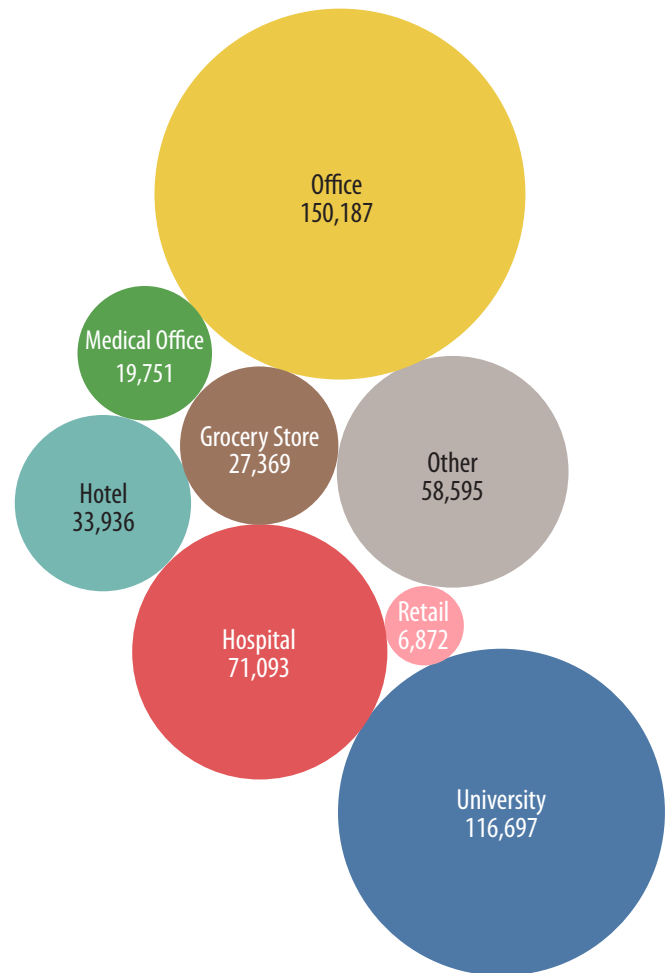


Figure 2: Carbon Emissions (metric tons CO2e) by Building Type

# ENERGY PERFORMANCE RESULTS

Commercial buildings of the same type can vary greatly in energy performance. The data analysis showed a wide range in Site EUI and ENERGY STAR scores even among buildings of the same building type, as displayed in Figures 3 and 4, respectively. **For each building type, the lower performing buildings used two to four times as much energy per square foot as the most efficient buildings.**

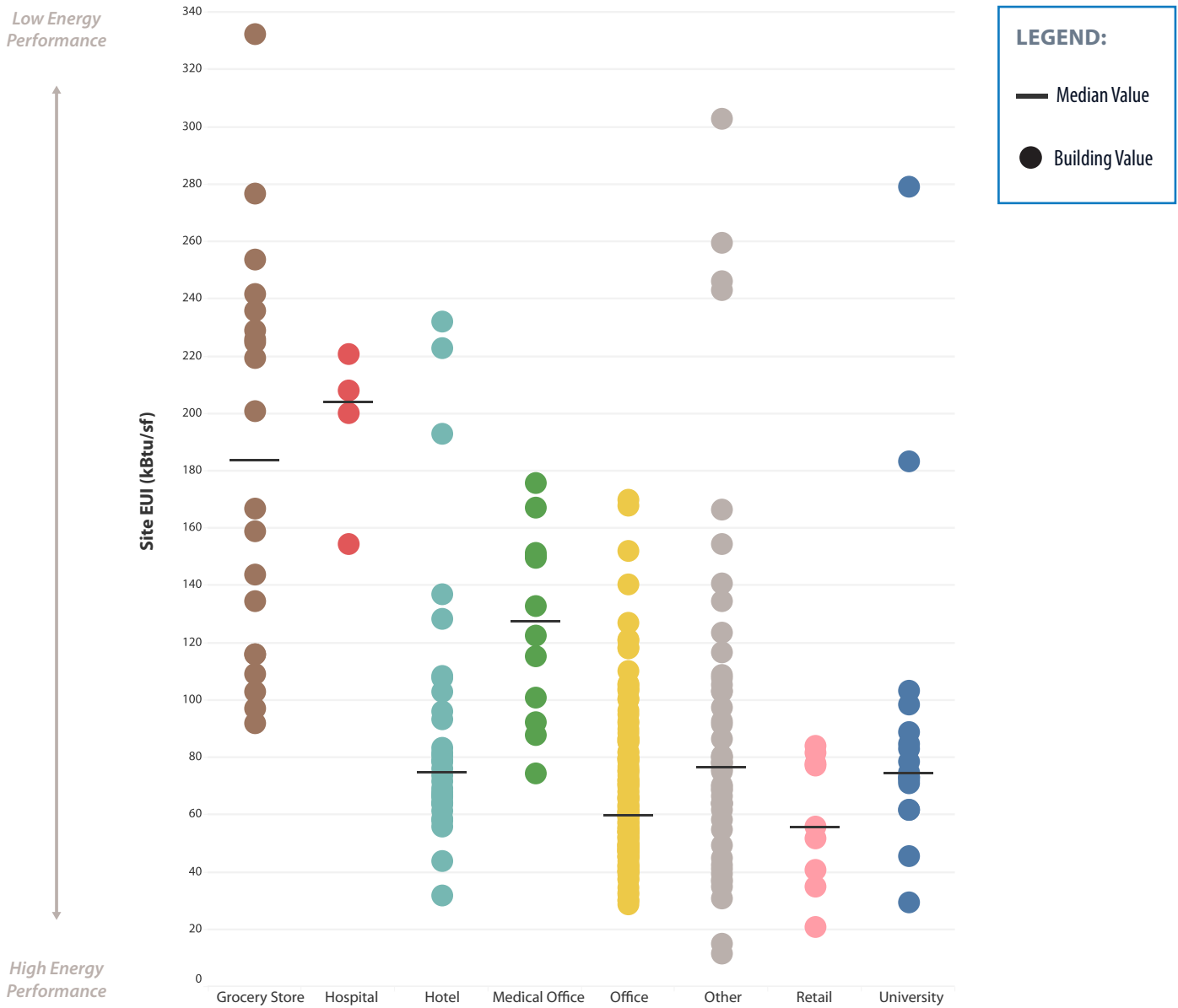


Figure 3: Site EUI Distribution and Median by Building Type



Buildings that report an ENERGY STAR score lower than the national median of 50 are likely to have the greatest opportunities to improve energy performance.

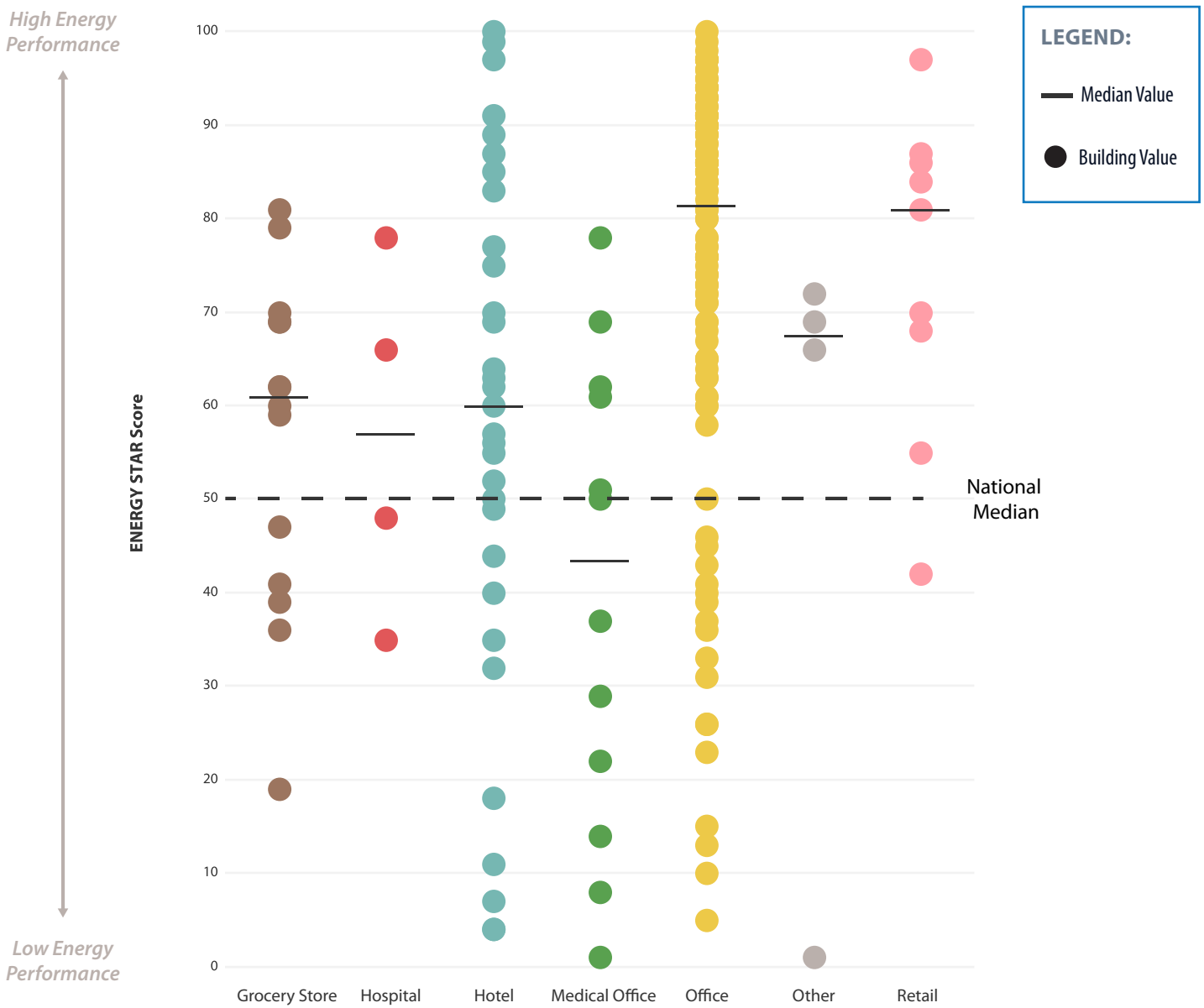


Figure 4: ENERGY STAR Score Distribution by Building Type

All 279 buildings and campuses included in this analysis reported a Site EUI, and 188 of these buildings were also eligible to report an ENERGY STAR score. These include offices, retail stores, courthouses, grocery stores, hotels, hospitals, medical offices, and properties with a mix of these building types. To enable year-over-year comparison between buildings, the ENERGY STAR score considers Site EUI along with changes in weather conditions and building operations.

**For calendar year 2015, ENERGY STAR scores ranged from 1 to 100 with a mean score of 67 — significantly higher than the national median of 50.** Figure 5 displays the median ENERGY STAR scores by building type, and Figure 6 shows the distribution of the number of buildings that received each ENERGY STAR score from 1 to 100.

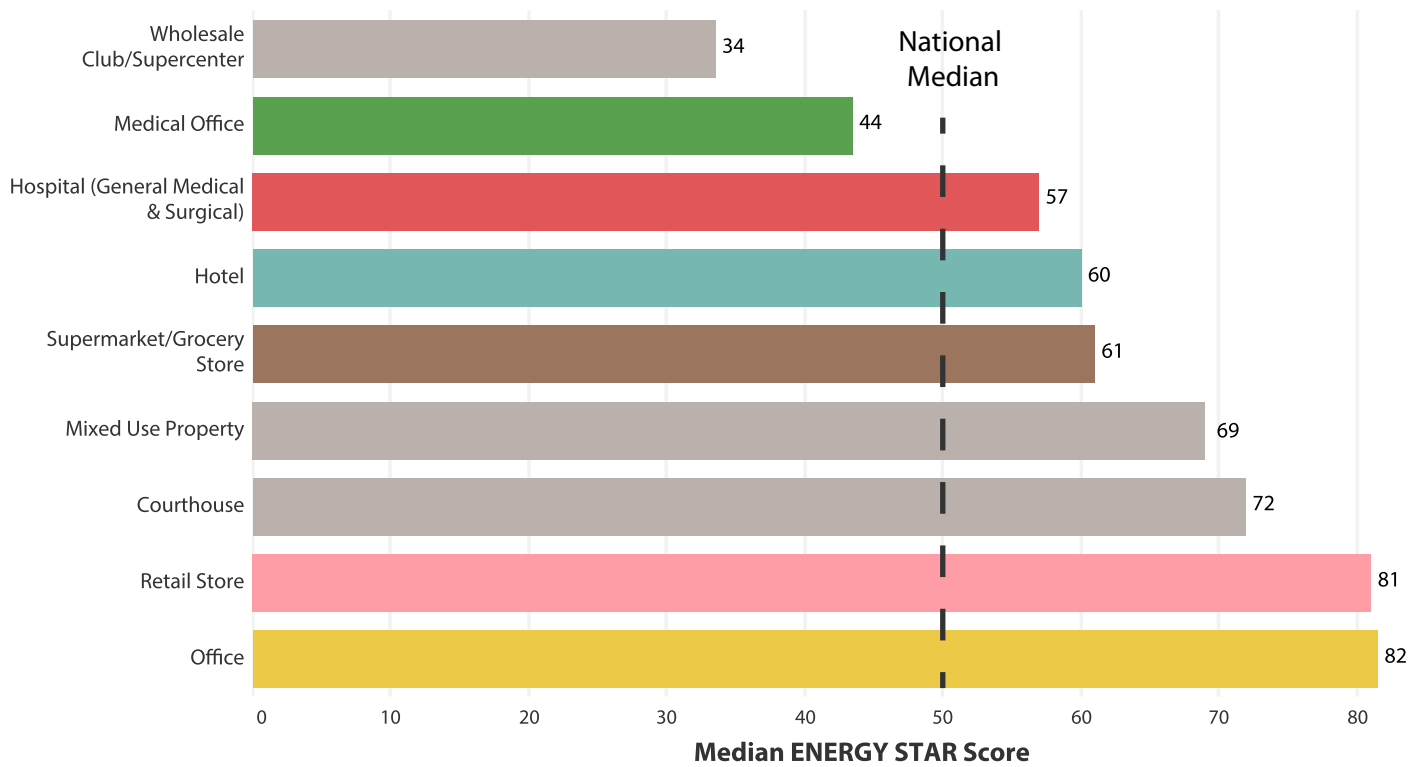


Figure 5: **Median ENERGY STAR Score by Building Type**

Over three-quarters of the buildings scored at the national median of 50 or higher. Those that score 75 or higher could be eligible for ENERGY STAR certification. Office buildings, in particular, had relatively high energy performance with a median of 82 for the 114 offices that reported an ENERGY STAR score.

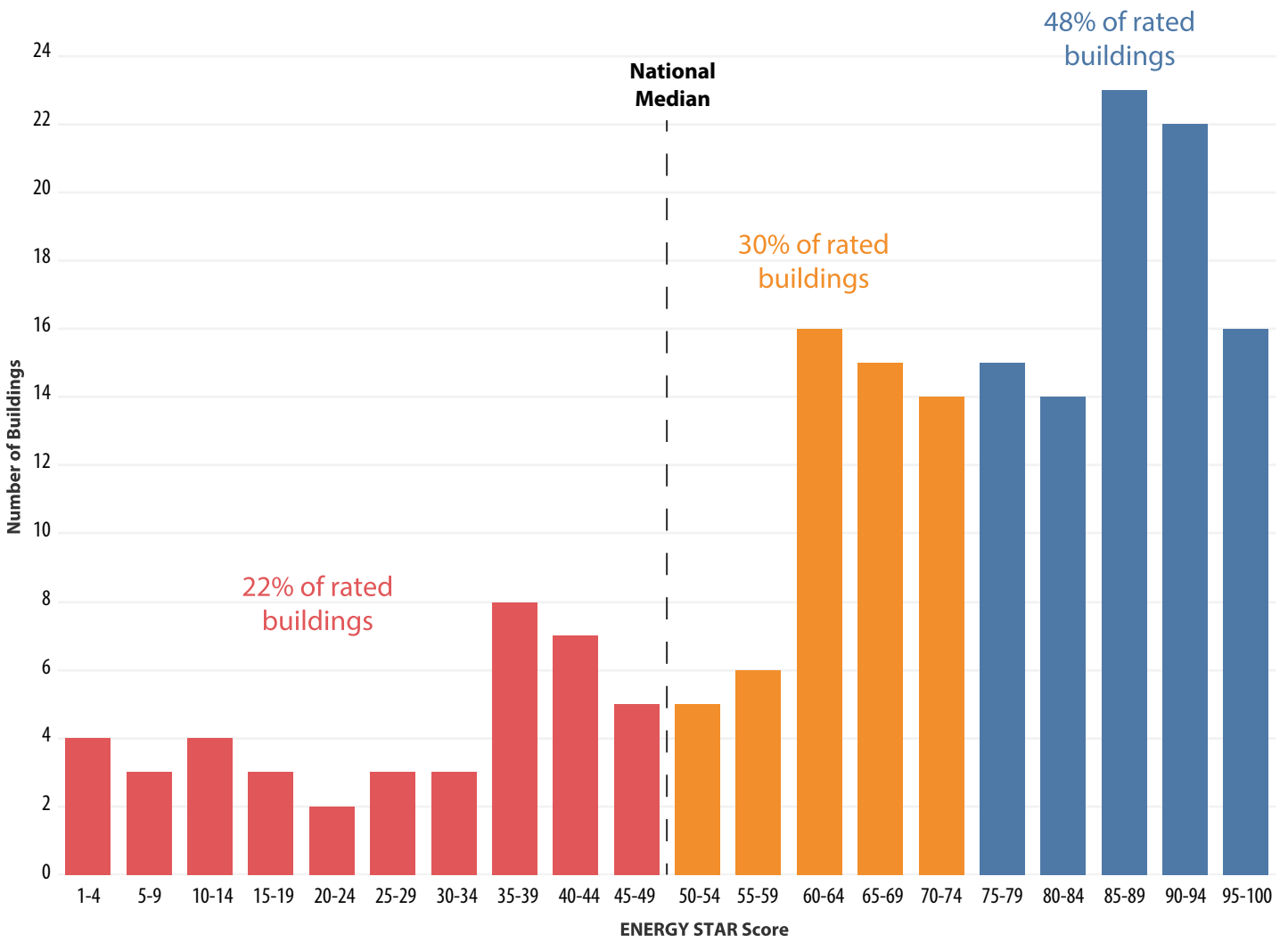


Figure 6: Number of Buildings Receiving ENERGY STAR Scores from 1 to 100



Of all the building types, offices reported the most Site EUIs and ENERGY STAR scores, allowing for more detailed analysis, such as the effect of building age on energy performance. The median ENERGY STAR score for offices by year constructed is shown in Figure 7. **Offices built from the 1910s through the 1930s perform better than those built from the 1940s through the 1980s.** Additional analysis of office buildings in the future may reveal trends that will provide insight to potential energy performance improvements and building code updates.

Older office buildings perform well in comparison to newer office buildings.

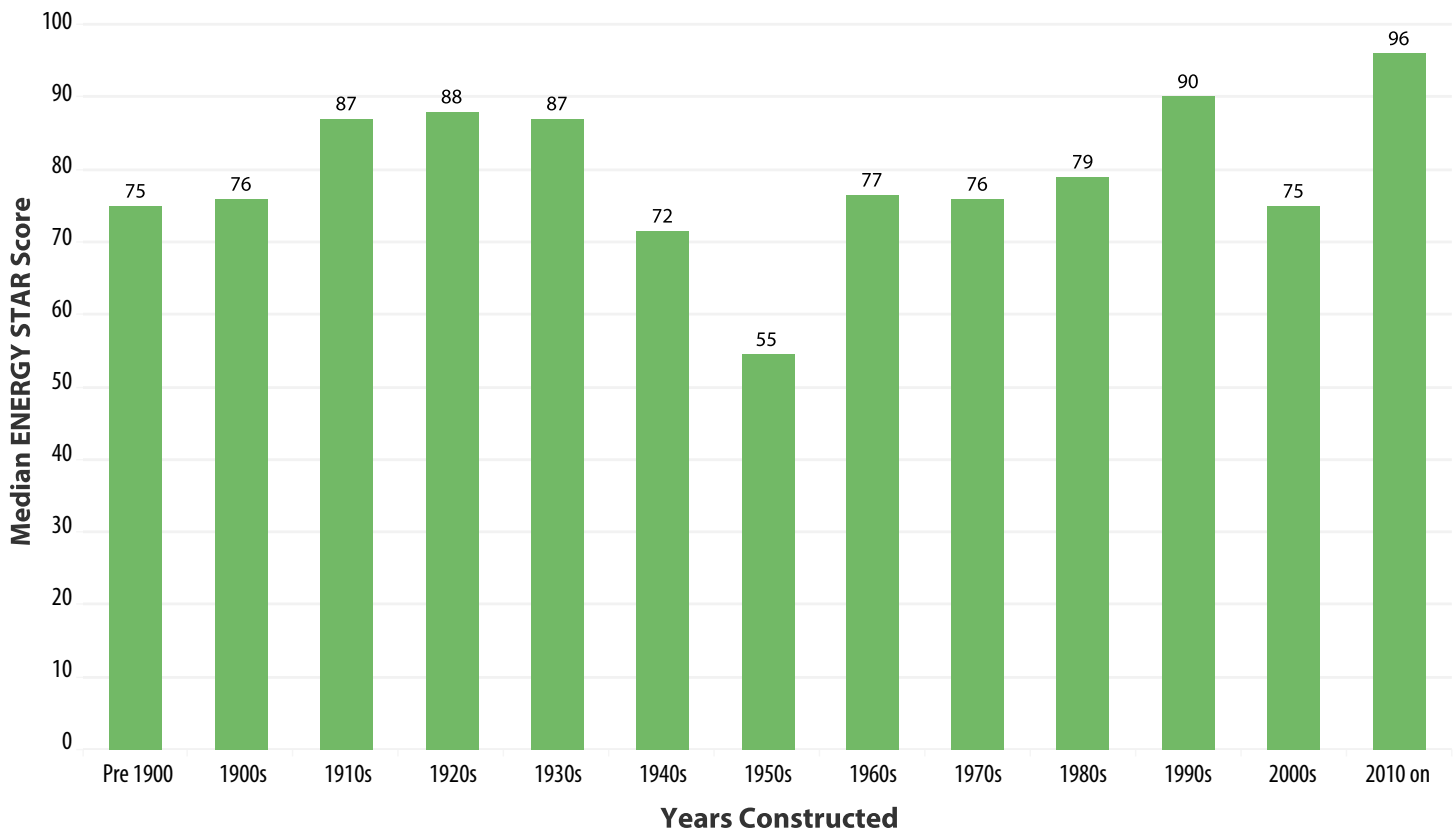


Figure 7: Median Office Building ENERGY STAR Score by Decade of Construction

## NEXT STEPS

The results of this first reporting year analysis suggest that Portland's commercial buildings perform relatively well compared to national averages. However, the analysis also identifies many opportunities for improving energy performance in every type of commercial building covered by the Energy Performance Reporting Program. To refine and characterize the best opportunities for improvement, the City will continue to engage with Portland State University and expand the scope of the statistical analysis for coming years. In addition, the U.S. Department of Energy awarded the City of Portland a grant in August 2016 to research building systems based on permit history. The resulting Building Energy Asset Scores will complement ENERGY STAR scores for a selection of buildings that submitted a report in 2016. Building information from this research will be made available to Portland State University to expand on future analyses.

Later this year, the City of Portland will reach out to building contacts who reported energy performance information through Portfolio Manager that appeared to be errant and therefore had to be removed from the data set. This step will increase the number of buildings that report Site EUIs and ENERGY STAR scores next year. Beginning 2016, the Energy Performance Reporting Program requirements extend to commercial buildings 20,000 square feet and over — more than doubling the number of buildings that are required to report energy performance information.

Starting in 2017, the City of Portland will begin publishing individual building energy performance information reported by covered commercial buildings 50,000 square feet and over. Managers and tenants will be able to visit a website and gain access to transparent energy performance metrics for comparison between similar commercial buildings. Expanded access to energy information will enable a greater understanding of the energy use and associated carbon emissions for Portland's largest buildings. Increasing awareness of energy use is intended to motivate energy performance improvements in commercial building, and ultimately, measure progress towards meeting Portland's climate goals for existing buildings.

### QUESTIONS?

**Please contact the City of Portland  
Energy Reporting Help Desk**

**503-823-7070**

-OR-

**[energyreporting@portlandoregon.gov](mailto:energyreporting@portlandoregon.gov)**



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