

CITY OF PORTLAND

# 2016 BUILDING ENERGY PERFORMANCE REPORTING RESULTS

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YEAR TWO



**Bureau of Planning and Sustainability**

Innovation. Collaboration. Practical Solutions.

City of Portland, Oregon

Ted Wheeler, Mayor • Susan Anderson, Director



# ACKNOWLEDGMENTS

## BUREAU OF PLANNING AND SUSTAINABILITY

**Ted Wheeler**

Mayor, Commissioner-in-charge

**Susan Anderson**

Director

**Alisa Kane**

Green Building and Development Manager

**Vinh Mason**

Project Manager

**Lisa Timmerman**

Energy Reporting Specialist

## PORTLAND STATE UNIVERSITY

**Liliana Caughman**

Institute for Sustainable Solutions

**Vivek Shandas**

Toulon School of Urban Studies and Planning,  
and Institute for Sustainable Solutions

## TECHNICAL ADVISORY GROUP

**Andy Eiden**

Energy Trust of Oregon

**Alex Novie**

Energy Trust of Oregon

**Mike Psaris-Weis**

Northwest Energy Efficiency Alliance

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## SUMMARY



*Building managers submitted energy reports for 799 commercial buildings resulting in a compliance rate of 84 percent.*

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 these 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 20,000 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. In 2016, commercial buildings 50,000 square feet and larger began energy reporting for the previous calendar year. In 2017, the building size threshold dropped to 20,000 square feet. With these additional buildings, the requirements now include approximately 80 percent of the commercial floor area in Portland.

To help building owners and managers comply with the ordinance, 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 an entire calendar year.

The City reviewed and compiled the energy use reports and the Institute for Sustainable Solutions at Portland State University subsequently conducted an analysis of the data which focused on energy performance metrics 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 and up to four times as much energy per square foot as the most efficient buildings.

This report summarizes the energy performance data collection, analysis and results for the second year of commercial reporting. In September 2017, the City also began publishing energy performance metrics for individual buildings 50,000 square feet and larger, now available at [www.portlandoregon.gov/bps/energyreporting](http://www.portlandoregon.gov/bps/energyreporting). With access to building energy performance information, building owners, managers, tenants and other stakeholders can make more informed decisions to improve building performance and reduce carbon emissions.

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## HIGHLIGHTS FROM 2016 ENERGY REPORTING:

1. The compliance rate for larger buildings that are now in their second year of reporting jumped to 90 percent compared to 82 percent in their first year. Even with the addition of 578 smaller buildings reporting for the first time this year, the overall compliance rate improved to 84 percent. In total, 956 commercial buildings were expected to report, and the City received submittals for 799 of those buildings. Buildings that are out of compliance are identified in the publication of individual building energy performance metrics.
2. Building age was not found to be a determinant of energy performance, as buildings built from the 1910s and 1920s performed better than those built in any other decade.
3. The City received data from 256 buildings that reported in both 2015 and 2016. The annual energy consumption of these buildings remained relatively flat with a small increase in energy use over the prior year. The pace of building energy efficiency improvements and future greenhouse gas reductions will be determined by how aggressively property owners and managers make these improvements to their buildings.
4. In aggregate, the results suggest that Portland's commercial building stock continues to perform better than national averages across all building sizes.



*Offices and mixed-use buildings had the best 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. It 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 the **ENERGY STAR score**. Together these performance metrics provide national 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 2017, 101 buildings in Portland have achieved this certification distinguishing their exemplary energy efficiency.

## COMPLIANCE AND DATA QUALITY

Portland's Energy Performance Reporting Program applies to commercial buildings containing a gross floor area (GFA) of at least 20,000 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, 991 buildings were expected to report for calendar year 2016, and 35 of those buildings received exemptions from reporting.

As of August 1, 2017, the City received Portfolio Manager reports for 799 buildings resulting in a compliance rate of 84 percent – slightly higher than Year One's 82 percent compliance rate. Notably, the Year Two compliance rate climbed to 90 percent for the 50,000 square feet and larger buildings. The smaller commercial buildings between 20,000 to 50,000 square feet that began reporting in Year Two had a compliance rate of 79 percent.

Building energy information is self-reported through Portfolio Manager by building managers or energy service providers acting on their behalf. Factors influencing data quality can include manual data entry error, omission of energy meters, and a lack of familiarity with Portfolio Manager or software tools in general. For the purposes of the analysis, the project team removed several buildings from the data set due to obvious and apparent data quality issues as listed below:

- No Site EUI available.
- Exceptionally high or low Site EUI with a likely error identified.
- Missing electric consumption.
- Incorrect primary building type selected.
- Reported GFA less than 20,000 square feet.
- Extra reports received that were not expected.
- Default or temporary building use values reported

After removing the above errors from the data, a subset of 567 buildings and 44 campuses covering 75.2 million square feet remained for statistical analysis by Portland State University. Less discernible errors may remain, such as unreported electric and natural gas meter data. To help improve data quality issues, the City continues to provide a free Energy Reporting Help Desk and Energy Reporting How-to Guides for new and returning users.

# BUILDING CHARACTERISTICS

Office buildings cover the most floor area, followed by universities, hotels, strip malls, grocery stores, retail spaces, medical offices and hospitals, as shown in Figure 1. The “other” category refers to a variety of 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, 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.

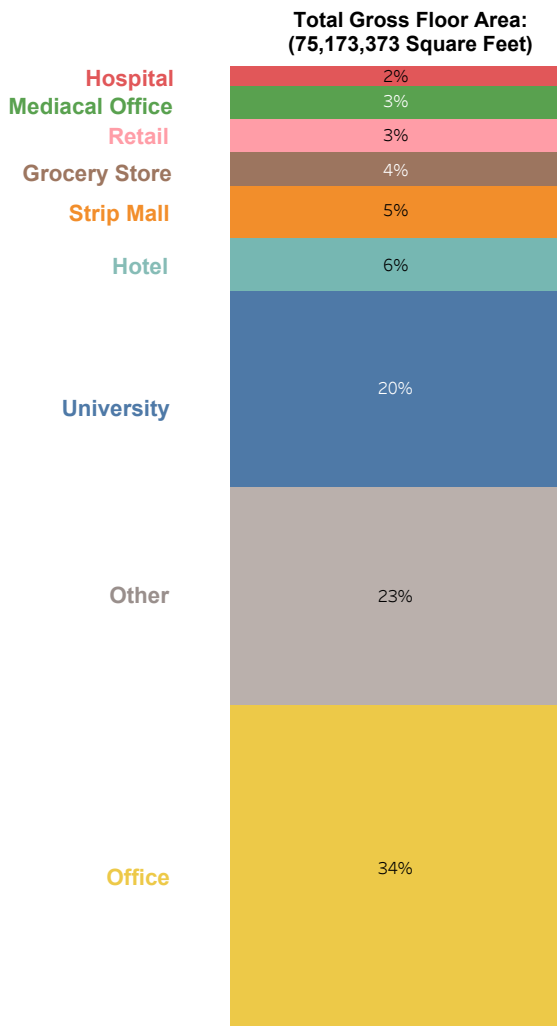


Figure 1: Percentage of Floor Area by Building Type

Among buildings included in the analysis, office buildings and universities were responsible for the most carbon emissions in 2016, as shown in Figure 2. Based on Portfolio Manager estimates, the buildings and campuses included in this analysis emitted a total of 530,000 metric tons of carbon pollution in Year Two.

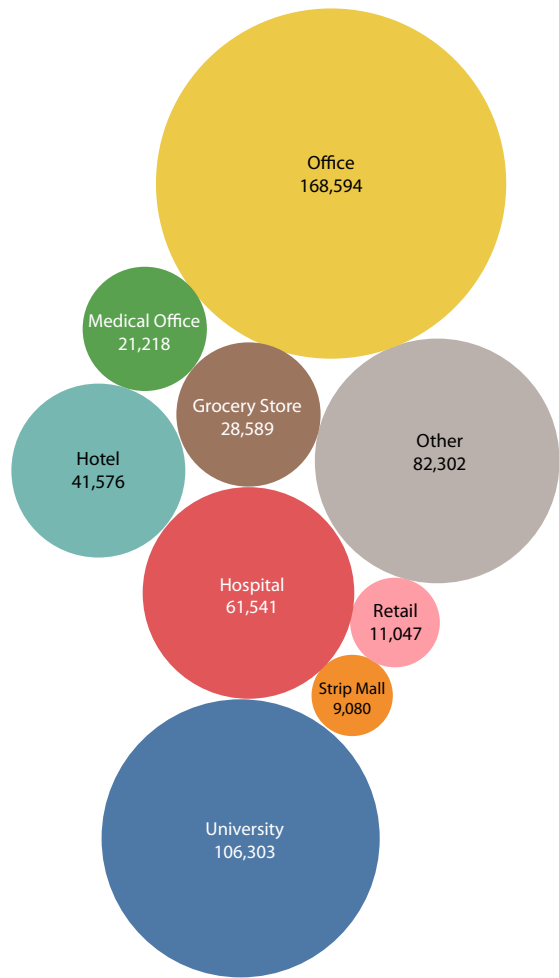
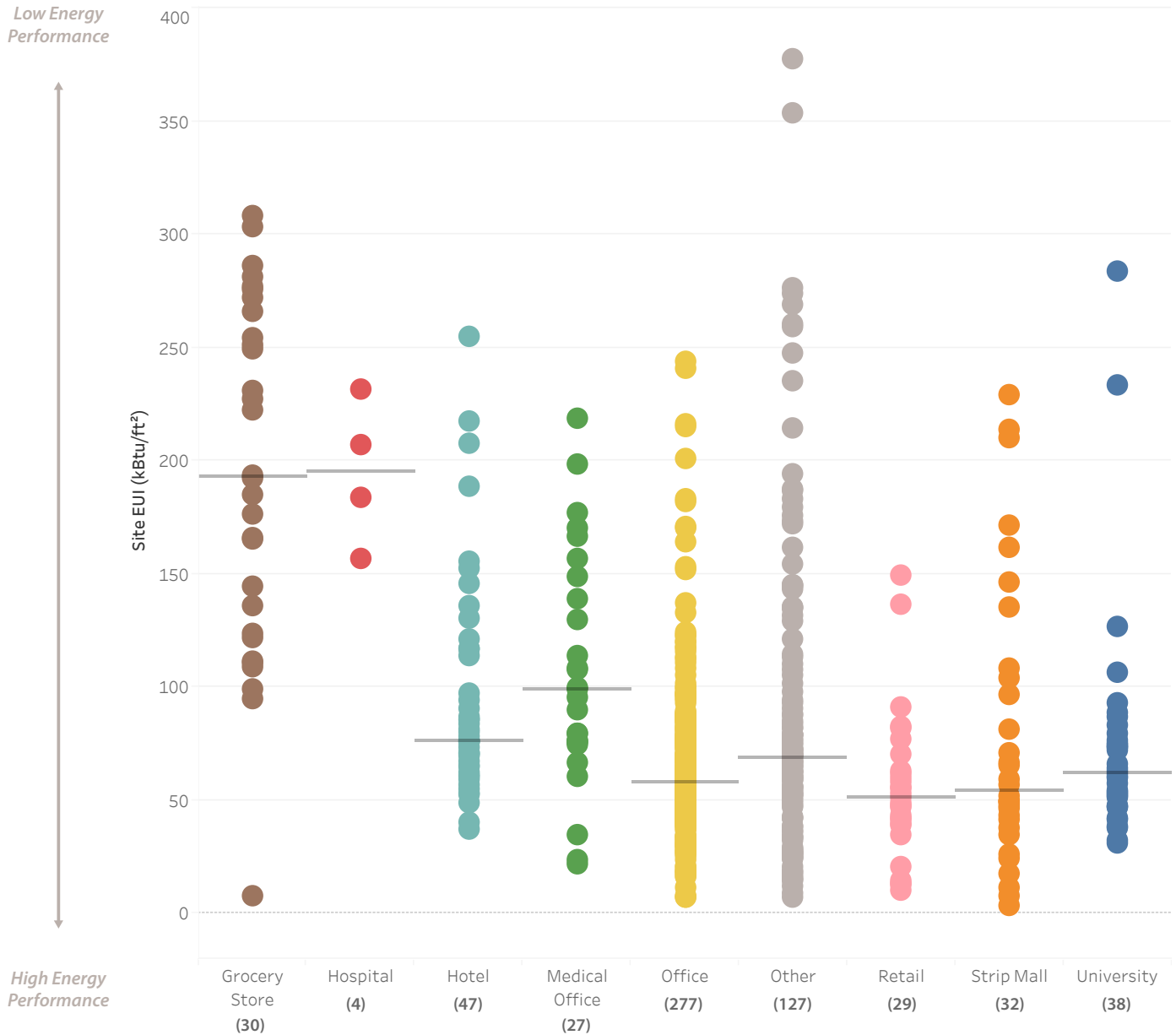


Figure 2: Carbon Emissions (metric tons CO2e) by Building Type

# ENERGY PERFORMANCE RESULTS

Site EUI and ENERGY STAR scores varied greatly in commercial buildings of the same 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.**



**LEGEND:**

- Portland Median Value
- Building Value

Figure 3: Site EUI Distribution and Median by Building Type



The ENERGY STAR score uses a national dataset to compare buildings with similar characteristics on an ascending scale of 1-100. To enable year-over-year comparison between buildings, the ENERGY STAR score considers EUI along with changes in weather conditions, utility fuel mix and building operations. **Buildings that receive an ENERGY STAR score lower than the national median of 50 are likely to have the greatest opportunities to improve energy performance.** The median overall Energy Star score for this dataset is 72.

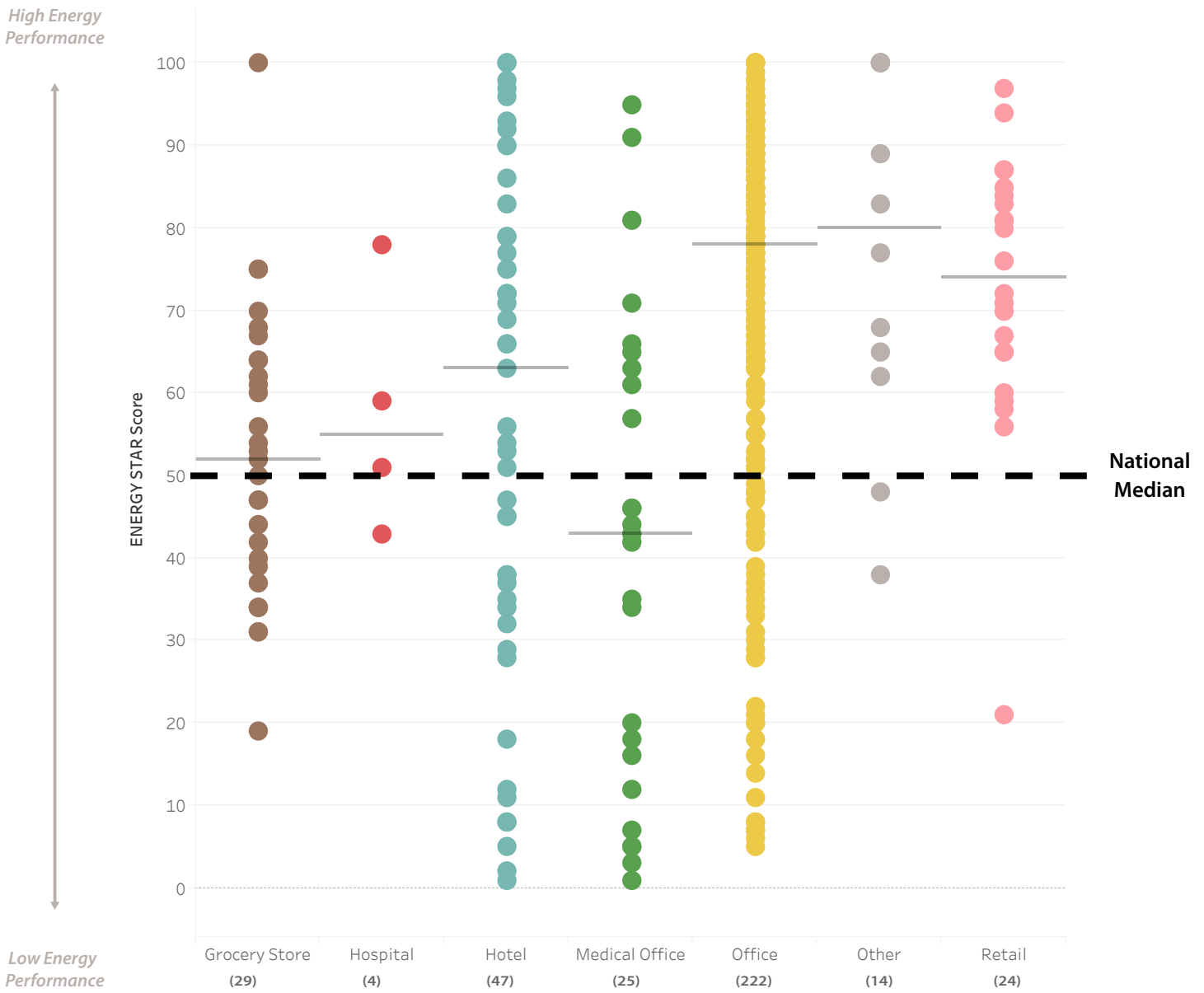


Figure 4: ENERGY STAR Score Distribution by Building Type

**LEGEND:**

- Portland Median Value
- Building Value

All 611 buildings and campuses included in this analysis reported a Site EUI, and 365 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. Figure 5 shows the median ENERGY STAR scores by building type.

The City received reports from 256 buildings that reported in both 2015 and 2016. **The energy consumption of these buildings remained relatively flat while the overall median ENERGY STAR score declined slightly from 73 in Year One to 72 in Year Two. This is still significantly higher than the national median of 50.**

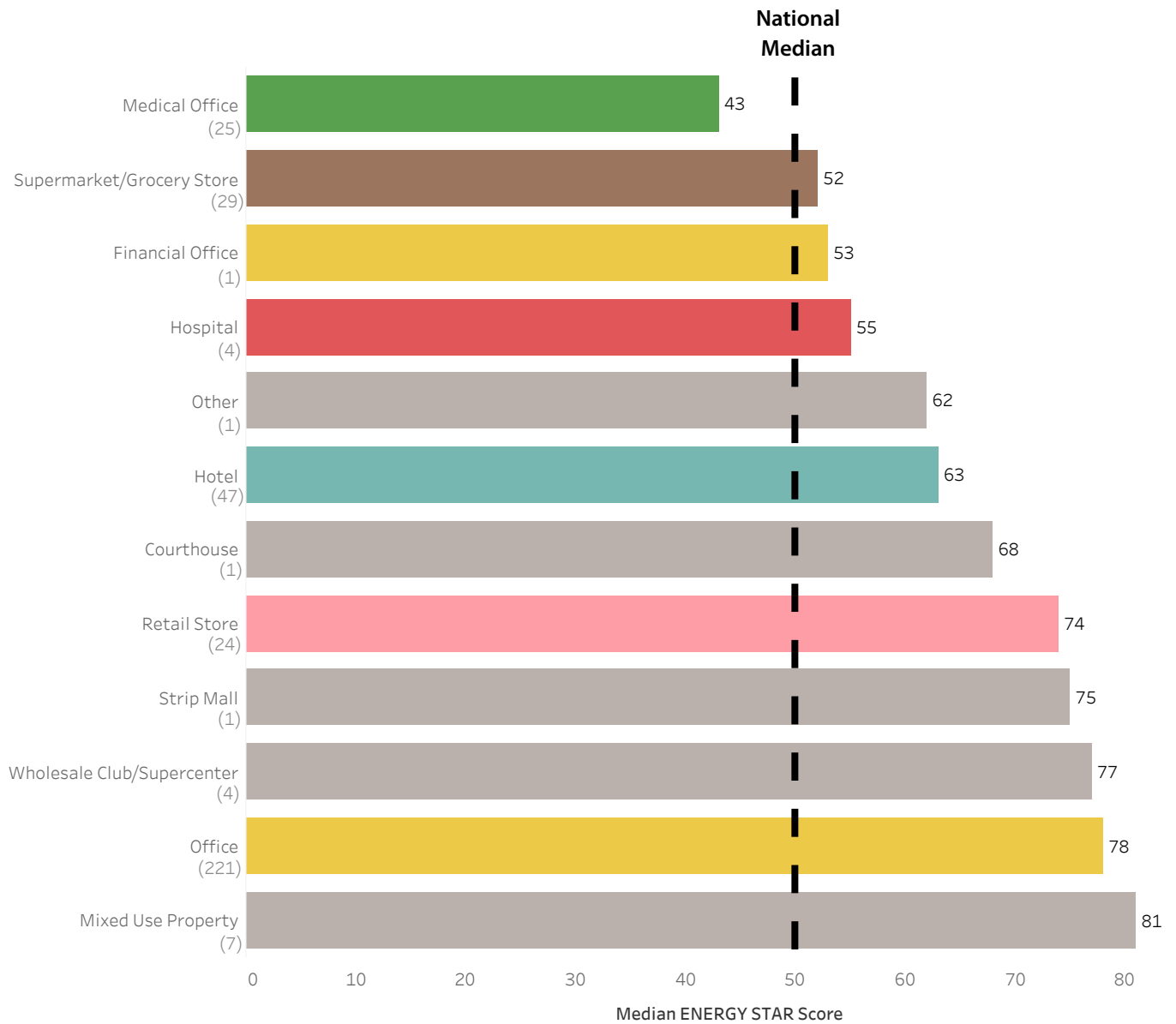


Figure 5: Median ENERGY STAR Score by Property Type

Figure 6 shows the distribution of the number of buildings that received each ENERGY STAR score from 1 to 100. The smaller buildings between 20,000 to 50,000 square feet are represented by the lighter shaded areas. Buildings that score 75 or higher could be eligible for ENERGY STAR certification. **Like Year One, nearly half of the buildings that reported ENERGY STAR scores in Year Two are eligible for ENERGY STAR certification regardless of size.**

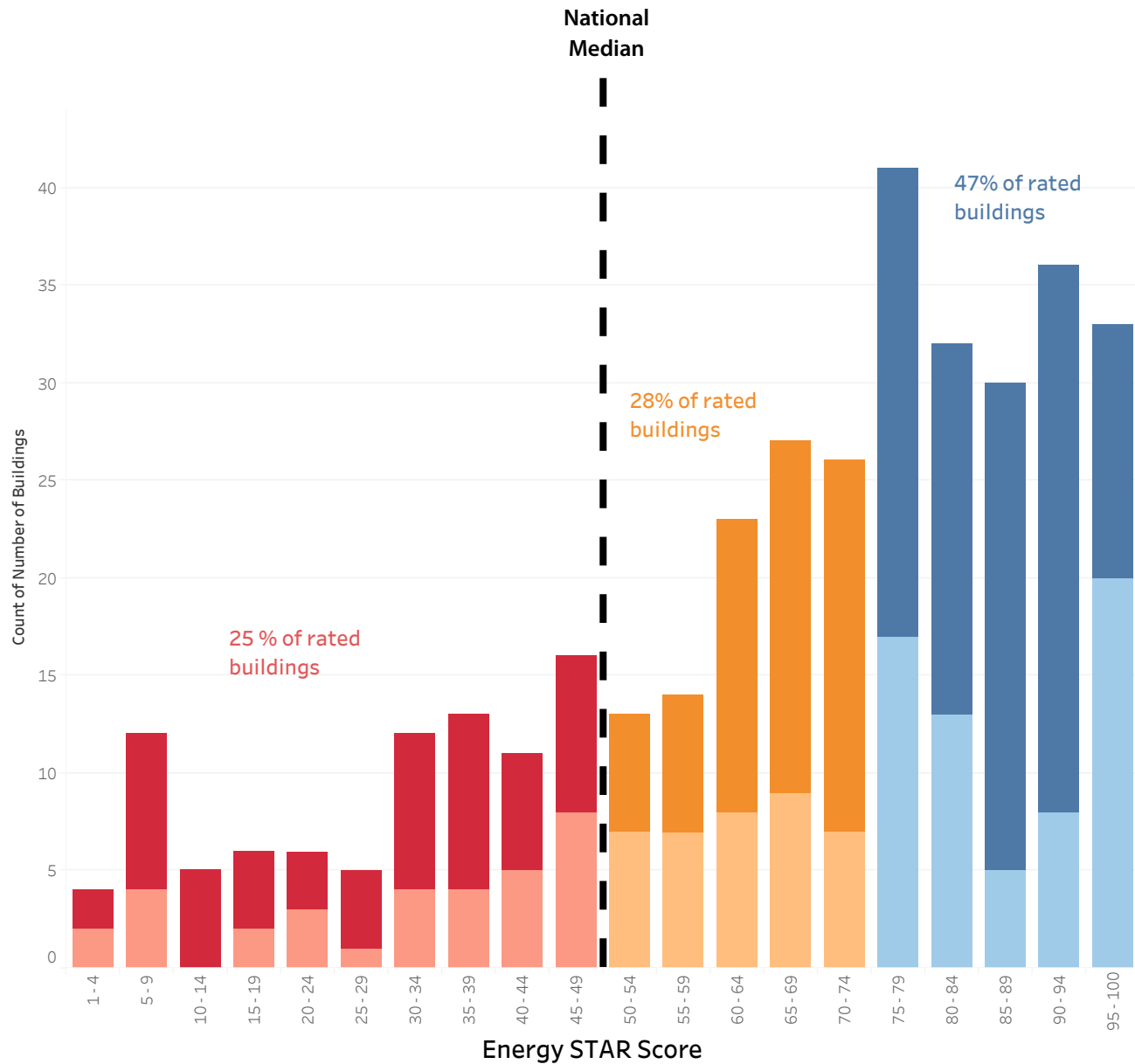


Figure 6: Number of Buildings Receiving ENERGY STAR Scores from 1 to 100

The effect of building age on ENERGY STAR scores is shown in Figure 7. **Notably, buildings built from the 1910s through the 1920s reported higher ENERGY STAR scores than those built in any other decade.**

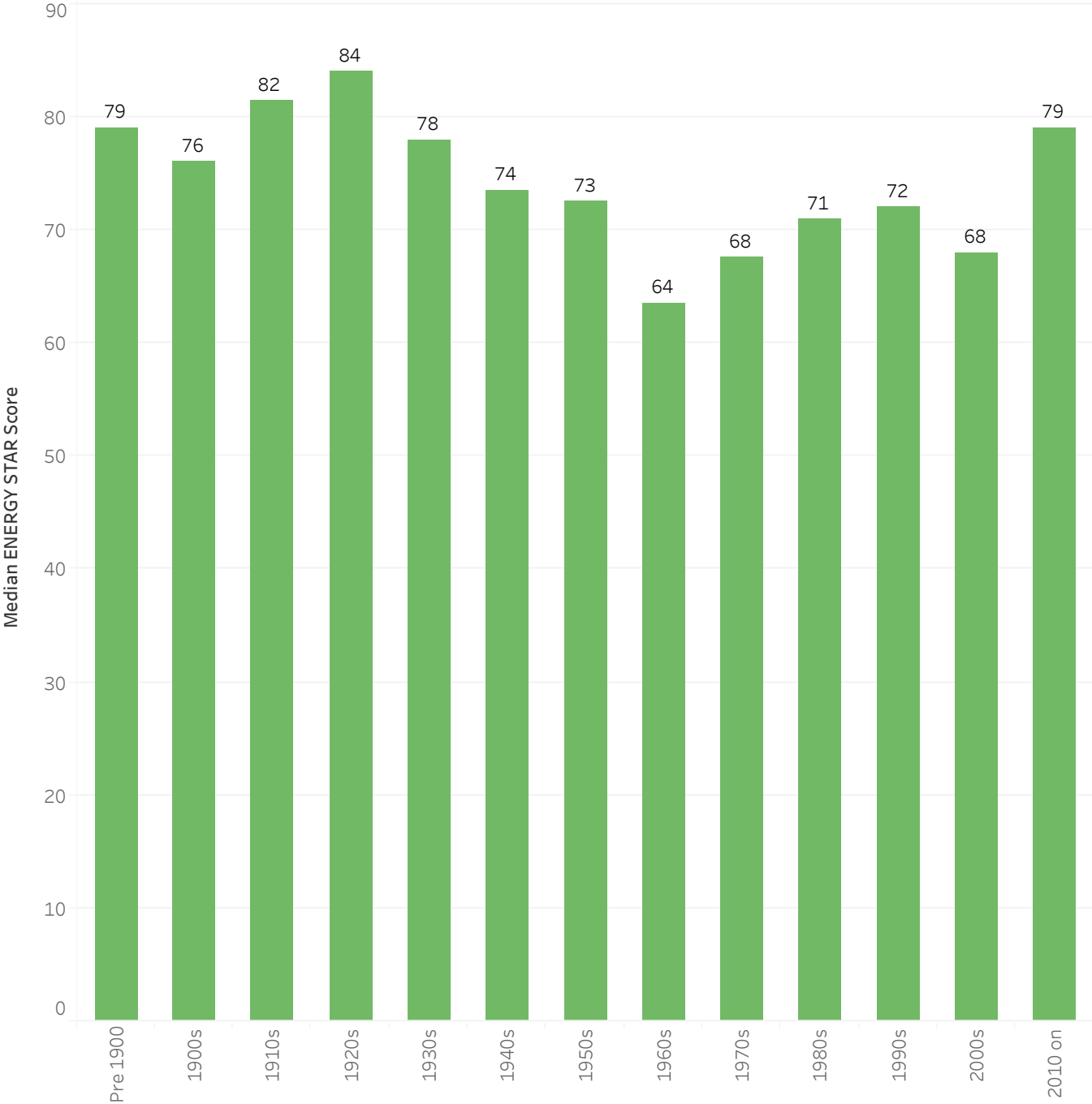
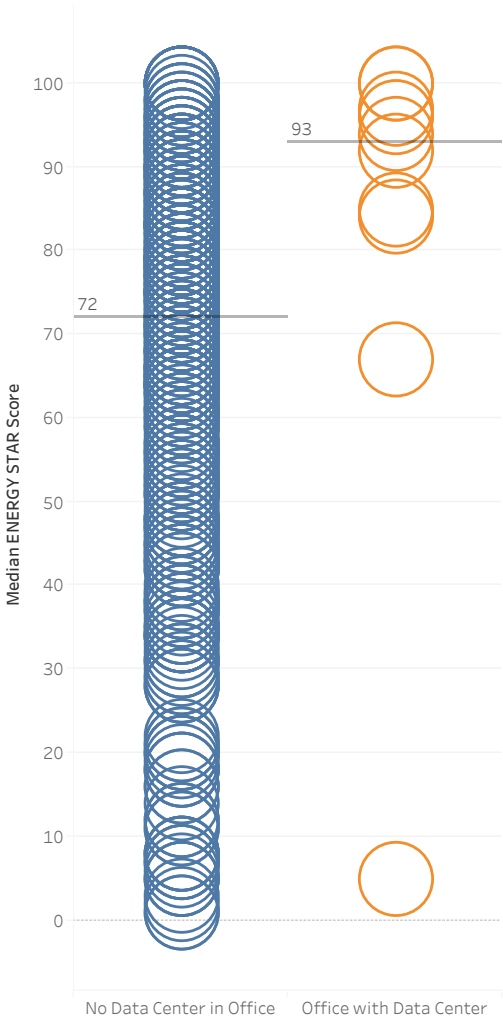


Figure 7: Median Building ENERGY STAR Score by Decade of Construction





Older buildings perform well in comparison to newer buildings.



**Office buildings continue to be the most commonly-reported building type in Portfolio Manager. In Year Two, 221 office buildings reported ENERGY STAR scores. Of these, 20 reported that their building included a data center as a secondary use type.** As shown in Figure 8, the distribution of ENERGY STAR Scores for offices with and without a data center is substantially different. This difference could be attributed to the presence of extremely efficient data centers; however, the complexity of entering data centers correctly into Portfolio Manager could be a factor. Since many building managers are new users to Portfolio Manager, there is potential for inadvertent errors and incomplete data. The potential for error suggests the need for verification of the self-reported information entered into Portfolio Manager.

Figure 8: Data Center in Office ENERGY STAR Score Distribution

## NEXT STEPS

**Portland's commercial buildings continue to perform well compared to national averages. However, the results of the second reporting year analysis reveal opportunity for improving energy performance within every type of commercial building covered by the Energy Performance Reporting Program. In the coming years, the City will complete the following next steps:**

- Publish individual building energy performance metrics and compliance status annually. Currently, information for buildings that are 50,000 sf and greater is now available at [www.portlandoregon.gov/bps/energyreporting](http://www.portlandoregon.gov/bps/energyreporting). Next year, buildings that are 20,000 sf and greater will be published as well. For the first time, managers and tenants also will be able to gain access to the energy information.
- Create an online map for easier comparison of energy performance between similar commercial buildings.
- Work with Energy Trust of Oregon and Portland State University to expand the scope of the statistical analysis.
- Engage with program partners to promote data verification and recognition of those buildings that demonstrate the highest performance and most year-over-year improvement. Since the energy performance information relies on the accuracy of data entered by building managers into Portfolio Manager, only buildings that have verified energy information or received ENERGY STAR certifications will be eligible for recognition.
- Continue to address data quality issues and delinquent reports through extensive outreach and technical assistance by the Energy Reporting Help Desk.

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 will motivate energy performance improvements in commercial building, and ultimately, make 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)**