

CITY OF PORTLAND

2017 BUILDING ENERGY PERFORMANCE REPORTING RESULTS

SEPTEMBER 2018

YEAR THREE



Bureau of Planning and Sustainability
Innovation. Collaboration. Practical Solutions.
City of Portland, Oregon



ACKNOWLEDGMENTS

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2017 BUILDING ENERGY PERFORMANCE REPORTING RESULTS

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SUMMARY



Building managers submitted energy reports for 895 commercial buildings resulting in a compliance rate of 91 percent.

The City of Portland and Multnomah County's 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. Because commercial buildings are responsible for one-quarter of Portland's carbon emissions, improving energy performance in the building sector is a critical component of achieving these reduction targets.

In April 2015, Portland City Council adopted the Commercial Building Energy Performance Reporting Ordinance which uses building energy benchmarking to measure and advance progress toward the City's climate goals for existing buildings. The ordinance requires property owners of commercial buildings 20,000 square feet and larger to use the U.S. Environmental Protection Agency's ENERGY STAR® Portfolio Manager® benchmarking tool to track energy performance metrics and report this information annually to the City. The requirements were phased in with commercial buildings 50,000 square

feet and larger reporting on their 2015 calendar year energy performance metrics. The following year, buildings 20,000 square feet and larger were required to begin reporting with 2016 calendar year energy performance metrics.

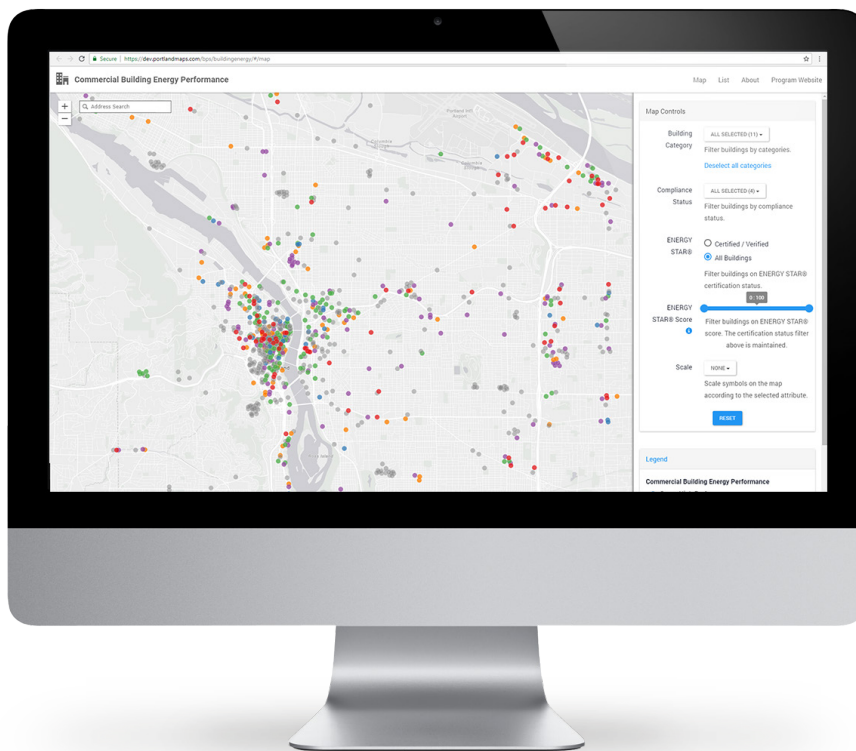
The City worked closely with Energy Trust of Oregon (Energy Trust) and the Northwest Energy Efficiency Alliance (NEEA) to provide resources to help building owners and property managers improve their energy performance. Energy Trust and NEEA designed a range of resources, including web content and case studies. Energy Trust's Existing Buildings program representatives are also working one-on-one with property managers interested in completing energy efficiency improvements. The City offers step-by-step compliance guides, a dedicated Energy Reporting Help Desk for customized assistance and drop-in "office hours" leading up to the April 22 compliance deadline.

Each year, the City compiles and reviews the energy performance report submittals. This report summarizes the energy performance data collection process, analysis and results for the third year of commercial reporting under the City's ordinance. For the 2015 and 2016 reporting years, the Institute for Sustainable Solutions at Portland State University conducted analyses of the data, primarily focusing on energy performance and carbon emissions by building type. The analysis for this year's annual report was completed by City staff, with advising from Energy Trust and NEEA, and is consistent with the methodology established in the previous years.

In September 2017, the City published energy performance metrics for individual buildings 50,000 square feet and larger. Individual building energy performance information is now available for all buildings reporting under the ordinance in an Excel spreadsheet and an online interactive map, which can be accessed at www.portlandoregon.gov/bps/energyreporting. This information allows building owners, managers, tenants and other stakeholders to make more informed decisions to reduce energy use and carbon emissions. The map also features a page that recognizes high-performing buildings. The list ranks buildings which have had their ENERGY STAR score certified through the ENERGY STAR program any time since 2017 or if the information in their account has been verified by a registered architect or professional engineer.

HIGHLIGHTS FROM 2017 ENERGY REPORTING:

1. The overall compliance rate for reporting on the 2017 calendar year climbed to over 91 percent – up from 84 percent in the previous year. In total, 979 commercial buildings were expected to report, and 895 buildings fulfilled the reporting requirements. The compliance status of individual buildings, as well as energy performance metrics, are published in an Excel spreadsheet and an online interactive map available at www.portlandoregon.gov/bps/energyreporting.
2. Portland's commercial building stock continues to perform better than national averages across most building categories. Of buildings eligible for an ENERGY STAR score, 75 percent received a score higher than the national median of 50. While this finding is encouraging, significant opportunities for improvement remain in certain building categories and for the lower performing buildings in each category. Lower performing buildings can use up to five and half times as much energy per square foot compared to the median.
3. Similar to the analyses in previous years, a building's old age did not necessarily indicate that its energy performance would be lower. The highest median ENERGY STAR scores occurred in buildings constructed prior to 1940. In particular, buildings constructed in the 1960s have consistently demonstrated lower performance and may be a potential area for additional analysis.
4. The City received 258 reports from buildings that reported their energy usage in 2015, 2016 and 2017. This cohort only includes larger buildings, as only buildings 50,000 square feet and larger were required to report in 2015. Some building types, such as medical offices and supermarkets, demonstrated ENERGY STAR score improvements over this three-year period, while other categories exhibited lesser changes.



All commercial buildings reporting to the City under the ordinance are now published in an online interactive map displaying the building's compliance status and energy performance metrics.

BENCHMARKING METRICS

Similar to 23 other cities across the country with building energy benchmarking laws, the City collects annual energy performance information via ENERGY STAR® Portfolio Manager®. The free online tool was first launched in 1999 and is now used to benchmark more than 450,000 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 and over time.

Portfolio Manager generates two main outputs to measure building energy performance: **Site Energy Use Intensity (EUI)** and the **ENERGY STAR score**. These performance metrics provide diagnostics for identifying and tracking building energy performance. The tool also calculates carbon emissions.

Portfolio Manager offers more than 80 building types to characterize a building. Of these, only 21 building types are eligible to receive an ENERGY STAR score. The City has further categorized buildings into nine building categories for the purposes of this data analysis which include Grocery Store, Hospital, Hotel, Office, Medical Office, Retail, Strip Mall University and Other. These categories are used to create the figures that appear in this report, unless specified otherwise.

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 buildings across the country on a scale of 1 (least efficient) to 100 (most efficient). A score of 50 represents the national median and buildings scoring 75 or higher may be eligible to earn ENERGY STAR certification. As of August 2018, 111 buildings in Portland have achieved this certification distinguishing their exemplary energy efficiency, and 25 buildings have a certification that was earned in 2017 or more recently.



COMPLIANCE AND DATA QUALITY

Portland's Energy Performance Reporting Policy applies to commercial buildings which have 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. In total, 979 buildings were expected to report energy performance metrics for the 2017 calendar year. Some buildings share energy metering services across multiple building footprints and report their energy performance as a "campus." The City offers case-by-case exemptions from the reporting requirements for new construction, wholly unoccupied buildings, permitted demolitions and other extenuating circumstances. Twenty-seven buildings received exemptions from 2017 reporting.

As of August 1, 2018, the City received reports accounting for energy performance in 895 buildings, resulting in a compliance rate of 91.4 percent – the highest compliance rate to-date. Remarkably, the Year Three compliance rate climbed to 95 percent for buildings that are 50,000 square feet and larger. Smaller commercial buildings, between 20,000 to 50,000 square feet, which are now in their second year of reporting, had a compliance rate of 88 percent.

Building energy information is self-reported through Portfolio Manager by building managers or energy service providers acting on their behalf. Data quality can be influenced by factors including manual data entry errors, omission of energy meters and a lack of familiarity with Portfolio Manager or software tools in general. For the purposes of this 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.
- Reported GFA smaller than 20,000 square feet.
- Primary property type incorrectly reported.
- Extra reports received that were not expected.
- Default or temporary building use values were used for buildings that were also eligible for an ENERGY STAR score.

After removing the above errors from the data, a subset of 657 individual buildings and 50 campuses covering more than 81.5 million square feet remained for statistical analysis. Less discernible errors may be present within the dataset, such as unreported electric and natural gas meter data or discrepancies in actual property use type or gross floor area. To help improve data quality issues, the City continues to provide an Energy Reporting Help Desk, reference guides for new and returning users, and specific and customized instructions for correcting reports submitted with errors.

As part of its standard process, the U.S. EPA updated how Portfolio Manager calculates performance metrics for buildings in August 2018. The data analyzed in this report was collected prior to that. Building energy performance reports submitted in the next reporting period will be scored based on more recent market data. More information is available at www.energystar.gov/benchmark.



BUILDING CHARACTERISTICS

As displayed in Figure 1, **office buildings cover the most floor area, followed by universities, hotels, hospitals, medical offices, retail stores, grocery stores and strip malls.** 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 or may be the only building of its type eligible for a score. The call-out box shown below describes the building types that are included in the “other” category.

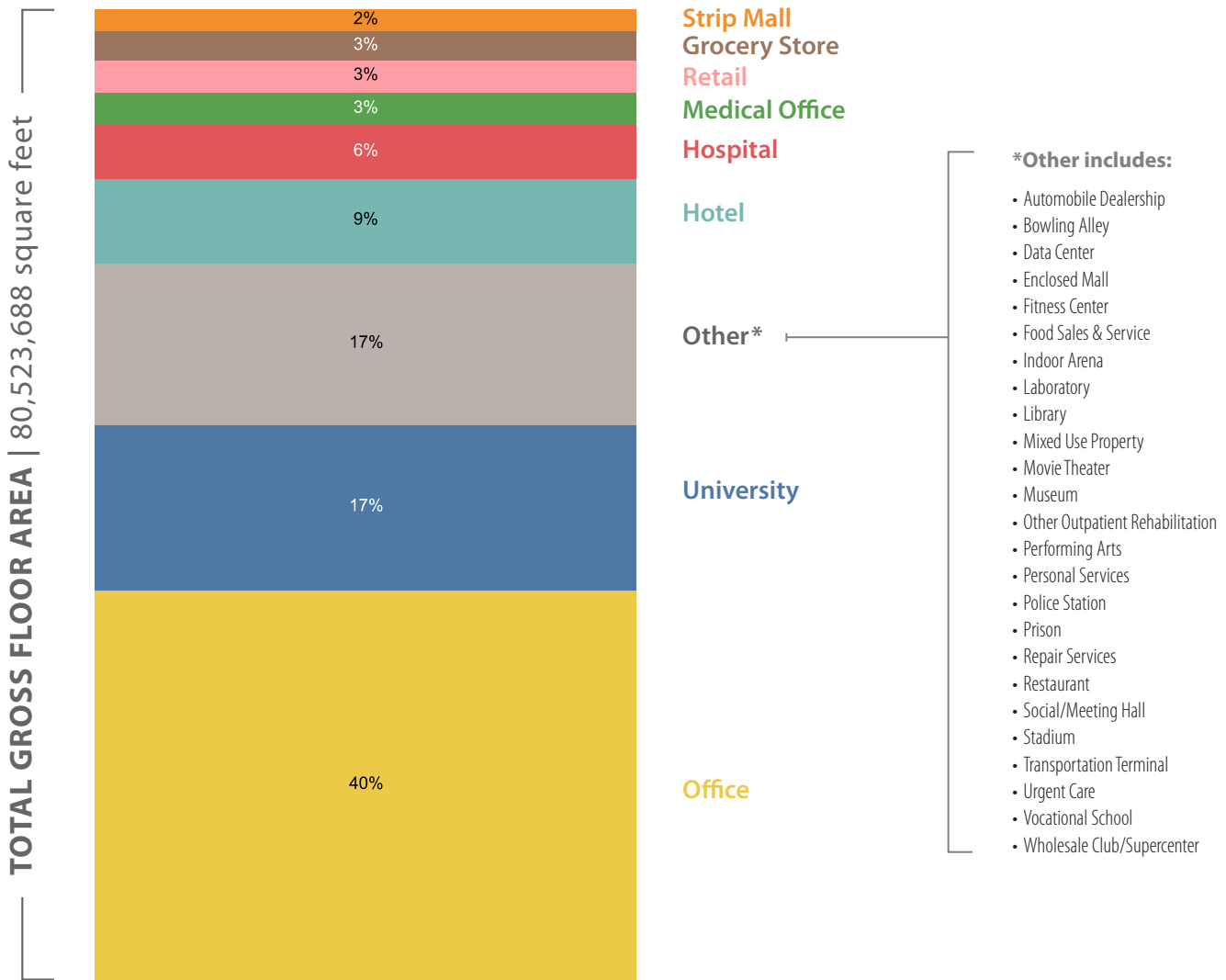


Figure 1: Percentage of Floor Area by Building Category

Among buildings included in the analysis, **office buildings and universities account for the most carbon emissions**, as shown in Figure 2. These two categories represent just over half of the total carbon emissions. Based on Portfolio Manager estimates, the buildings and campuses included in this analysis emitted an approximate total of 728,000 metric tons of carbon pollution in Year Three.

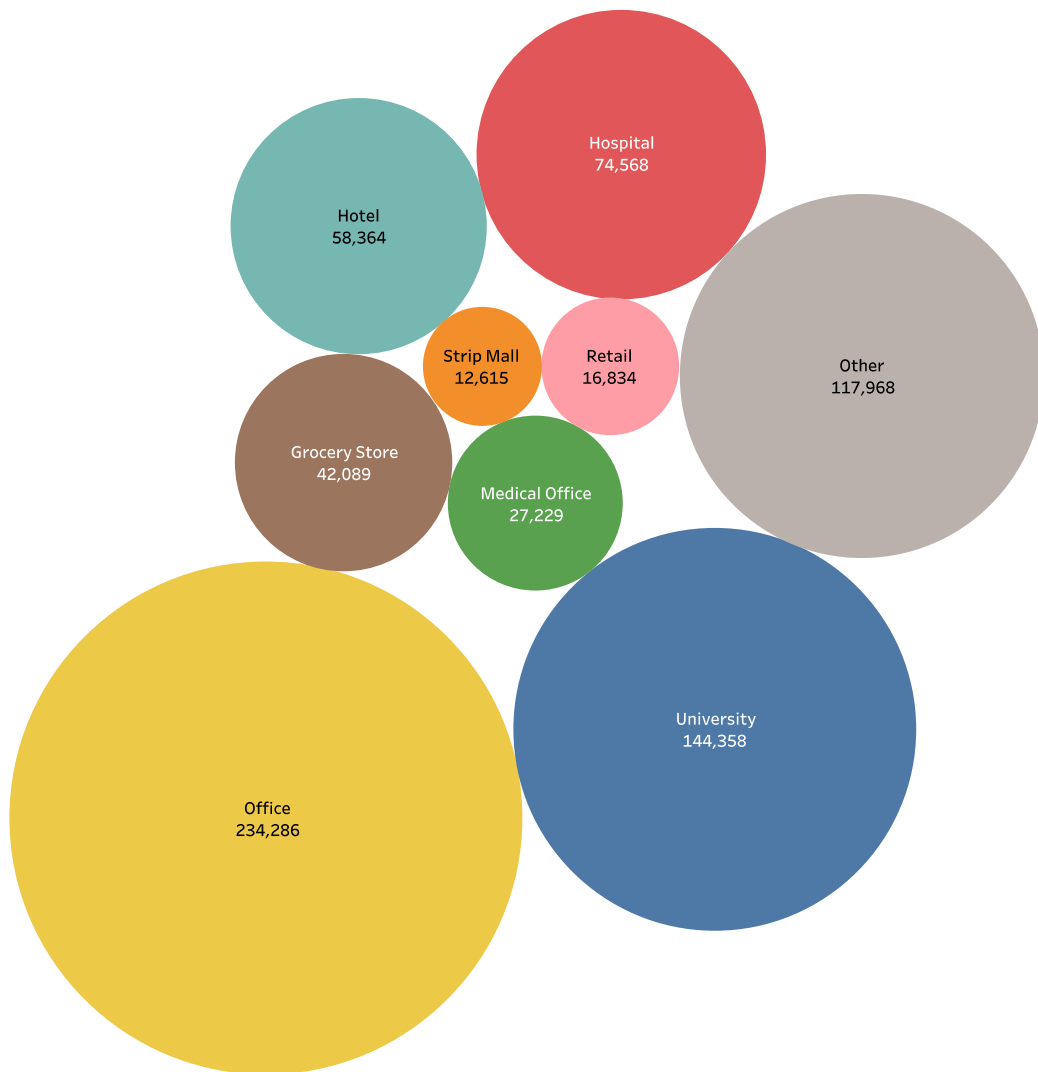


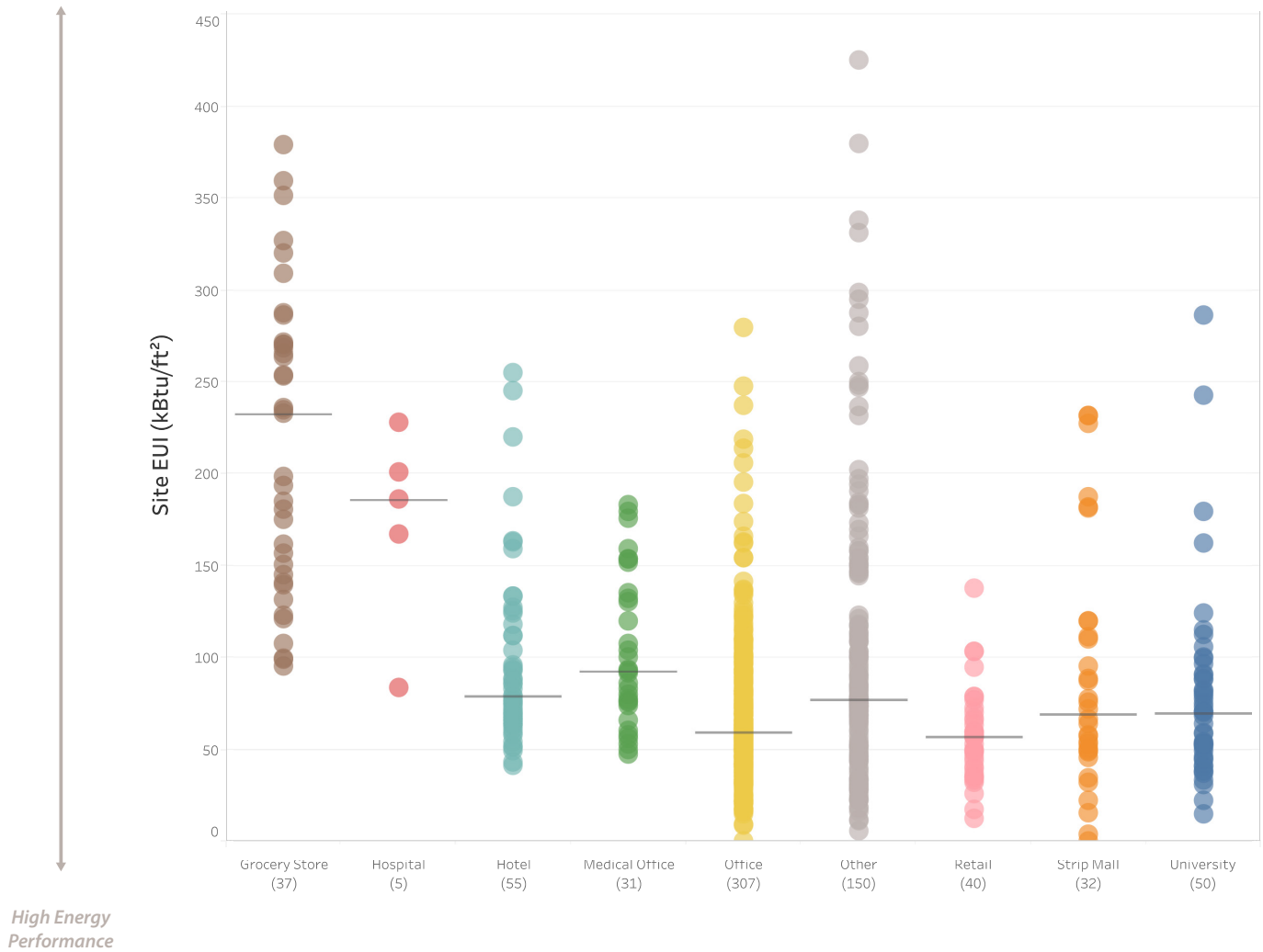
Figure 2: **Carbon Emissions (metric tons CO2e) by Building Category**

ENERGY PERFORMANCE RESULTS

Site EUI and ENERGY STAR scores varied greatly for commercial buildings of the same type, as displayed in Figures 3 and 4, respectively.

The lowest performing buildings used up to five and a half times as much energy per square foot compared to the median value within their category, shown below in Figure 3.

Low Energy Performance



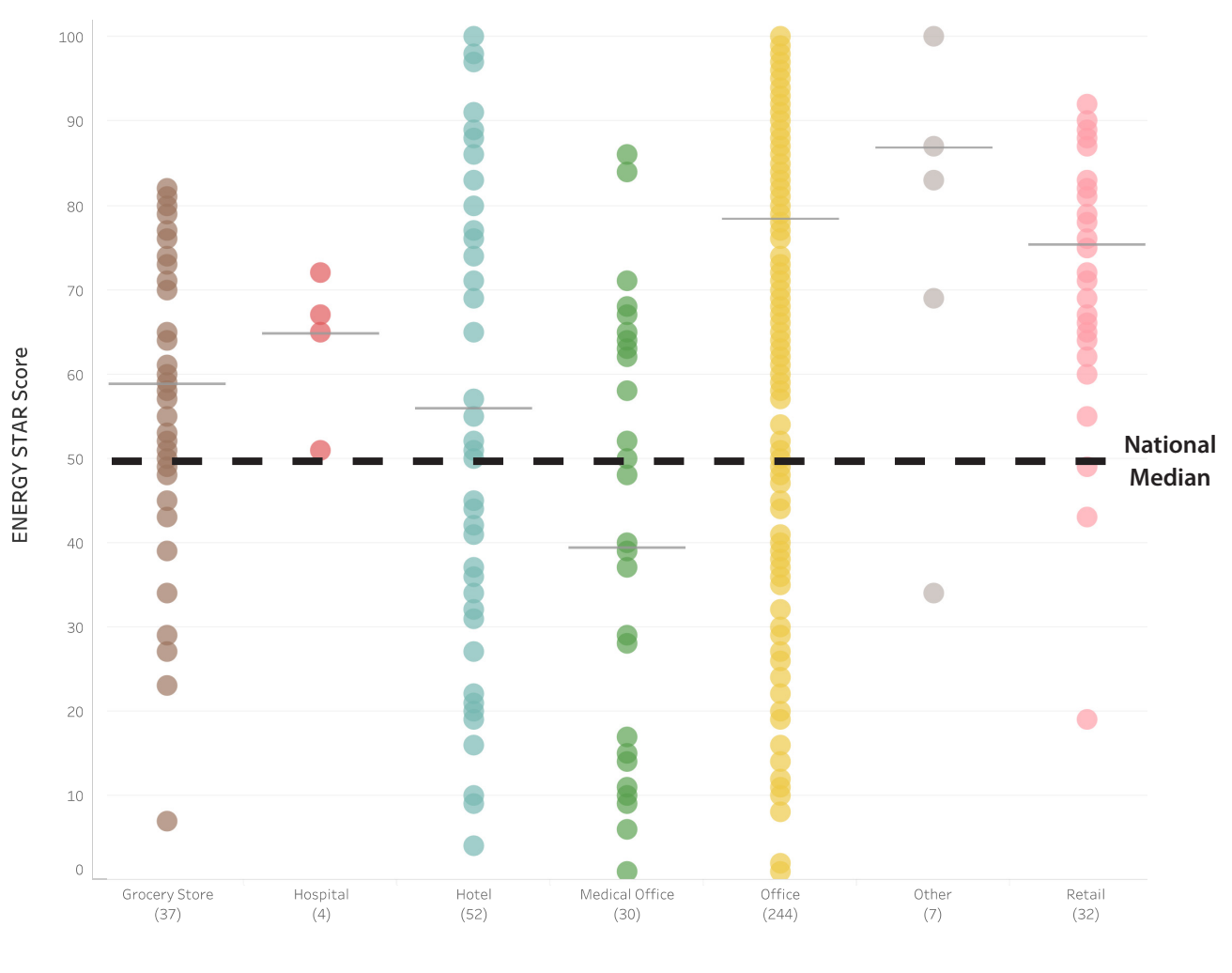
LEGEND:

- Portland Median Value
- Building Value

Figure 3: Site EUI Distribution and Median by Building Category

In Portfolio Manager, some buildings are eligible for an ENERGY STAR score, which uses a national dataset to compare buildings with similar characteristics on an ascending scale of 1-100. The score normalizes for business operations and it allows year-over-year comparison by considering changes in weather conditions. **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 73, a one-point increase from the median of 72 in Year Two.

Low Energy Performance



LEGEND:

- Portland Median Value
- Building Value

Figure 4: ENERGY STAR Score Distribution by Building Category

All 657 individual buildings and 50 campuses included in this analysis reported a Site EUI. Of these buildings, 412 were also eligible to report an ENERGY STAR score. The building types include offices, retail stores, a courthouse, grocery stores, hotels, hospitals, medical offices and properties with a mix of any of these. Figure 5 displays the median ENERGY STAR scores for these building types.

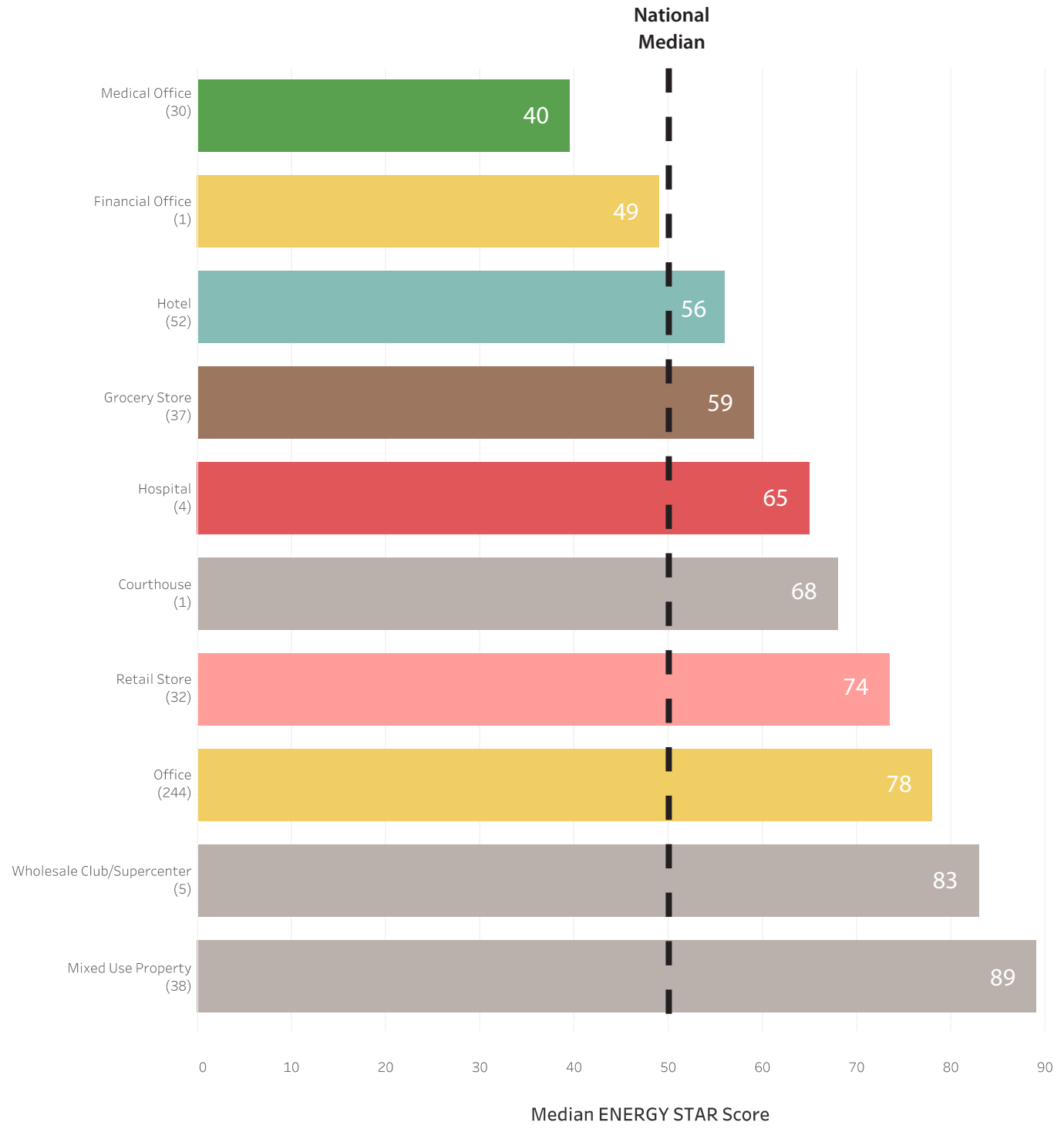


Figure 5: Median ENERGY STAR Score by Building Type

Figure 6 shows the distribution of the number of buildings that were eligible to receive an ENERGY STAR score on a scale from 1 to 100. Buildings that receive a score of 50 or higher are performing better than the national median. Buildings that score 75 or higher could be eligible for ENERGY STAR certification. Similar to the previous years' analyses, **about 75 percent of buildings receiving an ENERGY STAR score are above the national median. Just over 40 percent of buildings that reported ENERGY STAR scores in Year Three are eligible for ENERGY STAR certification.** Buildings between 20,000 to 50,000 square feet are represented by the lighter shaded areas, while buildings larger than 50,000 square feet appear in darker shades.

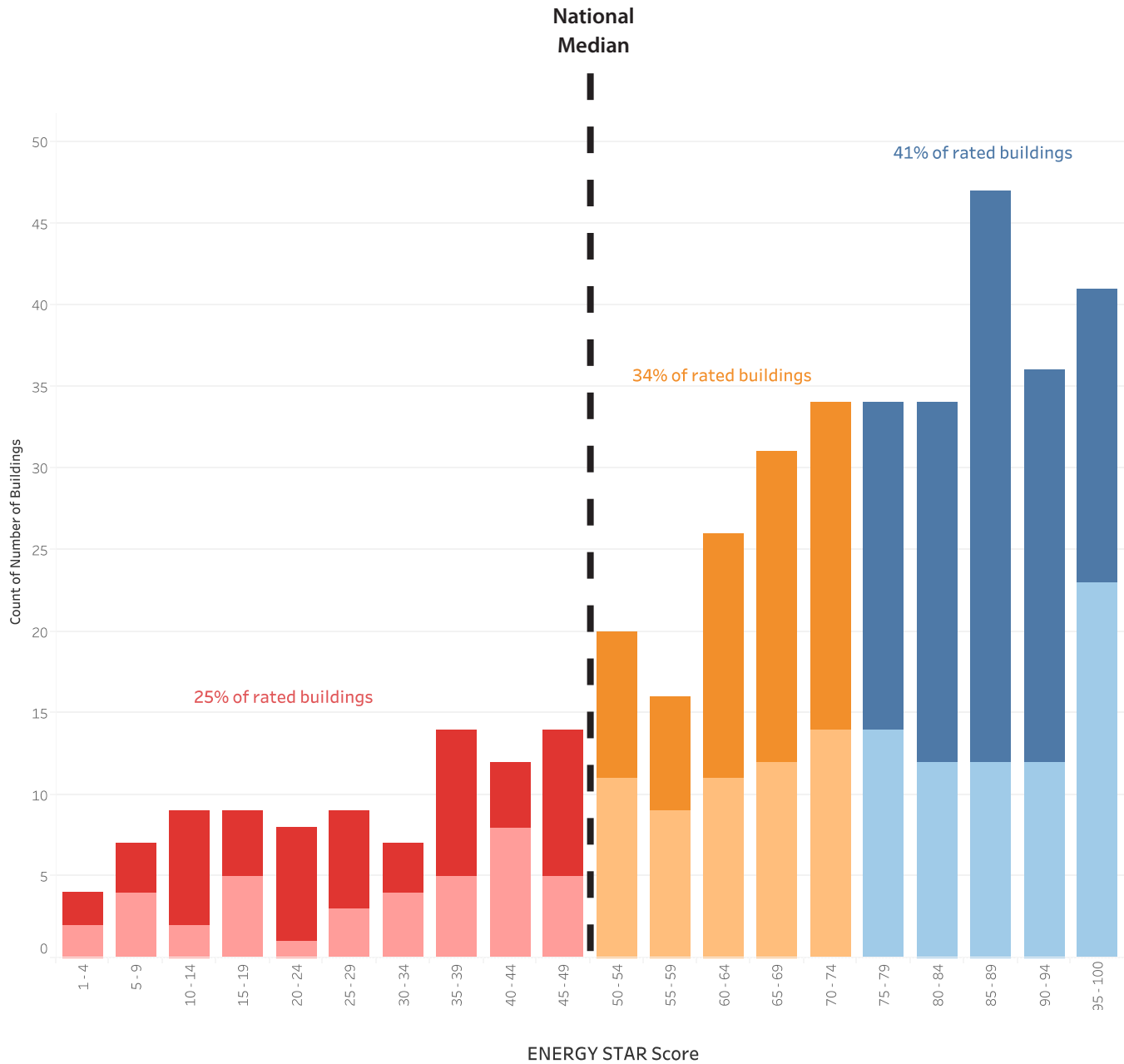


Figure 6: Number of Buildings Receiving ENERGY STAR Scores from 1 to 100

The effect of building age on ENERGY STAR scores is shown in Figure 7. Notably, buildings constructed in the 1930s and earlier reported higher ENERGY STAR scores than those built in any other decades. Buildings constructed in the 1960s were the lowest performers, followed by the 1970s and 2000s. This finding is consistent with the previous year's analysis and similar to findings in the first year's analysis of larger buildings. This may indicate that buildings constructed in these decades present the greatest opportunities for energy efficiency improvements.

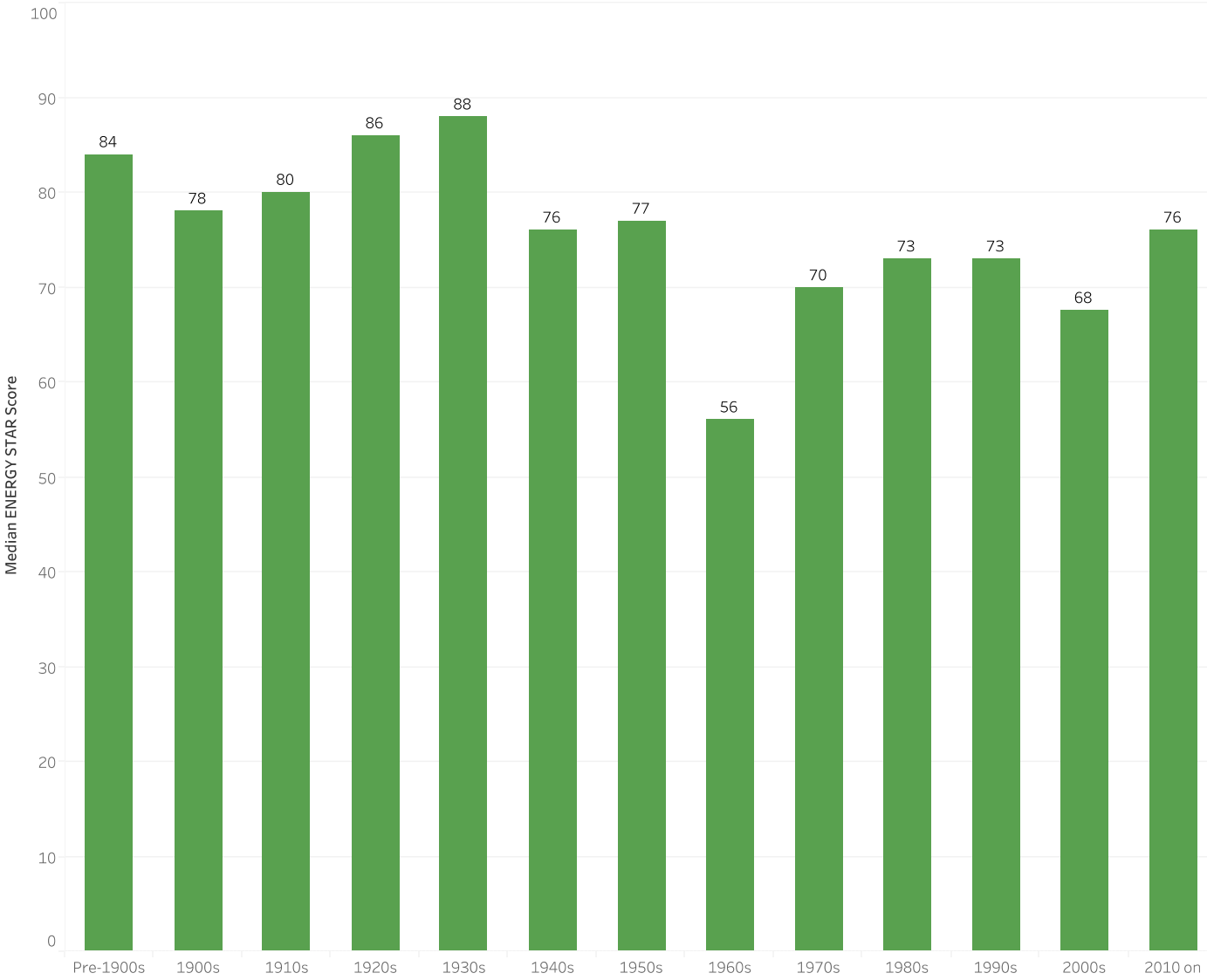


Figure 7: Median ENERGY STAR Score by Year Built

With many buildings 50,000 square feet and larger reporting for the third consecutive year, ENERGY STAR scores within each building category can be tracked over time. Figure 8 shows the median ENERGY STAR score for buildings reporting to the City in all three years. **Some categories, such as medical offices and supermarkets, show considerable upward trends**, while retail building energy performance dipped in 2017. Other categories are flat or show only slight changes in performance.

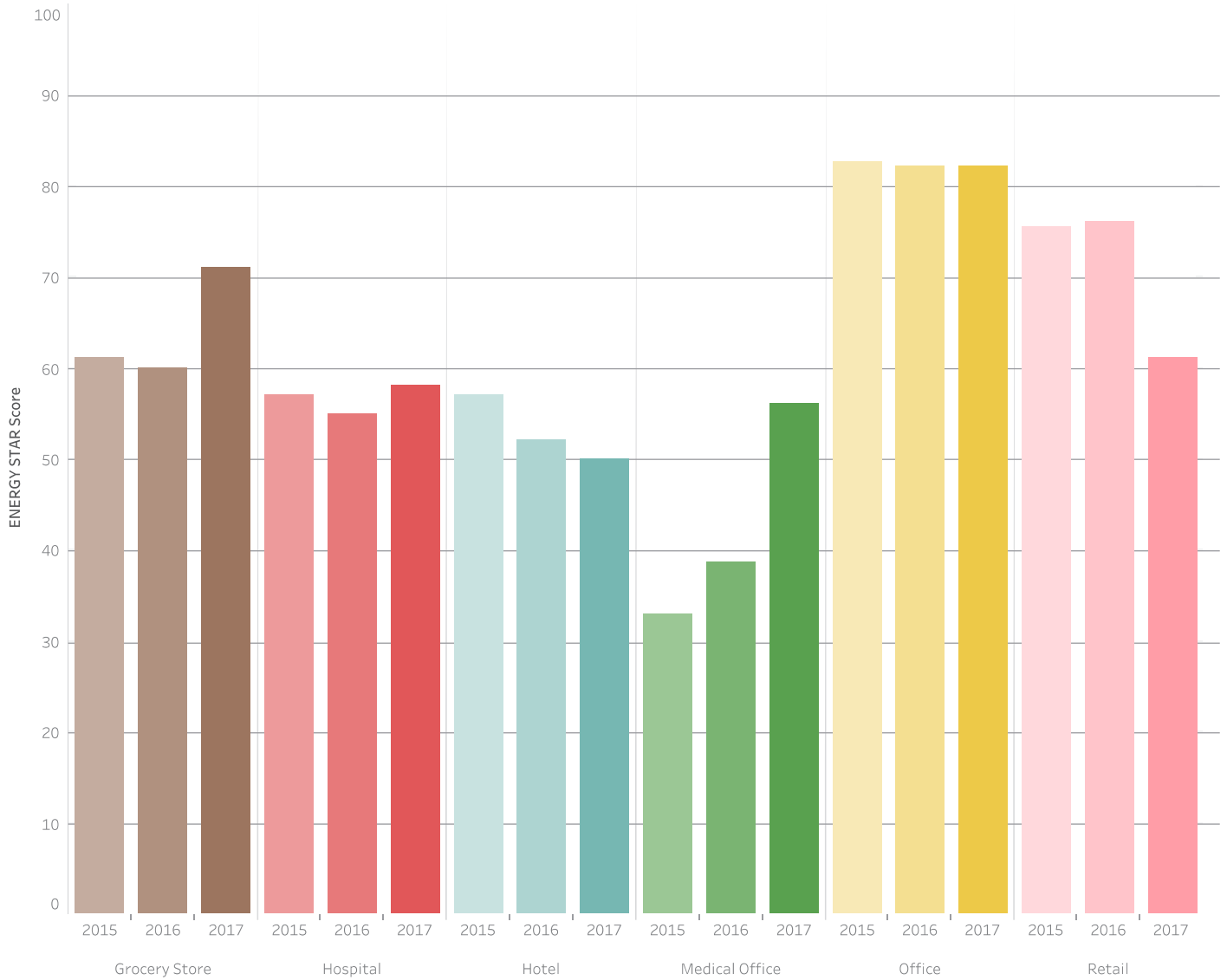


Figure 8: Median ENERGY STAR Score by Building Category from 2015-2017

NEXT STEPS

Expanding access to energy information enables a greater understanding of the energy use and associated carbon emissions for Portland's largest buildings. Increasing awareness of building energy use is intended to motivate energy performance improvements in commercial buildings, and ultimately, to make progress towards meeting Portland's climate goals for existing buildings.

Portland's commercial buildings continue to perform relatively well compared to national averages. However, significant opportunities for improving energy performance remain within every category of commercial building covered by the Energy Performance Reporting Program. In the coming years, the City will continue to focus on the following next steps:

- **Publish individual building performance metrics annually.**

This year, individual building energy performance metrics and compliance status information for buildings 20,000 to 50,000 square feet were published for the first time. Information for all buildings 20,000 square feet and larger is available at www.portlandoregon.gov/bps/energyreporting and will continue to be updated on an annual basis.

The publication of this information allows managers and tenants, as well as the broader public, access to transparent building energy information. It also allows for easy comparison of energy performance based on building characteristics.

- **Update the online interactive map annually.**

The online map provides an interactive method to explore individual building data and compare building performance to peer buildings. Information for buildings 20,000 to 50,000 square feet is now included. The map can be viewed at www.portlandmaps.com/bps/buildingenergymap.

- **Recognize high performing buildings.**

In this year's update to the online map, the City published a ranking of top-performing buildings that are eligible for an ENERGY STAR score and have recently had their score certified or verified.

The City will continue to encourage building managers to pursue certification or verification and is exploring how to support expanding the adoption of this voluntary option. Reliable energy performance information depends upon the accuracy of the data entered by building managers into Portfolio Manager.

- **Coordinate with program partners.**

The City will continue to work with program partners to evaluate more opportunities to recognize buildings that demonstrate the highest performance or significant year-over-year improvement. The City will also continue to engage with Energy Trust and NEEA to perform deeper analysis of data collected through the City's benchmarking requirements in 2015, 2016 and 2017. The data informs strategies to connect commercial building owners with Energy Trust and NEEA resources that can help them assess and implement energy efficiency improvements.

- **Maintain support for building managers.**

The compliance rate with the City's reporting requirements remains high and therefore the City will maintain the level of support provided to building managers by the dedicated Energy Reporting Help Desk. The City will also continue to refine processes to address data quality issues and minimize the amount of delinquent buildings.

- **Assist building managers in understanding Portfolio Manager modeling updates.**

The U.S. EPA completed an update to Portfolio Manager in August 2018 as part of its standard process to keep ENERGY STAR metrics reflective of current market performance. As a result, scores for some buildings and building types are likely to change significantly in the next reporting period.

The Energy Reporting Help Desk will support building managers by answering questions and providing guidance related to the changes.

QUESTIONS?

Please contact the City of Portland Energy Reporting Help Desk

503-823-7070

-OR-

energyreporting@portlandoregon.gov