

REPORT



LLOYD ECODISTRICT ENERGY REPORT

2017 ENERGY STAR PORTFOLIO MANAGER DATA ANALYSIS

SUBMITTED TO

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EXECUTIVE SUMMARY



Lloyd EcoDistrict Energy Action Plan establishes an energy goal of “no net increase” in energy use above 2010 levels by 2035. To reach this objective, the Plan targets a 33 percent reduction in the total energy use of existing buildings over the 25-year period.

Since 2014, RWDI has assisted Lloyd with the implementation of the Energy Action Plan. Each year, RWDI provides energy benchmarking and analysis at the district level to help Lloyd track progress toward the district’s energy goals. Understanding current and past energy use is key to identifying opportunities to improve energy performance, reduce emissions, and make informed energy efficiency investments.

Lloyd EcoDistrict (Lloyd) utilizes the U.S. Environmental Protection Agency’s ENERGY STAR® Portfolio Manager® program to monitor energy use for the district. The program enables Lloyd building owners and operators to track and share energy performance metrics for analysis on an annual basis.

ENERGY STAR Portfolio Manager is a web-based tool for benchmarking and tracking energy and water consumption, as well as greenhouse gas (GHG) emissions. Building owners and operators can set goals, track consumption, and compare performance to similar buildings in the U.S. Buildings can receive recognition through certification as well. ENERGY STAR Certification is achieved when a property’s ENERGY STAR Score is 75 or greater.

This report summarizes the data collection, analysis and results for Lloyd’s fourth year of ENERGY STAR Portfolio Manager energy benchmarking. RWDI’ analysis focuses on energy performance metrics and GHG emissions by property type and several other attributes. The results show progress as well as opportunities for energy performance improvement at the building-specific and district-wide level. Recommendations and next steps are presented at the end of this report.

HIGHLIGHTS FROM 2017 LLOYD ECODISTRICT DATA ANALYSIS



- Of the 25 commercial properties sharing access to data with Lloyd's ENERGY STAR Portfolio Manager master account, RWDI received data from 24 properties for the calendar year 2017, resulting in a reporting rate of 96 percent.
- The area weighted site EUI in Lloyd is 67.0 kBtu/ft², while the Portland median EUI is 75.0 kBtu/ft² for office, retail, hospitality, and healthcare properties, as published in the 2017 Building Energy Performance Reporting Results.
- Office, hospitality, and retail properties in Lloyd are performing better than the Portland median energy use of similar properties.
- Of the 14 properties generating an ENERGY STAR Score, 10 out of 14 buildings have scores of 75 or above, making them eligible for ENERGY STAR Certification.
- The median ENERGY STAR Score for Lloyd is 83, whereas the Portland median ENERGY STAR Score is 73.
- GHG emissions have reduced roughly 14 percent despite an increase in energy use in 2017 from the 2010 baseline.

Benchmarking Metrics

Metrics used for diagnosing performance include energy use, site energy use intensity (EUI), ENERGY STAR Score, and greenhouse gas (GHG) emissions.

- Site energy use intensity (EUI) represents a building's total annual energy use, divided by gross floor area. EUI is measured in kBtu/sf and signifies overall building energy performance.
- All EUI figures are area weighted to give a more accurate representation of average EUI.
- ENERGY STAR Score considers EUI along with changes in weather conditions, utility fuel mix and building operations. A score of 50 represents the national median. Buildings with a score of 75 or higher may be eligible for ENERGY STAR Certification.
- Greenhouse gas (GHG) emissions, expressed in metric tons of carbon dioxide equivalent (MTCO_{2e}) are calculated by multiplying site energy values by emissions factors. Specific emissions factors for natural gas consumption were obtained from EPA sources, whereas emissions factors from electricity were provided by Pacific Power.

ENERGY STAR PORTFOLIO MANAGER PARTICIPANTS



To date, 25 commercial properties have shared access to energy data with Lloyd EcoDistrict's master Portfolio Manager account. These properties cover 7,386,442 square feet (SF) of building floor area, representing 64 percent of building area in the district, based on figures in Lloyd's Energy Action Plan.

Lloyd EcoDistrict ENERGY STAR Portfolio Manager participants make up the district's largest commercial buildings. The current Portland Commercial Energy Performance Reporting Ordinance requires commercial buildings 20,000 SF and greater to use Portfolio Manager to track energy use. At the present, residential property data is not required by the ordinance nor is it included in this report.

Portfolio Manager participants are categorized in this analysis into five property types: Healthcare, Retail, Hospitality, Office, and Public Assembly. Figure 1 provides a breakdown by property type of the participants that have agreed to share Portfolio Manager accounts or energy data with Lloyd EcoDistrict.

PORTFOLIO MANAGER AGREEMENTS BY PROPERTY TYPE (FT²)

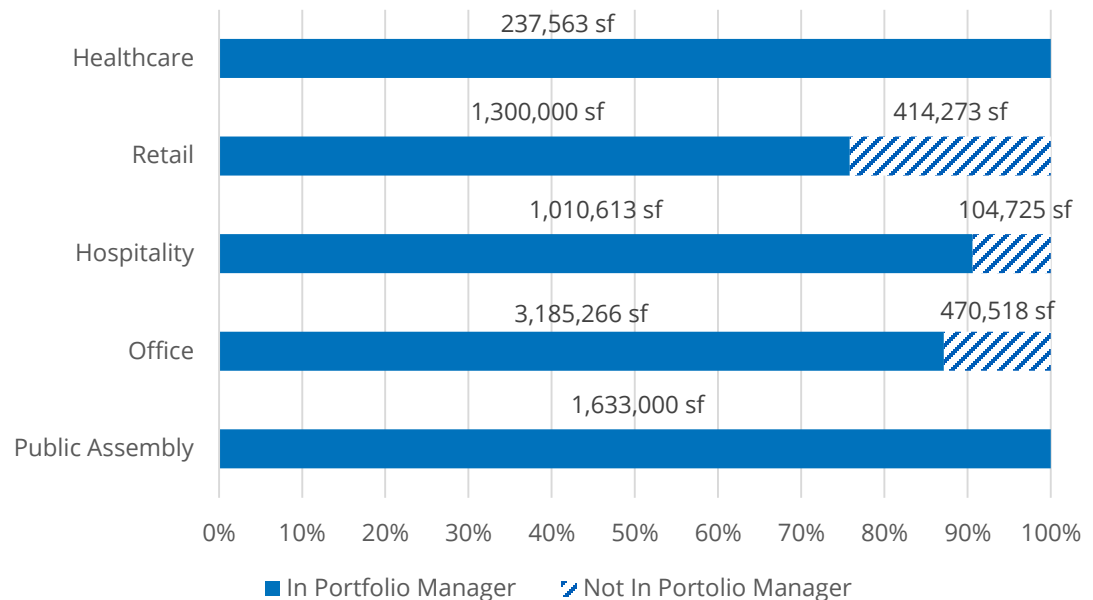


Figure 1. Portfolio Manager agreements by property type.

ENERGY STAR PORTFOLIO MANAGER PARTICIPANTS



Of the participating commercial properties in Lloyd, office buildings cover the most floor area, followed by public assembly, retail, hospitality and healthcare, as displayed below.

PROJECT AREA BY MARKET SECTOR (FT²), 2017

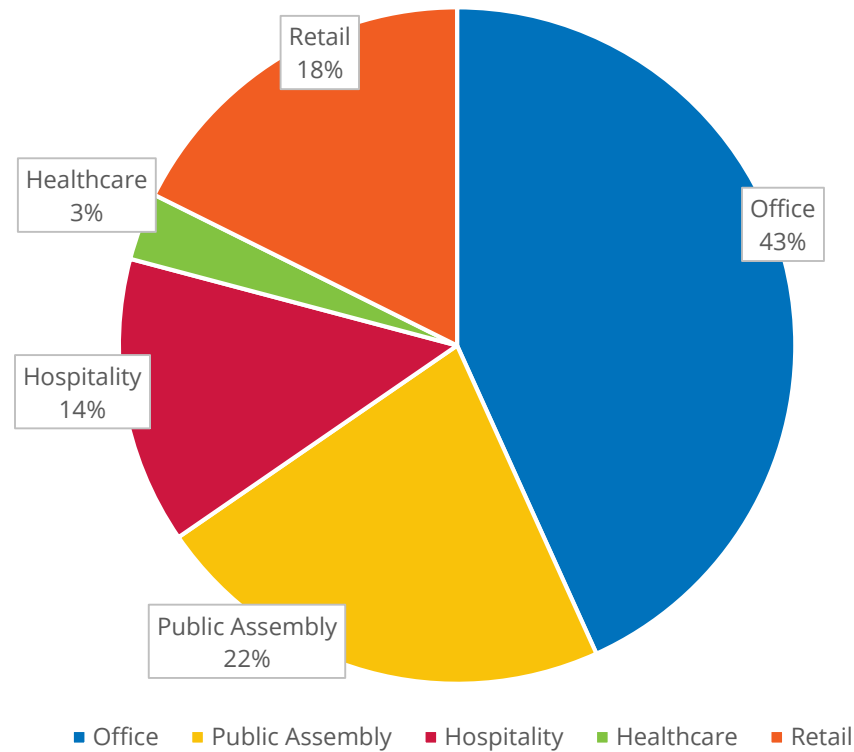


Figure 2. Percentage of building area by property type.

ENERGY STAR PORTFOLIO MANAGER PARTICIPANTS



Figure 3 below shows the area by space type of properties that have reported data from years 2010 to 2017. Total reported square footage has increased 31 percent since 2010.

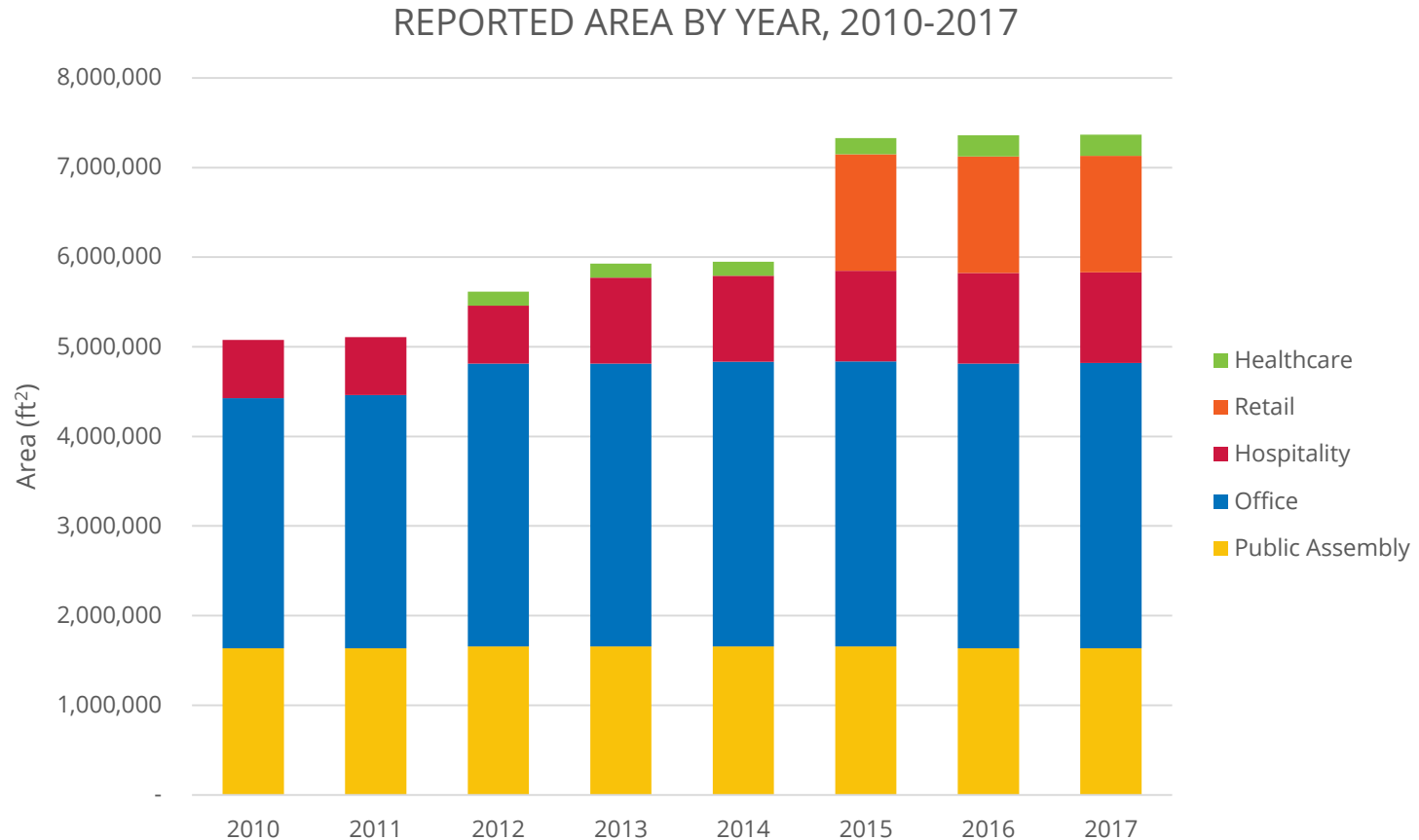


Figure 3. Building area by property type of reporting properties between 2010 and 2017.

ENERGY PERFORMANCE DATA ANALYSIS – SITE EUI



Overall building energy performance can be measured by site energy use intensity (EUI), which expresses the total annual energy use, divided by the gross floor area measured in kBtu per square foot. Site EUI represents energy use based on the size of a building rather than in raw energy use. This analysis uses a **weather normalized site EUI**, which also accounts for changes in weather when accounting for changes in energy. The weather normalized site energy is the energy use a property would have consumed during 30-year average weather conditions. To maintain confidentiality, all properties in this analysis were assigned a “building number” designation.

Overall, most buildings in Lloyd EcoDistrict are performing well. A low EUI generally indicates good energy performance, while a higher site EUI shows greater energy use. As shown in Figure 5 on the next page, seven buildings reported a low EUI in 2017 (below 40) and seven buildings showed a higher EUI (above 70). There are several buildings that should be distinguished for the 2017 data.

The reported site EUI for Building 10 is identified as an anomaly. Although it is categorized as a healthcare property type in this analysis, it is neither a hospital, a clinic, nor a medical office building. The site includes two buildings with multiple uses - behavioral health hospital, laboratory and clinical research with the majority of the square footage dedicated to lab spaces. Due to this unique combination of use types along with recent construction, remodeling activity and variations in occupancy at the site over the past few years, a new baseline is being established. There are no conclusions to be drawn about the site energy use until more data is available.

Buildings 20, 21, and 22 have reported unusually low EUI's. However, these three buildings have gone through various stages of remodeling and vacancy causing EUI values to be lower than if they were fully occupied. New baselines will be established in the coming years.

ENERGY PERFORMANCE DATA ANALYSIS – SITE EUI



The median overall area weighted site EUI for this dataset in Lloyd EcoDistrict is 67.0 kBtu/ft².

The median overall EUI for Portland in regards to office, healthcare, hospitality, and public assembly is 75.0 kBtu/ft², as published in the 2017 Building Energy Performance Reporting Results.

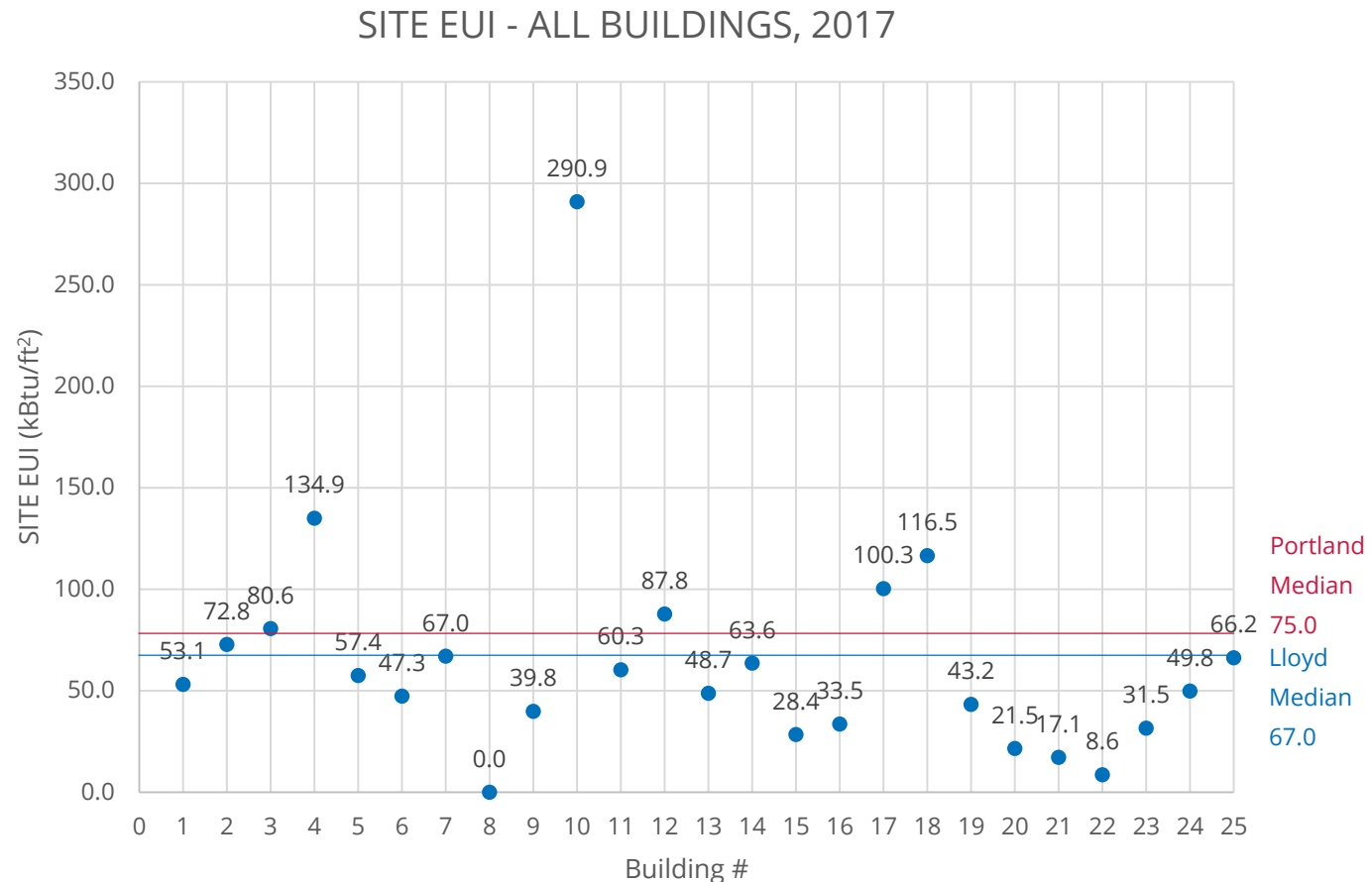


Figure 5. 2017 site EUI for all 25 participating commercial properties.

ENERGY PERFORMANCE DATA ANALYSIS – SITE EUI



RWDI compared site EUI to the Portland median EUI by property type. Figure 6 shows how the buildings compare to the median performance of buildings in each peer group. The Portland median is established by Portland’s Energy Performance Reporting Program as published in the 2017 Building Energy Performance Reporting Results.

As displayed in Figure 6, hospitality, retail, and office properties in Lloyd are performing better than the Portland median for their property type while public assembly spaces are using about the same. The healthcare property type category was removed due to buildings with multiple distinctly different uses and lack of similar building types available for a valid comparison.

Hospitality, retail, and office properties in Lloyd have higher energy performance than similar properties across Portland. However, it should be noted that there are differences in how properties are characterized in this data analysis as opposed to the City’s reporting. For example, the 2017 Building Energy Performance Reporting Results categorized a large retail property located in Lloyd as “Other” rather than “Retail”.

SITE EUI COMPARED TO PORTLAND MEDIAN BY MARKET SECTOR, 2017

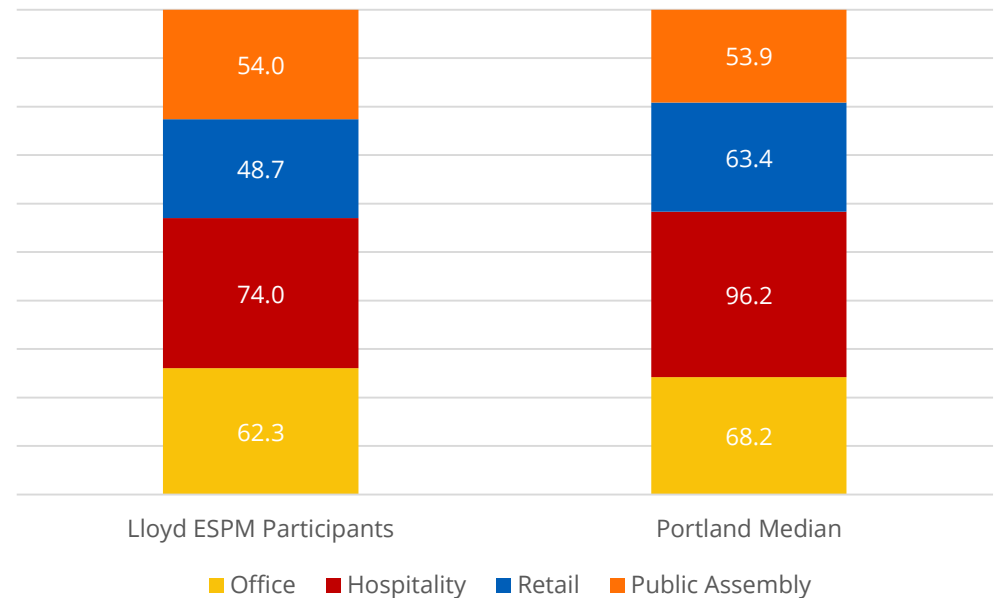


Figure 6. 2017 site EUI compared to Portland median EUI by property type (healthcare excluded).

ENERGY PERFORMANCE DATA ANALYSIS – ENERGY STAR SCORE



The ENERGY STAR Score measures a property's performance relative to similar properties, when normalized for climate and operational characteristics. Not all space types are eligible for an ENERGY STAR Score, such as hospital or assembly.

An ENERGY STAR Score was calculated for 14 of the 25 participating commercial properties in the district. These include office and hospitality properties in the dataset. As shown in Figure 7, more than 75 percent of the buildings scored 75 or above. ENERGY STAR Certification can be achieved for projects scoring 75 or greater. These buildings are poised to be ENERGY STAR-certified and Lloyd can work to assist in and celebrate their efforts.

Buildings that received 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 Lloyd is 83, whereas the median overall ENERGY STAR Score for Portland is 73. This is up from the 2016 value of 72 as published in the 2017 Building Energy Performance Reporting Results.

ENERGY STAR SCORE, 2017

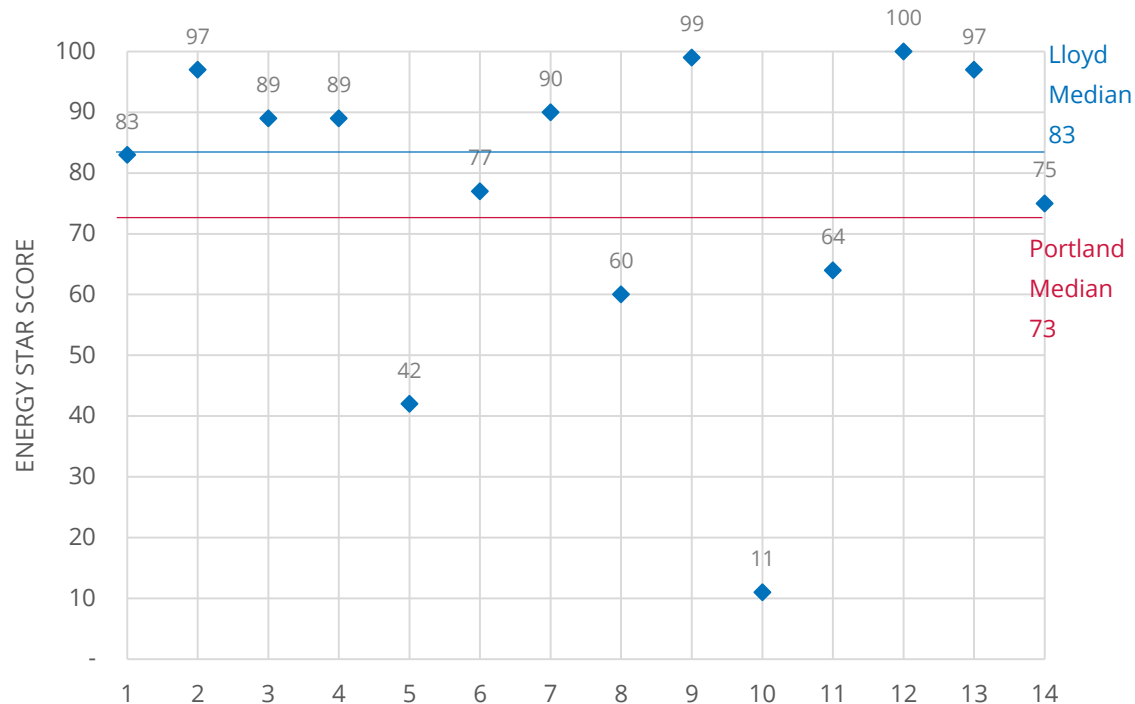


Figure 7. 2017 ENERGY STAR Score distribution for participating commercial properties eligible for an ENERGY STAR Score.

ENERGY PERFORMANCE DATA ANALYSIS – GREENHOUSE GAS EMISSIONS



In this analysis, greenhouse gas (GHG) emissions account for the carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) gases released into the atmosphere as a result of a property's energy consumption.

Based on Portfolio Manager estimates, the 24 properties included in this analysis emitted 75,167 metric tons of carbon emissions equivalent (MTCO₂e).

Office buildings were responsible for the most GHG emissions in 2017, as shown in Figure 8. It should be noted that office buildings encompass 70 percent of the total square footage of reporting properties.

TOTAL GHG EMISSIONS BY MARKET SECTOR, 2017

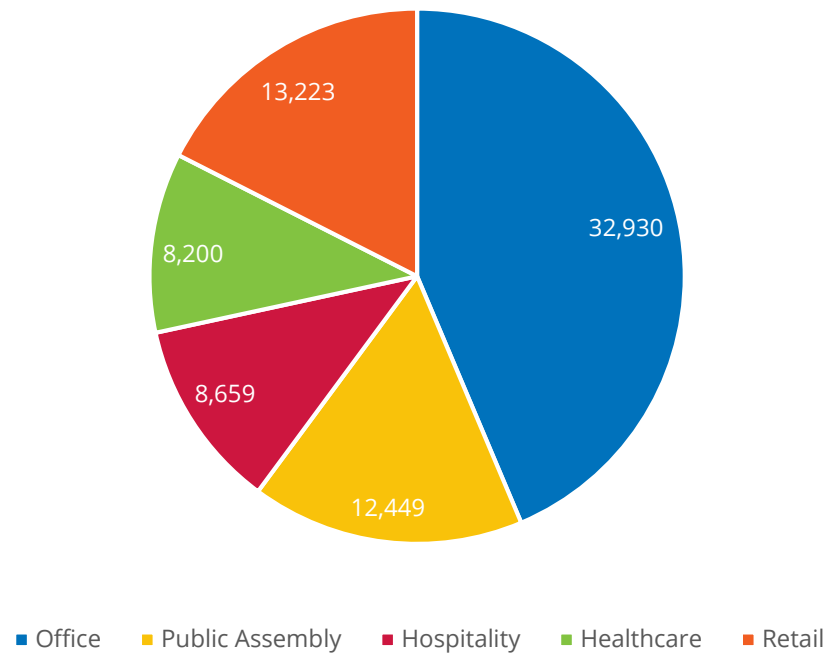


Figure 8. 2017 GHG emissions (MTCO₂e) by property type.

ENERGY PERFORMANCE DATA ANALYSIS – ENERGY USE TRENDS



Understanding current and past energy use can help identify opportunities to improve energy performance and measure efficiency efforts. Although the amount of historical data in Portfolio Manager varies, RWDI evaluated energy use trends for the past seven years wherever possible. Figure 9 shows the average EUI for all properties. The increase in 2012 is the result of additional participating properties added to the portfolio that were performing at a higher EUI than the average in years before.

Figure 9 shows the average site EUI is 1 kBtu/ft² higher than in 2010. Overall building energy performance has improved each year since 2012 but has slightly increased starting in 2016. From 2016 to 2017, 11 of 24 reporting properties had an increased EUI which resulted in an average of an 8.4 percent increase in EUI. During this same period, 13 of the 24 reporting properties had lower EUI's which was an average of a 6.0 percent drop in EUI.

There are many different reasons for this increase. They range from changes in occupancy in buildings to operational changes to remodeling. Buildings that experienced high increases from previous years should examine the cause.

SITE EUI - ALL BUILDINGS, 2010 - 2017

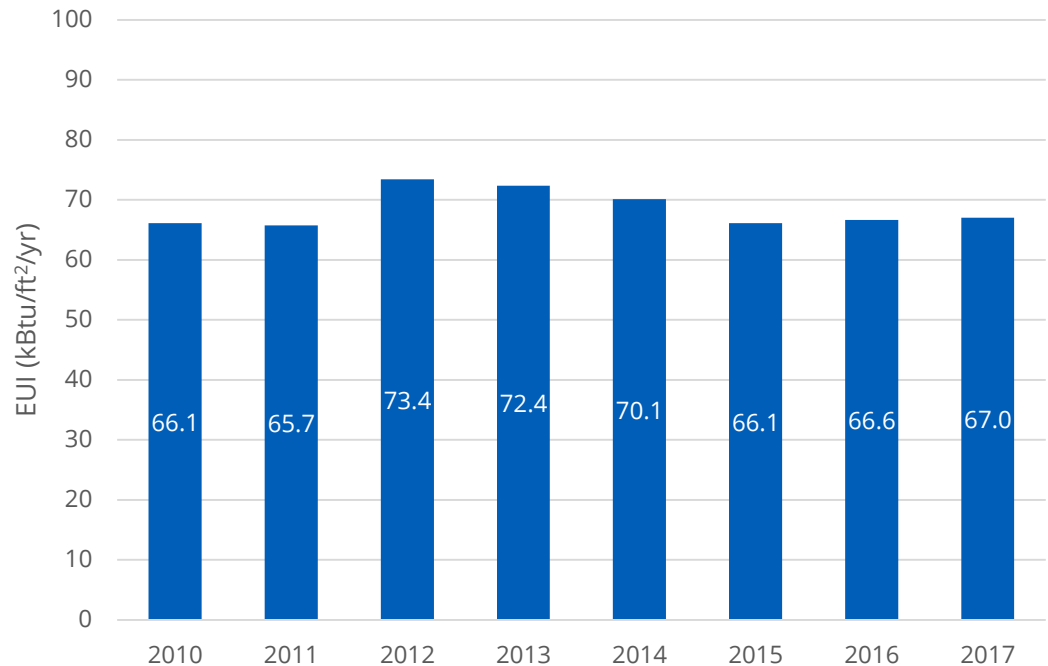


Figure 9. Site EUI for participating commercial properties between 2010 and 2017.

ENERGY PERFORMANCE DATA ANALYSIS – ENERGY USE TRENDS



Figure 10 shows the performance of each of the 25 reporting properties from 2010 to 2017. From here, it can be shown which buildings are improving in performance year of year and which are showing reduced energy performance.

SITE EUI BY BUILDING, 2010-2017

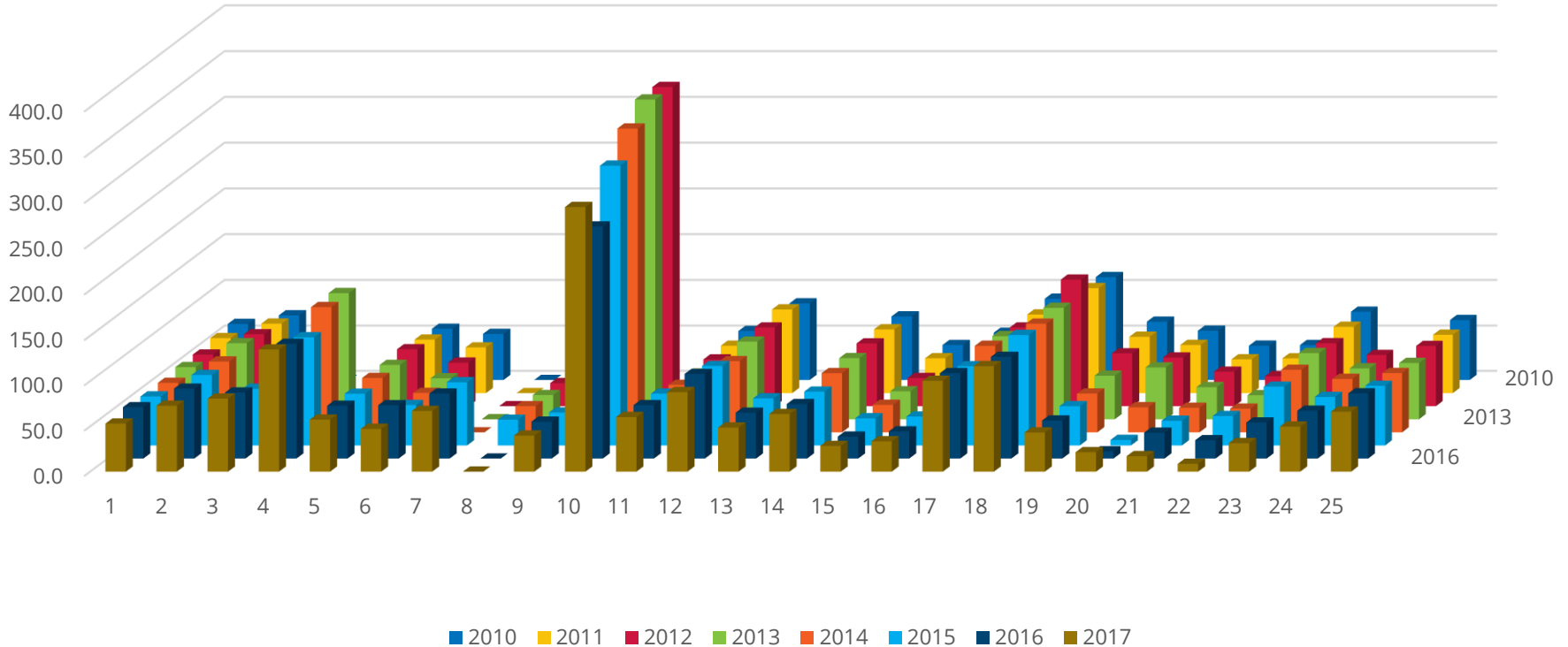


Figure 10. Site EUI for each year for all participating commercial properties between 2010 and 2017.

ENERGY PERFORMANCE DATA ANALYSIS – GREENHOUSE GAS EMISSIONS



As displayed in Figure 11, GHG emissions intensity is measured in metric tons of CO₂ equivalent per square foot. On a per square foot basis, GHG emissions have reduced roughly 14 percent despite an increase in energy use in 2017 from the 2010 baseline. While reducing energy is important to reduce GHG emissions, it is not the only metric that has an effect on emissions. An electric utilities' source generation or power mix is an important part of reducing GHG emissions. Over the past seven years, Pacific Power's power mix has reduced emissions by about 3 percent since 2010.

GHG EMISSIONS INTENSITY, 2010-2017

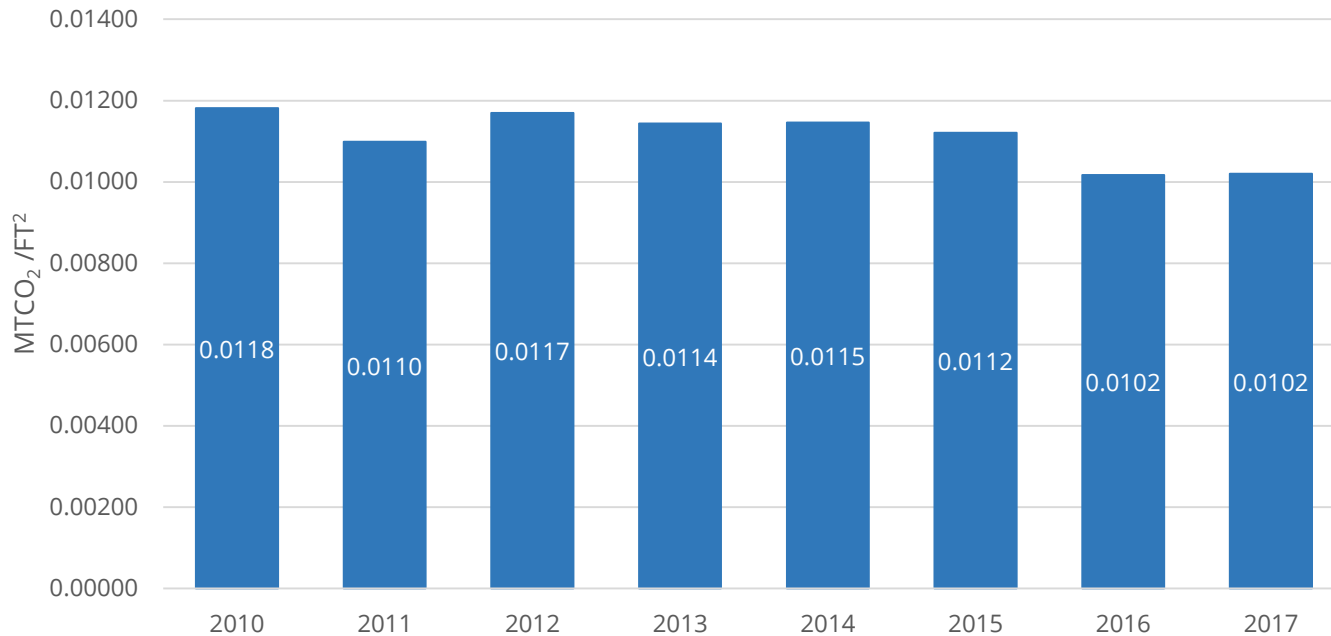


Figure 11. GHG emissions per square foot for participating commercial properties between 2010 and 2017.

ENERGY PERFORMANCE DATA ANALYSIS – ENERGY USE TRENDS



Figure 12 shows progress towards Lloyd’s Energy Action Plan of “no net increase” of energy from 2010 with an estimated addition of 22M square feet by 2035. This results in an approximate 65 percent drop in EUI from 2010 to 2035 which is about a 2.5 percent decrease per year. For properties reporting in 2010, the EUI was 66.1. Using an EUI of 66.1 as a starting point, the EUI should be 22.7 by 2035. The current trend shows energy performance is not keeping pace with the established reduction targets. Greater improvements are needed to adjust course and reestablish the path towards the Lloyd’s energy goal.

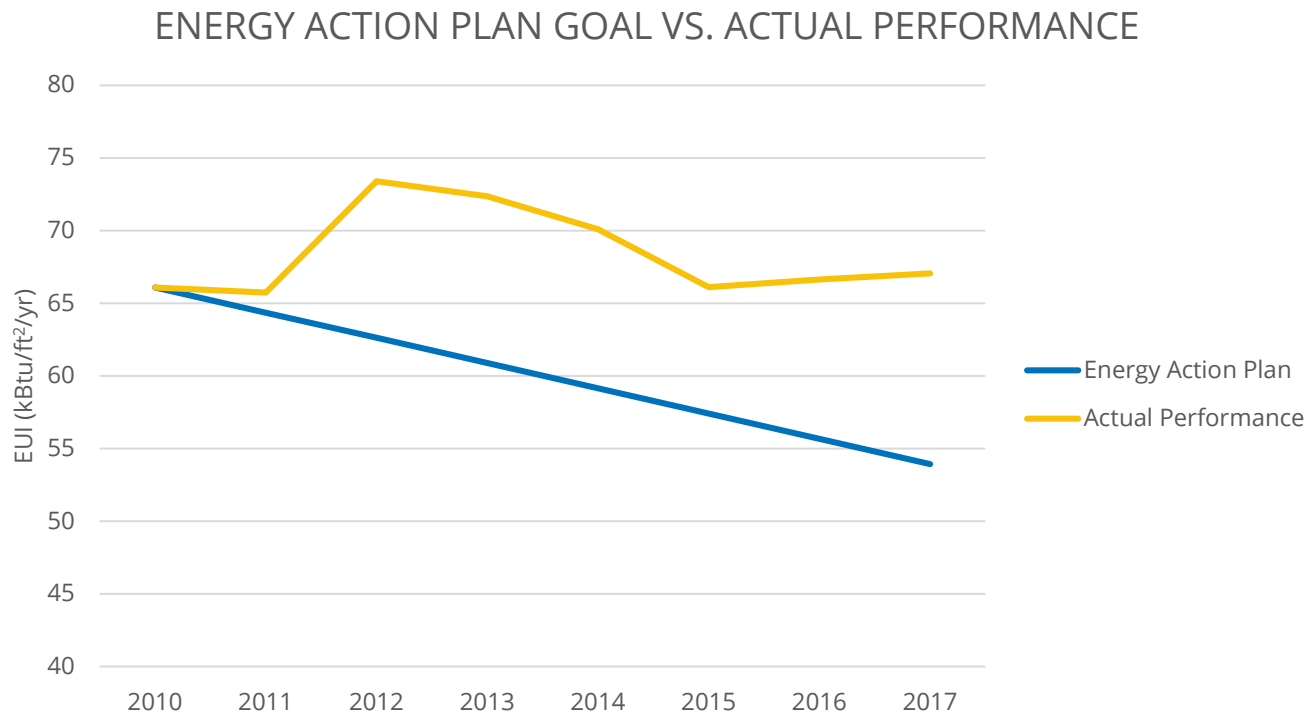


Figure 12. Energy Action Plan goal vs actual performance for all participating commercial properties between 2010 and 2017.

RECOMMENDATIONS AND NEXT STEPS



While the results show some progress on energy use reduction and GHG emissions within Lloyd EcoDistrict, the pace has not kept with Lloyd's Energy Action Plan goal. Energy consumption continues to increase as square footage is added to the district. Lloyd's median site EUI is 67.0 kBtu/ft² which is 1.0 kBtu/ft² higher than the Energy Action Plan target for 2017. As the fourth year of energy benchmarking, these results show greater opportunity for improvement. RWDI will continue working with Lloyd to benchmark and analyze energy use patterns and trends. The following steps are recommended:

- Support investments in existing building retrofits and renewable energy projects to capture inefficiencies and reduce energy costs. These efforts are critical to help Lloyd reach its energy goals.
- Target underperforming properties by connecting building owners with technical resources to evaluate operating performance and identify strategies for improvement.
- Increase retail property participation in ENERGY STAR Portfolio Manager and expand participation to residential properties within Lloyd EcoDistrict to enable greater understanding of energy use, greenhouse gas emissions, and trends in the district.
- Recognize the results and achievements of high performing properties and communicate achievements and replicable practices.
- Utilize Lloyd Eco Action Forum (LEAF) as an information-sharing platform for building owners and operators to seek informed input from others, as well as anecdotes and lessons learned.
- Continue to improve the quality of data through outreach and technical assistance.