



2019

**CHICAGO ENERGY
BENCHMARKING**

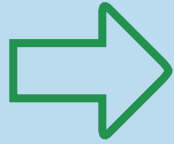
★ ★ REPORT ★ ★

2019 Chicago Energy Benchmarking Report ★ ★ ★ ★

ENERGY

benchmarking

is the foundation for



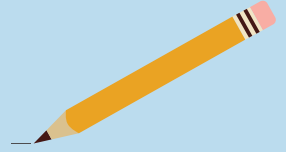
Reducing energy,



Saving on utility costs, &



Supporting clean energy jobs.



REACH

Under **Chicago Energy Benchmarking**, **91%** of large buildings reported energy use in **2019**, up from **88%** in **2018**.

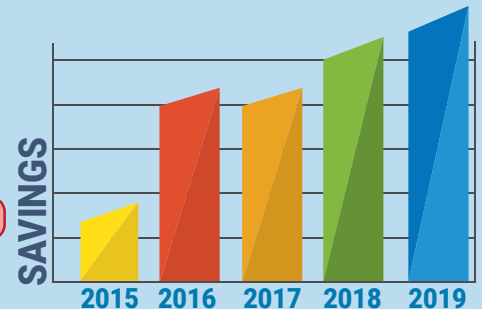
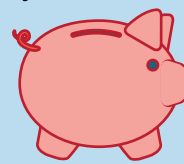


There are also **over a thousand** buildings **voluntarily** benchmarking in Chicago.

IMPACT AND OPPORTUNITY

Reporting properties have **saved an estimated \$24.6 million per year from energy reductions**, with cumulative **savings** of nearly **\$74 million** since **2016**.

The carbon emissions from these buildings are down by **15%** in just three years.



BUILDING ON SUCCESS

The **Chicago Energy Rating System** was successfully rolled out in 2019 to increase **awareness** of energy use. Building owners are now able to display a placard illustrating their building's energy performance to the general public. Chicago is proud to be the **first city in the nation** to require this kind of **transparency**.

The next energy reports are due by **June 1, 2020**

To learn more, go to: www.CityofChicago.org/EnergyBenchmarking
www.ChicagoEnergyRating.org



DEAR FELLOW CHICAGOANS,



Energy benchmarking continues to provide the foundation for increasing energy aptitude, saving energy, reducing utility costs for building operators, businesses and residents, and boosting our local economy by helping to create and support clean energy jobs throughout the City of Chicago. These

important “wins” directly align with two key parts of my commitment expressed earlier this year to eliminate poverty in Chicago by reducing expenses for Chicagoans and expanding quality jobs. But of course, benchmarking also connects to important climate issues before us.

While climate change has broad impacts at the global scale, it disproportionately affects low income communities and communities of color—sometimes referred to as “the climate gap”. Increasing temperatures and precipitation over the long term, dotted by flooding and heat wave events result in unexpected expenditures, increased health risks, and a continued degradation in overall quality of life. While these can affect all of us, the ability to navigate these challenges is far more difficult in underserved communities that may lack the necessary resources to react quickly and spontaneously. As much as climate is an environmental issue, it is also a social justice issue. Chicago will continue to lead in this fight against climate change.

Reducing energy consumption is a significant step towards the City’s continued commitment to the goals of the Paris Climate Agreement, including a 26-28% reduction in greenhouse gas emissions by 2025. Energy use in buildings represents approximately 70% of the City’s current greenhouse gas emissions, and the City must improve energy efficiency in buildings in order to meet our long-term climate goals. Related, the City also continues to strive towards reaching

100% renewable energy by 2035. Assuring that we are using energy as efficiently as possible is the first step in that endeavor. Improving energy performance in buildings remains a critical component of Chicago’s climate strategy.

In 2019, we continued to see improvements in energy performance for the largest buildings across the City. These reporting properties represent approximately 20% of total citywide carbon emissions. Properties which have benchmarked three consecutive years or more have saved an estimated \$24.6 million per year from energy reductions, with cumulative savings of nearly \$74 million since 2016. Further, the carbon emissions per square foot continued to decline rapidly and has decreased by 11% from 2016 to 2019.

In 2019, Chicago became the first U.S. city to assign buildings an energy performance rating and require properties to post their rating. The new Chicago Energy Rating System makes energy use information for large buildings easily accessible to residents while encouraging energy savings. The City also began to share information on water use in buildings under the updates.

The strides made towards these goals to date would not be possible without the partnership of many dedicated groups, from building owners to property managers to operating engineers. We appreciate your persistent attention and work to ensuring that Chicago continues to serve as a global leader in tackling energy waste and supporting sustainable action at both the community and building-level.

Sincerely,

Lori Lightfoot,
Mayor, City of Chicago







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I. EXECUTIVE SUMMARY

Since 2016, the City of Chicago requires large buildings – those over 50,000 square feet (sq. ft.) – to report their energy use once per year, and to perform additional data verification every three years. This requirement was introduced by the Chicago Energy Benchmarking Ordinance enacted in 2014 and fully phased-in in 2016. Through the energy benchmarking ordinance, building owners are required to track the energy consumption of their building or across a portfolio of buildings. This allows building owners to increase awareness of how their buildings perform over the course of the year or multiple years, as well as in comparison to similar building types across the nation. Energy benchmarking is the first step to identifying opportunities to reduce energy use and save on utility bills. At a community-scale, energy benchmarking can provide a detailed “community snapshot” of energy consumption and efficiency potential across the community’s largest buildings.

In November 2017, the Chicago City Council voted to update the existing benchmarking ordinance by creating a new Chicago Energy Rating System that makes energy use information for large buildings easily accessible to residents while encouraging energy savings. The new system is a zero to four star rating and is based on existing and publicly available energy data, alongside recent energy improvements to buildings. Each building over 50,000 sq. ft. is required to post their rating in a prominent location on the property and share this information at the time of sale or lease listing. The update went into effect in 2019 and Chicago became the first U.S. city to assign buildings an energy performance rating and require properties to post their rating.

The City also began to share information on water use in buildings under the updates. Building owners are not required to gather and report the water usage data, as the City will continue to collect the data from its Department of Water Management and Department of Finance.

The City encourages, but does not require, property owners to make improvements, and the City provides numerous communications to building owners and their representatives on how to get started on saving energy. In place since 2014, energy benchmarking continues to prove its value. From 2016 to 2019 alone, the median carbon emissions per sq. ft. (also known as GHG Intensity) for reporting buildings has fallen by 15% while median energy use per sq. ft. (also known as Energy Use Intensity) has fallen by 7% (after adjusting for weather differences from year to year). Building owners which have benchmarked three consecutive years or more are collectively saving \$24.6 million per year on their utility costs as a result of these improvements.

■ KEY TAKEAWAYS:

Energy benchmarking continues to provide the foundation for increasing energy aptitude, saving energy, reducing utility costs, and supporting clean energy jobs throughout the City.

1 REACH

Compliance with the Chicago Energy Benchmarking Ordinance is high and continues to steadily increase every year.

- In 2019, 2,928 properties spanning over 750 million sq. ft. tracked and reported energy use, which represents an increase of 74 properties since 2018.
- The 2019 reporting rate by number of properties was 91%, which is 3% higher than the 2018 reporting rate of 88%; a 96% reporting rate by total sq. ft. also indicates the highest reporting rate by sq. ft. to date.

2 IMPACT

The bulk of Chicago properties required to benchmark continue to perform above national averages, based on a median ENERGY STAR score of 57 out of 100.

- Energy use per sq. ft. (also known as Energy Use Intensity) for all reporting buildings has dropped by 3% from the 2016 to 2019 reporting years.
- Properties reporting for three or more years in a row have saved an estimated \$24.6 million per year from energy reductions, with cumulative savings of nearly \$74 million since 2016.



I. EXECUTIVE SUMMARY

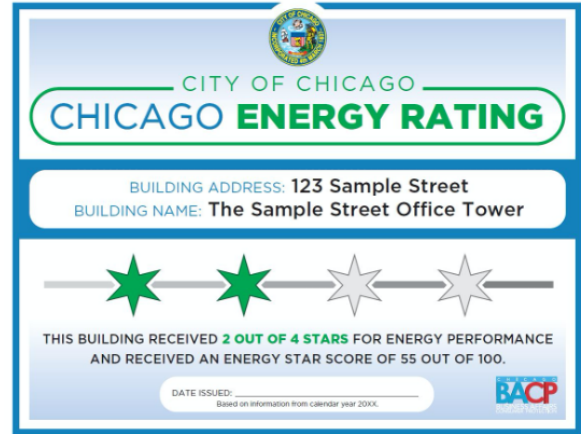
3 OPPORTUNITY

Extensive incentive and rebate programs are available from ComEd and Peoples Gas that enable building owners and managers to make energy improvements at little to no cost.

- ComEd and Peoples Gas programs are also available to advise nonprofits, houses of worship, and affordable housing facilities.
- In addition, Chicago began offering Property Assessed Clean Energy (PACE) in 2019, a voluntary low-cost financing opportunity for energy efficiency and renewable energy improvements.
- PACE is a particularly attractive choice for building owners that may not have the upfront funds needed to implement larger scale projects.



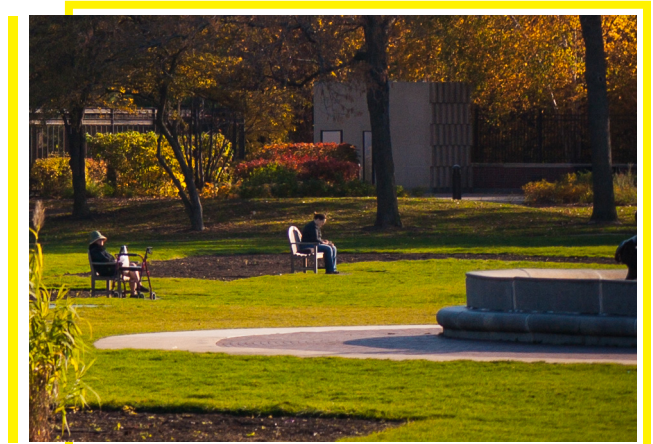
4 BUILDING ON SUCCESS



The new Chicago Energy Rating System rolled out June 1, 2019. This rating, the first of its kind in the U.S., will vastly expand awareness and transparency of energy use in large buildings across the City.

- Property owners or their representatives received their first rating placard in the fall of 2019.
- After an initial grace period of six months, property owners were required to post their rating and share it at time of listing the property for sale or for lease.
- Property owners will continue to receive updated rating placards on an annual basis and be required to post and share.

The City also began to share information on water use in buildings under the updates.





II. REACH:

OVERVIEW

The goal of the Chicago Energy Benchmarking Ordinance (adopted in 2013 and first implemented in 2014) is to increase awareness of energy performance through information and transparency. Approximately 3,500 buildings that are 50,000 square feet or greater are required to measure and report energy use once per year and also complete additional data verification every three years.

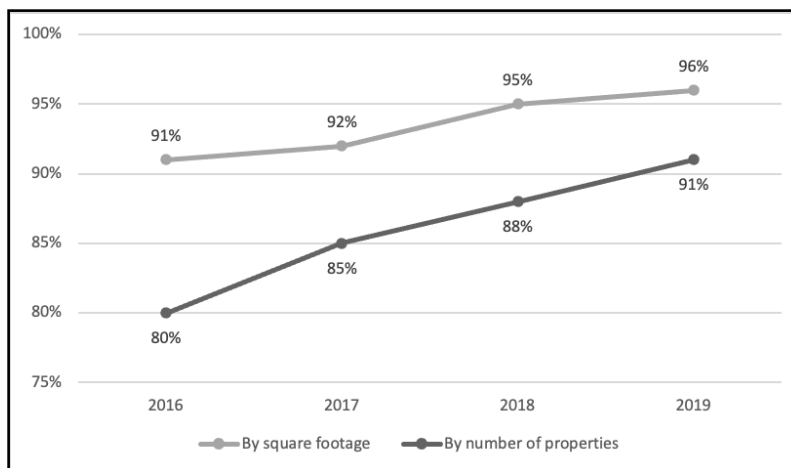
COMPLIANCE SUMMARY

Compliance with the Chicago Energy Benchmarking Ordinance is high and continues to steadily increase every year. The 2018 reporting rate by number of properties was 88%, which is 3% higher than the 2017 reporting rate of 85%.

2019 Reporting, by the Numbers:

- **2,928 total reporting properties, 74 more than in 2018**
- **~20% of citywide carbon emissions represented by reporting properties**
- **91% reporting rate, 3% higher than in 2017** (when measured by number of properties)
 - **96% reporting rate, when measured by total sq. ft.**

Figure 1: Energy Benchmarking Reporting Rate, 2016 to 2019



In 2019, 2,872 properties submitted reports to the City of Chicago, and 56 additional properties submitted on a voluntary basis, for a total of 2,928 reports. This is 74 more reports than were received in 2018. 275 properties received temporary exemptions, leading to 3,147 "covered properties" (required by ordinance to report) reporting or exempt out of 3,494 total, resulting in a 91% reporting rate (96% of all covered buildings by total sq. ft.). The City of Chicago and its partners will continue to conduct outreach and provide support to all property teams who are required to report and will aim to reach similar or higher levels of compliance in the future.



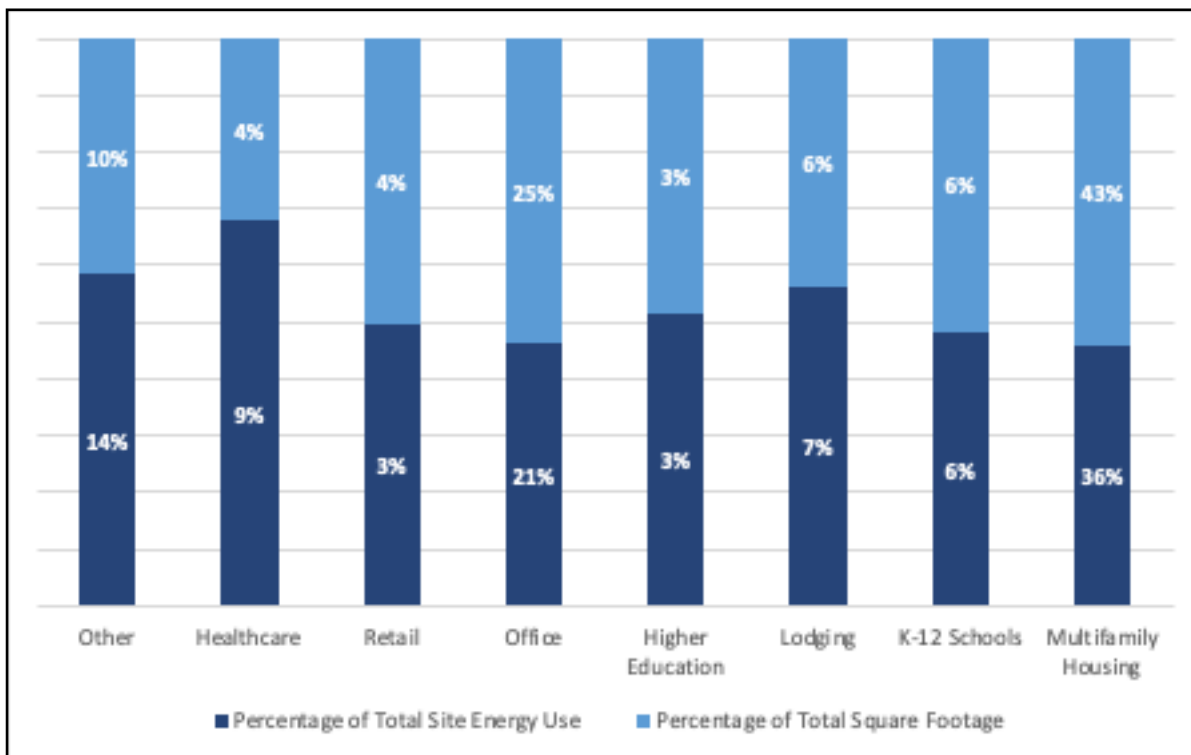
III. IMPACT: 2019 BENCHMARKING RESULTS

■ PROPERTIES ANALYZED IN 2019

Energy benchmarking reports from 2,598 properties are included in this analysis, and these buildings are referred to as “analyzed properties.” (For more details on the analysis methodology, please see the Appendix.) Each property is assigned to one of eight property groups.

The total square footage of all analyzed properties is over 720 million sq. ft. (including both buildings and parking). A breakdown of the sq. ft. versus breakdown of energy use by type of building is shown in Figure 2. Multifamily housing continues to be the largest by both sq. ft. and percentage of energy use, followed by offices and then “other” space uses. (For more details on property types, please see the Appendix.)

Figure 2: Percentage of Site Energy Use V. Square Footage by Property Type



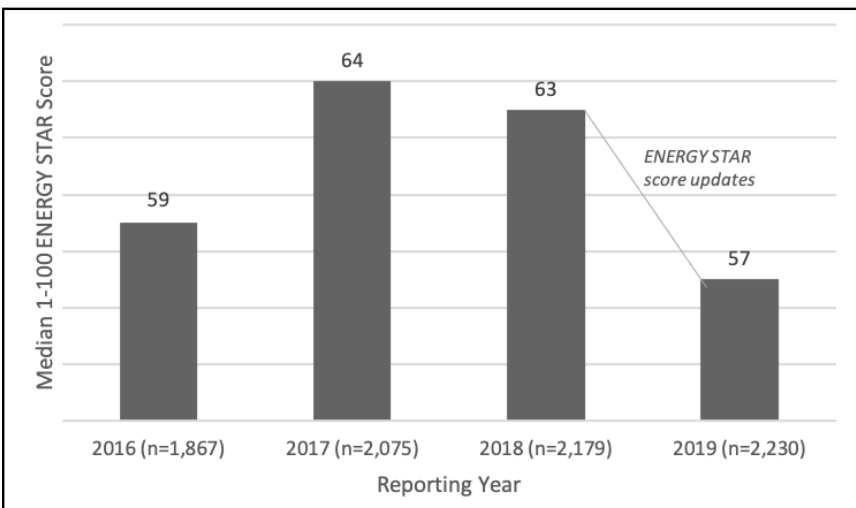


OVERALL ENERGY PERFORMANCE

The 1-100 ENERGY STAR score represents a property's overall energy performance relative to similar buildings across the nation, while normalizing for different climates. A score of 50 indicates energy performance at the national median, while a score of 100 represents extremely high energy performance. Scores below 50 indicate significant opportunities for improvement. (For more details on ENERGY STAR score calculations, please see the Appendix.)

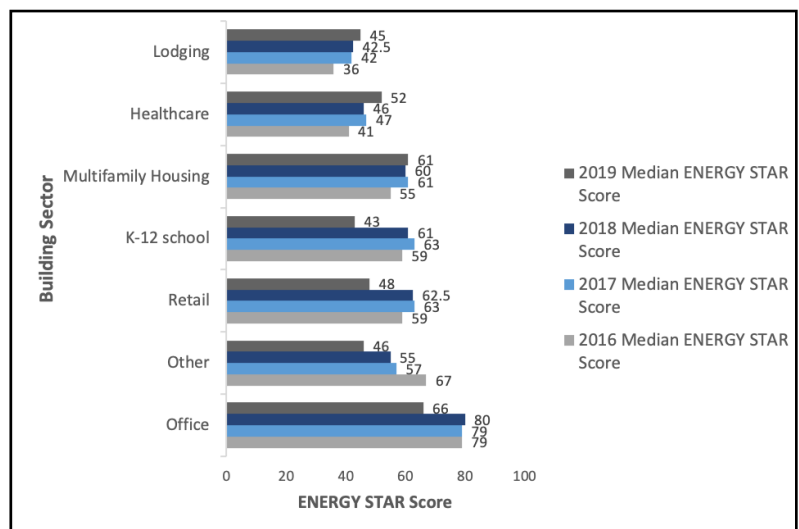
In 2019, the median ENERGY STAR score for all analyzed properties in Chicago was 57 out of 100, a drop of six points from the median of 63 in 2018. This drop was expected due to regular updates implemented to the ENERGY STAR Portfolio Manager system in August 2018¹. Figure 3 shows the median reported ENERGY STAR score from Chicago Energy Benchmarking reports over the past four years.

Figure 3: Median ENERGY STAR Scores Over the Past Four Years



The median ENERGY STAR score has increased in the Lodging, Healthcare, and Multifamily Housing property sectors, while the K-12 school, Retail, Other, and Office sectors have seen declines from 2016 to 2019. (See Figure 4). A median score of 57 is still above the national median of 50, indicating the Chicago properties over 50,000 square feet are performing slightly better than the majority of comparable buildings in the U.S.

Figure 4: Median ENERGY STAR Scores Over the Past Four Years



¹ 86% of all analyzed properties received a 1-100 ENERGY STAR score in 2018; the remaining 14% are not able to receive a score due to technical reasons.

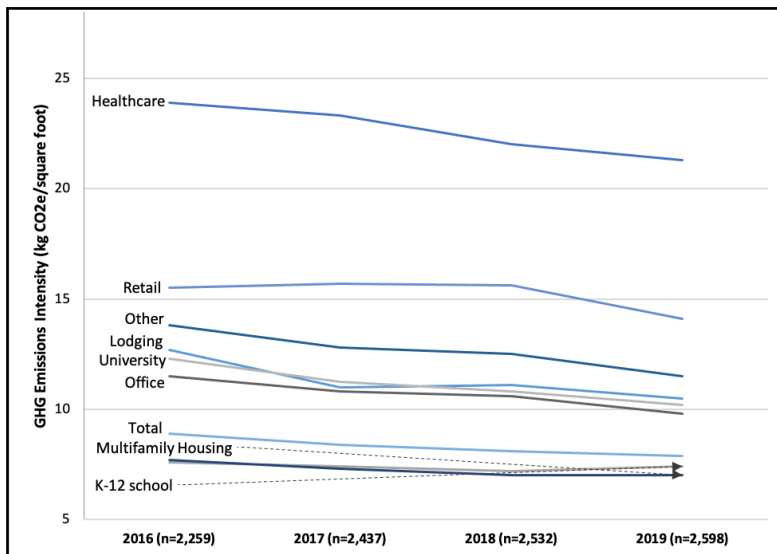


TREND ANALYSIS

The properties that measure and report energy use on a regular basis continue to see energy reductions and cost savings. Nearly 2,000 properties that benchmarked and reported in 2016 and again benchmarked and reported in 2019 are reducing energy use per sq. ft. by 7.6%, based on the median weather-normalized source energy use per sq. ft. from 2016 compared to 2019 (which takes into account changes in weather from year to year, as well as changes in the property size). These results suggest that the majority of properties continue to achieve energy savings opportunities, even after multiple years of required energy benchmarking, which went into effect for all properties over 50,000 sq. ft. in 2016.

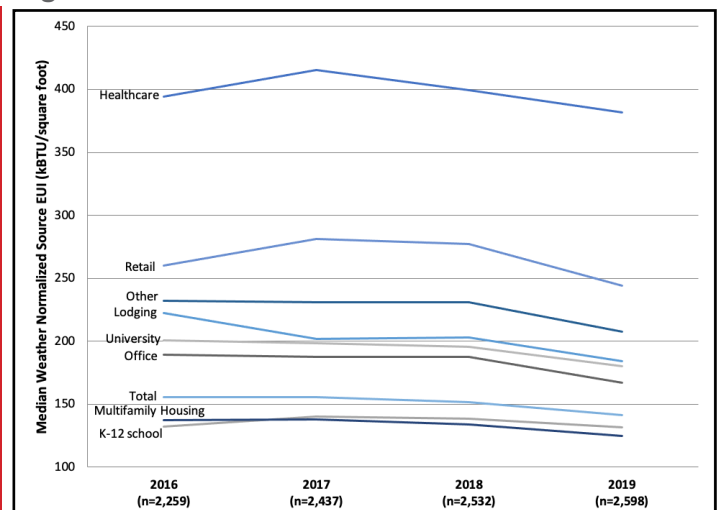
Overall, the carbon emissions per sq. ft. of space continued to decline rapidly and decreased by 11% from 2016 to 2019. All building sectors except K-12 schools saw decreases in the GHG intensity as shown in Figure 5. When comparing total GHG emissions from nearly 2,000 properties that reported in 2016 and again reported in 2019, total GHG emissions are down 15%, which equates to over 900,000 metric tons of carbon dioxide equivalents (CO₂e). This reduction is equivalent to removing nearly 200,000 passenger cars from the road each year.

Figure 5: Median GHG Intensity from 2016-2019



Finally, comparison of the past three years of benchmarking information shows that the median weather-normalized source energy use per sq. ft. for all reporting buildings has dropped by 8% from the 2016 to 2019 reporting years. All sectors saw decreases since the 2016 reporting year, with the greatest improvements seen in the Lodging sector (17% improvement) and Office sector (12% improvement).

Figure 6: Median Source EUI from 2016-2019





ENERGY STAR Certification

Properties that receive a score of 75 or higher and meet other criteria may be able to earn the ENERGY STAR label. In Chicago, the number of ENERGY STAR certifications continues to rise year after year (Figure 7). As of the 2019 Reporting Year, a total of 188 properties subject to the energy benchmarking ordinance have been certified, up from 142 certified properties in 2016.

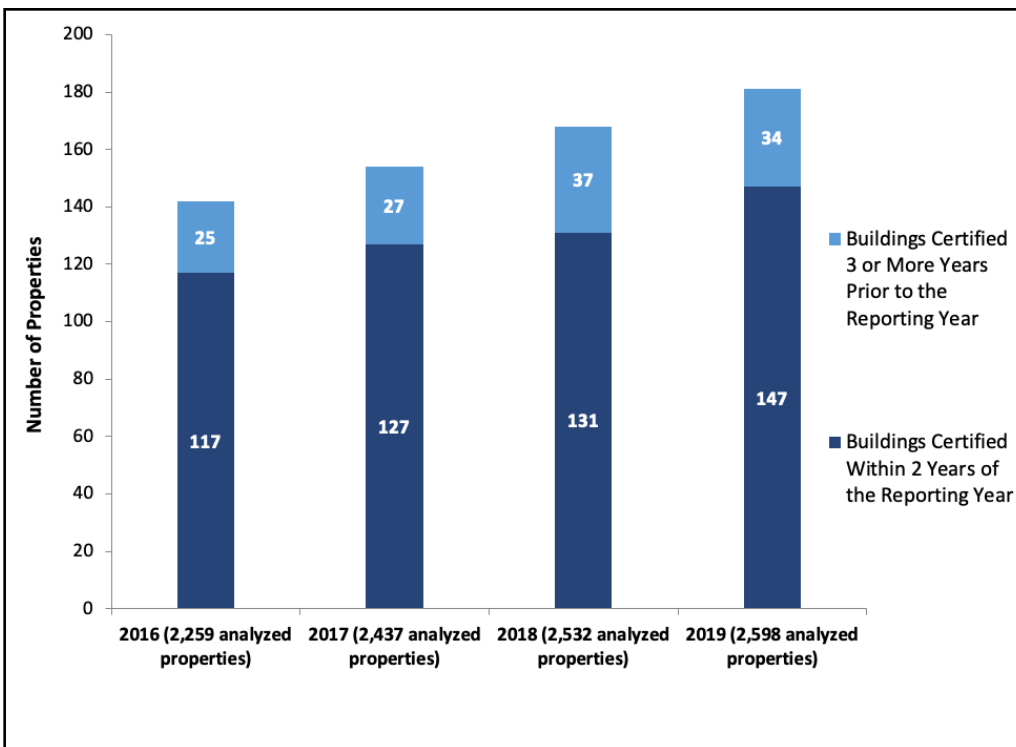
ENERGY STAR certification is a nationally-recognized standard for energy performance. According to the U.S. EPA, ENERGY STAR certified buildings meet strict energy performance standards set by EPA. They use less energy, are less expensive to operate, and cause fewer GHG emissions than their peers.

However, some properties may have seen their score decline since August 2018 due to technical platform updates within Portfolio Manager meant to periodically update the benchmarks used for scoring. This suggests that on average, buildings across the country are beginning to perform better.



If your property has a score of 75 or higher, consider getting it certified and receiving the ENERGY STAR label.

Figure 7: ENERGY STAR Certified Properties from 2016-2019





IV. OPPORTUNITY: Ways to Save Energy

■ UTILITY INCENTIVE AND REBATE PROGRAMS

Extensive incentive and rebate programs are available from ComEd and Peoples Gas that enable building owners and managers to make energy improvements at little to no cost.

Get started with a FREE energy assessment, which provides an analysis of energy-consuming equipment and operations to help you gain a better understanding of possible improvements. An energy assessment is an important place to start if you have not done this within the last two to three years; and most properties are eligible. This process will help you identify low-cost and no-cost opportunities specific to your property, and other opportunities to reduce consumption.

To find out more, contact the utilities today:

- **ComEd:**
Phone: 855.433.2700
Website: <https://www.comed.com/WaysToSave/ForYourBusiness/Pages/FacilityAssessments.aspx>
- **Peoples Gas:**
Phone: 855.849.8928
Website: <http://www.peoplesgasdelivery.com/business/rebates.aspx>

If you have already conducted an assessment or audit, or you have already identified specific projects to retrofit your property, be sure to consider using one of the utility rebate and incentive programs to help finance your project:

Commercial, Institutional, and Public Buildings:

- ComEd's Energy Efficiency program can help reduce building energy use. Incentives and support programs help businesses drive energy savings and an improved bottom line. For more information, please visit: <https://www.comed.com/WaysToSave/ForYourBusiness/Pages/Default.aspx>
- Peoples Gas Natural Gas Savings Program offers incentives to encourage business customers make energy-efficient improvements to reduce energy use and enhance workplace comfort.

For more information, please visit: <https://accel.peoplesgasdelivery.com/business/rebates.aspx>

Multifamily Residential Buildings:

- ComEd and Peoples Gas offer building managers and owners energy efficiency upgrades and incentives through the Multi-Family Comprehensive Energy Efficiency Program: https://accel.peoplesgasdelivery.com/home/rebates_multifamily.aspx
- ComEd's Marketplace Website: Current listings of product offerings and discounts: <https://www.comedmarketplace.com/>



■ PROPERTY ASSESSED CLEAN ENERGY (PACE)



Launched in late spring 2019, Chicago PACE is a new, voluntary financing program that makes it possible for owners and developers of commercial and multifamily properties to obtain low-cost, long-term financing for energy efficiency, sustainability and renewable energy infrastructure deployed in new or existing buildings. This City of Chicago program is based on legislation that classifies energy efficient and/or renewable upgrades as well as new installations at or above-code as a public benefit.

Up to 100% of the “energy improvements and associated soft costs (permitting, structural support, etc.) can be financed with no money down and then repaid as a benefit assessment on the property tax bill over a term that matches the useful life of improvements (often as long as 20-25 years). What makes this attractive is that the financing is based on the anticipated energy cost savings the building owner can expect to experience once improvements are installed. The financing offers a fixed interest rate, and projects typically have a net positive cash flow beginning in the first year. Additional advantages include the assessment transfers on sale to the new owner.

PACE is available to the following types of properties:

- Commercial and industrial properties
- Multifamily residential apartment buildings or cooperative housing properties with five or more units
- Nonprofit properties

For more information, please visit: www.ChicagoPACE.org



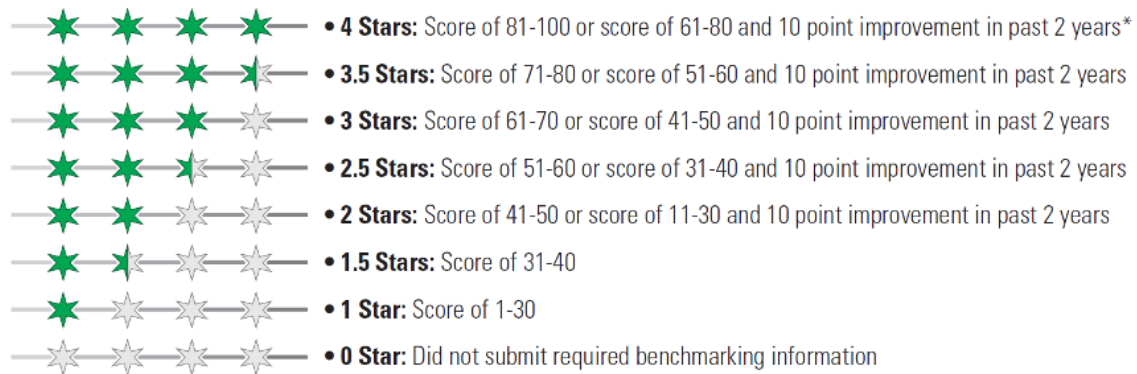


V. BUILDING ON SUCCESS: Energy Rating System Implementation

The original Chicago Energy Benchmarking ordinance (2014) allows the City to share buildings' ENERGY STAR scores and other metrics publicly. The ENERGY STAR scores for most buildings required to benchmark are posted on the City's data portal, yet many tenants, condominium owners, building operating engineers, and even some property managers may not know how to access or use the information to their advantage. The primary intent of the Energy Rating System ordinance updates is to help improve the visibility and transparency of information that is already publicly available. There are no new reporting requirements, and no new costs associated with the updates.

Providing the rating at time of listing of the building for sale or lease will enable prospective buyers or tenants to make more informed decisions about operating costs related to energy. The rating system also provides every property with one, two, or three stars the opportunity to earn an extra star by making just a 10-point improvement, thus incentivizing properties to improve their ENERGY STAR scores.

CHICAGO ENERGY RATING SYSTEM (WITH HALF-STARS)



*Note: Any building with ENERGY STAR certification also receives four stars.

Improving ENERGY STAR scores by just 10 points per building could save up to \$70 million per year on utility costs. This translates to approximately 8% reduction in weather normalized energy use. The investments needed to achieve these savings would create over 1,400 jobs.

Additional visibility and transparency of ratings can improve performance. For example, restaurants in New York City are required to post grades of A, B, or C, based on their health inspections. The number of restaurants receiving an A grade on initial inspection increased by 14% in the 18 months after the City required restaurants to start posting their grades.

The City of Chicago has committed to the goals of the Paris Climate Agreement, including a 26-28% reduction in greenhouse gas emissions by 2025. The City is XX% of the way to meeting that goal. Energy use in buildings represents over 70% of the City's current greenhouse gas emissions, and the City must improve energy efficiency in buildings in order to meet our long-term climate goals. Improving energy performance in buildings is thus a key climate strategy in Chicago.



■ WATER DATA / ANALYSIS OPPORTUNITIES

The City also began to share information on water use in buildings under the updates, although building owners are able to opt-out of having their water usage data shared publicly. In addition, building owners will not be required to gather and report the water usage data, but rather the City will continue to collect the data from its Department of Water Management and Department of Finance. Similar to benchmarking energy usage, benchmarking water usage is the first step to identifying opportunities to reduce water use and save on utility bills.

Some building owners are also tracking water use in ENERGY STAR Portfolio Manager. While this is not required, it is encouraged by the City for building owners who plan to begin addressing water use and are looking for water efficiency opportunities. Based on data reported by the City for buildings required to benchmarking in 2019, average water use across all buildings is 6,334,796 gallons per year and 26.2 gallons per sq. ft. Water use varies by building type, as shown in Figures 8 and 9 below.

Figure 8: TOTAL WATER USE BY PROPERTY TYPE

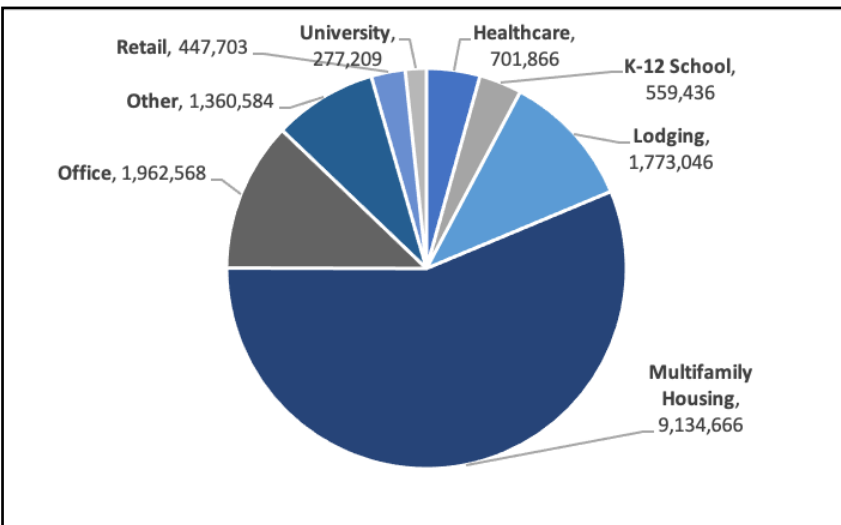
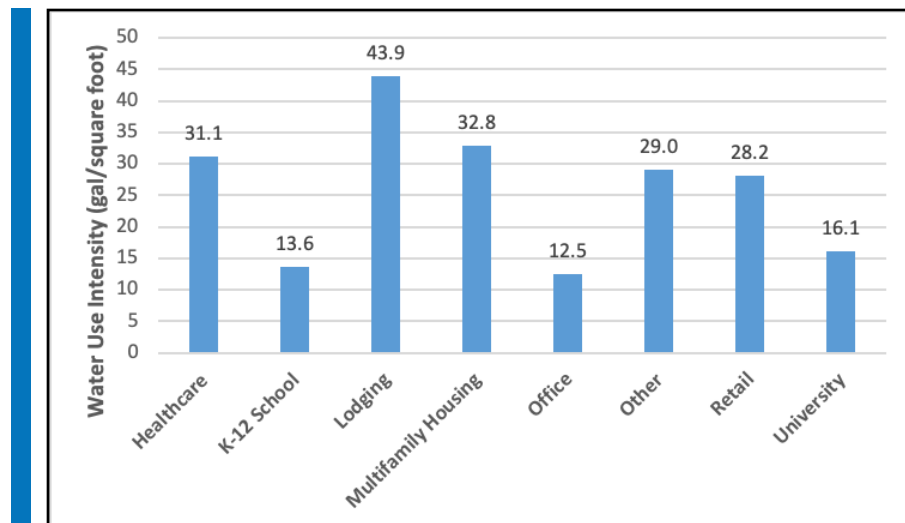


Figure 9: AVERAGE WATER USE INTENSITY BY PROPERTY TYPE





VI. ACKNOWLEDGEMENTS

The City of Chicago is grateful for the assistance and input of several partnering organizations that have supported implementation of the Chicago Energy Benchmarking Ordinance, as well as the new Chicago Energy Rating System. Additional partners have joined the collaboration, and contribute to ordinance implementation, or assist with development of the new Chicago Energy Rating System.

The 2019 Chicago Energy Benchmarking Report and the initiatives / programs described herein were created with input, analysis, and other support from the following organizations and individuals:

OFFICE OF THE MAYOR, CITY OF CHICAGO

Angela Tovar, Chief Sustainability Officer
Elise Zelechowski, Chief Sustainability Officer (Acting)

Yuna Song, Applied Data Fellow

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Amy Jewel

ELEVATE ENERGY AND THE HELP CENTER TEAM

Amy Jewel
Elena Savona
John Blaser
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Lindy Wordlaw

And a special thanks to ComEd and Peoples Gas for ongoing support in providing energy use data for the benchmarking requirements, as well as information regarding appropriate energy saving opportunities.

Document design by:
City of Chicago

CHICAGO ENERGY BENCHMARKING / CHICAGO ENERGY RATING SYSTEM PARTNERS

- ABOMA
- ASHRAE – Illinois
- American Cities Climate Challenge
- American Institute of Architects – Chicago Chapter
- BOMA - Chicago
- C40 Cities Climate Leadership Group
- Chicagoland Apartment Association
- Chicago Association of REALTORS
- ComEd
- Elevate Energy
- Enterprise Community Partners
- Illinois Environmental Council
- Institute for Market Transformation
- Midwest Energy Efficiency Alliance
- Natural Resources Defense Council
- Peoples Gas
- Seventhwave
- Sierra Club
- Illinois Green Alliance
- U.S. Environmental Protection Agency



VII. APPENDIX

■ USEFUL BENCHMARKING METRICS AND HOW TO USE THEM

• **ENERGY STAR Score:** A 1-100 ENERGY STAR score shows the property's overall energy performance relative to similar buildings. A score of 50 indicates energy performance at the national median, while a score of 100 represents extremely high energy performance. Scores below 50 indicate significant opportunities for improvement.²

- The 1-100 ENERGY STAR rating allows comparisons across property types, and across different geographies because it normalizes for differences in energy use (such as climate or annual weather patterns, building space uses, operating characteristics, and other variables).
- A score of 75 or above represents a top performer, and properties with scores of 75 or above may be eligible for the national ENERGY STAR recognition.

Learn more at: www.EnergyStar.gov/Buildings

• **Energy Use Intensity:** Energy Use Intensity (EUI) is the energy use per square foot of gross floor area in the property. There are two types of EUI metrics:

- Site EUI refers to the total energy per square foot that is actually consumed in the building, including all electricity, natural gas, and other fuels in all building spaces (including common areas and tenant spaces).
- Source EUI includes the energy per square foot that is actually consumed in the building (i.e. site EUI), plus additional energy that is generated and consumed 'upstream' of the building at power plants, or energy lost through transmission and distribution.

• The ENERGY STAR Portfolio Manager tool can also be used to track energy costs, as well as water consumption and water costs, solid waste generation, and many other metrics.

■ MULTI-YEAR BUILDING COMPARISONS

If you have two or more years of benchmarking results, determine the property's performance over time by using weather normalized metrics. Weather-normalized metrics account for changes in weather from year to year (such as an extremely hot summer or a very cold winter) and allow comparisons of the same building to itself across different years.³



² For more details about how to interpret your property's ENERGY STAR score, please visit: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/interpret-your-results/what>

³ Two key weather normalized metrics include weather normalized site energy use and weather normalized source energy use, both expressed in kBtu. These include the site and/or source energy (kBtu) that a property would have consumed under 30-year average weather conditions, based on actual energy use for a given time period. For more information on weather normalization, see the ENERGY STAR Portfolio Manager Technical Reference on Climate and Weather: <https://portfoliomanager.energystar.gov/pdf/reference/Climate%20and%20Weather.pdf>



VII. APPENDIX

■ ADDITIONAL TERMS

- **ENERGY STAR Portfolio Manager:** Free, online software developed by the U.S. EPA to help buildings benchmark, verify, and report energy use and property information (www.EnergyStar.gov/PortfolioManager).
- **Greenhouse Gas (GHG) Emissions:** Carbon dioxide (CO₂) and other gases released as a result of energy generation, transmission, and consumption. GHG emissions contribute to climate change and are expressed in metric tons of carbon dioxide equivalent (CO₂e). GHG emissions are also released due to other activities in buildings, such as refrigeration and cooling, but those emissions are not calculated from energy benchmarking.
- **Gross Floor Area (Building Size):** Total interior floor space between the outside surfaces of a building's enclosing walls, expressed in square feet. This includes tenant space, common areas, stairwells, basements, storage, and interior parking.
- **Site Energy Use:** Energy consumed on-site at a building, as measured by utility bills, and expressed in thousands of British Thermal Units (kBtu).
- **Source Energy Use:** Energy required to operate a property, including on-site consumption, as well as energy used for energy generation, transmission, and distribution; expressed in kBtu.

■ DATA VERIFICATION

Under the Chicago Energy Benchmarking Ordinance, all covered properties are required to complete data verification once every three years, starting with the first year that the property is required to comply with the ordinance. Data verification is required to ensure that reported information is being tracked and reported correctly.

Data verification may be completed by in-house staff, and the use of a third party is not required. However, data verification must be completed by an individual holding

a City-recognized license or training credential.⁴ City of Chicago-recognized credential programs must include training that covers benchmarking and the use of ENERGY STAR Portfolio Manager, as well as energy-efficient operations, measures, and technology.

Data verification takes the form of a signed Data Verification Checklist, a standard report generated automatically by the ENERGY STAR Portfolio Manager tool. It is important to note that verifiers are not required to complete the Indoor Environmental Standards section of the Data Verification Checklist, but are required to complete all other sections. Covered properties are not required to submit the signed Checklist, but they are required to include data verifier contact and credential details in the Property Notes field of their reported ENERGY STAR Portfolio Manager data. The ordinance requires covered properties to maintain benchmarking and data verification records for three years and to produce a copy of the signed Data Verification Checklist upon request by the City.

In 2019, any building team that had verified data in 2016, as well as any building team that had not ever verified data in the past, was required to conduct official verification. The City has followed up with all teams that were required to complete verification and did not do so, and will also continue to conduct outreach to building teams about the data verification requirement.



⁴

See www.CityofChicago.org/EnergyBenchmarking for additional information



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■ DATA QUALITY

Energy benchmarking continues to rely on a self-reporting process (although data verification is required once every three years). Certain indicators continue to point to a high level of data quality for the information reported in Chicago. These indicators also show that data quality appears to be improving each year.

As in previous years, the City and its partners complete automated reviews of all benchmarking submissions to identify missing information, errors, or possible data issues. If any issues are found, the Chicago Energy Benchmarking Help Center then sends a customized email to property representatives containing a list of issues, and links to documentation on how to address each issue. Property teams typically review their data, update any information that was entered in error, and then resubmit their report to the City. Once a submission is found to be complete and free of any potential data quality issues, the property representatives receive a final confirmation email.

Some of the indicators used to track data quality include the number of properties that use default, estimated, and temporary values. While using these values is allowed under the energy benchmarking ordinance, these values indicate a slightly lower level of data quality and accuracy. The use of each of these indicators has continued to fall, indicating ongoing improvements in data quality (See Table 1).

Table 1: Percentage of Analyzed Properties Using Estimated, Default, or Temporary Values

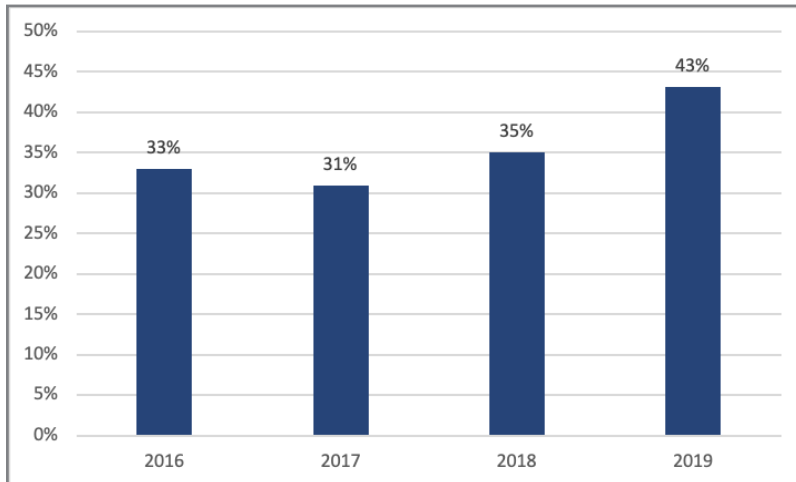
Type of Values	2016	2017	2018	2019
Temporary Values	9%	5%	5%	5%
Estimated Values – Energy	31%	24%	22%	19%
Default Values	4%	3%	2%	1%

In addition, more properties are using the Data Quality Checker, a feature provided within the ENERGY STAR Portfolio Manager benchmarking tool. Chicago Energy Benchmarking participants are strongly encouraged to use the Data Quality Checker to review their submissions before reporting to the City of Chicago each year. (See Figure 10).



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Figure 10: Percentage of Analyzed Properties Using the Data Quality Checker in ENERGY STAR Portfolio Manager, by Year



■ ANALYSIS METHODOLOGIES

Data Analysis Methodology

Most data analysis methodologies were unchanged from what was used in the 2016, 2017, and 2018 data analyses.

Data Cleansing and Summary of Analyzed Properties

Data cleansing was completed using the same process as previous years. First, properties with duplicate submissions were removed, which can occur when multiple facility managers or owners submit reports for the same property. Once duplicates were removed, the dataset included 2,843 reporting properties (as of the analysis cutoff date, which was August 1, 2019).

Of these 2,843 reporting properties, 69 properties reported voluntarily (i.e. were not required to comply) and were removed from the dataset that was used for analysis, leaving 2,774 reports for "covered properties" (i.e. those that were required to comply). From these 2,774 properties, 176 reports (6%) were removed from the data analysis due to being outliers or due to missing information.

The 176 records removed from the analysis either reported extreme values for key energy metrics or had other data issues as follows:

- 23 properties: Site EUI less than three kBtu/square foot or a Site EUI more the three standard deviations above or below the median site EUI for the property's building sector (see Table 2 for a breakdown of the eight building sectors included in this analysis).
- 127 properties: ENERGY STAR score of 1, 2, 99, or 100. Properties with scores of 99 or 100 were removed if they had not been ENERGY STAR certified in 2017 or 2018. All properties with scores of 1 or 2 were removed.
- 18 properties: Missing electricity use.
- 8 properties: Missing Site EUI metrics.

This data cleansing process resulted in 2,598 covered building data submissions that provide the basis for the analysis presented in this report, an increase of four percent over the analyzed properties in 2018, which included 2,532 analyzed properties.



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■ BUILDING SECTORS

Table 2 shows the eight building sectors included in this report’s analysis and the ENERGY STAR Portfolio Manager property types included in each sector. The number of properties analyzed, total floor area, median ENERGY STAR scores, and median site and source EUI values are also provided for each Portfolio Manager property type or property type grouping.

Properties with multiple uses are typically assigned to the space use that comprises 50% or more of the total floor area. If no single space use makes up 50% or more of the property’s floor area, then the property is considered to be Mixed Use, which is included in the “Other” property type category.

Table 2: Detailed Building Sector Description and Energy Performance Metrics by Sector for Analyzed Properties

Building Sector	Primary ENERGY STAR Portfolio Manager Property Type(s)	Number of Properties Included in Analysis	Total Floor Area (Gross ft ²) – Buildings and Parking	Median Site EUI (kBtu/square foot)	Median Source EUI (kBtu/square foot)	Median ENERGY STAR Score (1-100 rating)
Office	Bank Branch and Financial Office	8	11,809,585	101	212	44
	Office, 50,000 ft ² – 99,999 ft ²	74	6,471,599	79	166	56
	Office, 100,000 ft ² - 249,999 ft ²	94	14,797,741	86	174	63
	Office, ≥ 250,000 ft ²	163	144,937,833	72	165	70
	All Offices	339	178,016,758	78	169	67
Multifamily Housing	Multifamily Housing, 50,000 ft ² – 99,999 ft ²	435	30,943,973	84	122	66
	Multifamily Housing, 100,000 ft ² - 249,999 ft ²	440	69,994,081	80	126	59
	Multifamily Housing, ≥ 250,000 ft ²	403	196,813,759	80	130	58
	All Multifamily Housing	1,278	297,751,813	82	126	61
K-12 Schools	K-12 School, 50,000 ft ² – 99,999 ft ²	192	59,337,864	86	143	38
	K-12 School, 100,000 ft ² - 249,999 ft ²	145	13,398,612	77	127	47
	K-12 School, ≥ 250,000 ft ²	24	2,955,412	76	127	56
	All K-12 Schools	361	75,691,888	83	135	43
Healthcare	Ambulatory Surgical Center; Outpatient Rehabilitation/Physical Therapy; and Urgent Care/Clinic/Other Outpatient	3	699,169	Not Available	239	435
	Hospital (General Medical & Surgical)	24	2,925,326	228	404	57
	Medical Office	13	1,182,649	115	267	41
	Other - Specialty Hospital	5	576,580	183	339	Not Available
	All Healthcare	45	4,684,555	90	152	44
Higher Education	College/University, 50,000 ft ² – 99,999 ft ²	22	3,684,920	100	196	Not Available
	College/University, 100,000 ft ² - 249,999 ft ²	36	26,411,588	91	184	Not Available
	College/University, ≥ 250,000 ft ²	23	13,838,257	91	172	Not Available
	All College/University	81	43,934,765	92	181	Not Available
Lodging	Hotel	78	13,793,818	110	210	46
	Other - Lodging/Residential and Residence Hall/Dormitory	28	8,392,377	70	141	73
	Residential Care Facility	12	2,228,304	158	242	Not Available
	Senior Care Community	64	37,004,119	108	177	31
	All Lodging	182	61,418,618	102	188	45



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(Continued from previous page.)

Building Sector	Primary ENERGY STAR Portfolio Manager Property Type(s)	Number of Properties Included in Analysis	Total Floor Area (Gross ft ²) – Buildings and Parking	Median Site EUI (kBtu/square foot)	Median Source EUI (kBtu/square foot)	Median ENERGY STAR Score (1-100 rating)
Retail	Automobile Dealership	5	509,913	106	266	Not Available
	Enclosed Mall and Other - Mall	13	1,141,376	111	204	Not Available
	Lifestyle Center and Strip Mall	24	4,769,632	94	221	Not Available
	Retail Store	50	5,420,813	86	188	52
	Supermarket/Grocery Store	40	3,137,896	241	531	48
	Wholesale Club/Supercenter; Other – Services; and Repair Services (Vehicle, Shoe, Locksmith, etc.)	6	702,675	145	293	19
	All Retail	138	15,682,305	109	239	48
Other	Adult Education; Other – Education; and Preschool/Daycare	7	9,448,811	85	199	Not Available
	Convention Center and Other-Entertainment/Public Assembly	6	2,684,601	77	139	Not Available
	Courthouse; Other - Public Services; and Prison/Incarceration	7	1,200,488	88	163	67
	Fitness Center/Health Club/Gym	9	1,052,902	167	302	Not Available
	Indoor Arena and Other - Recreation	18	3,360,658	134	184	Not Available
	Laboratory	29	4,686,705	312	565	Not Available
	Library	8	908,127	104	219	Not Available
	Mixed Use	35	9,262,255	92	201	30
	Movie Theater; Performing Arts; and Social/Meeting Hall	11	2,011,312	155	294	Not Available
	Museum	5	1,276,273	81	182	Not Available
	Other	27	4,996,004	83	126	Not Available
	Worship Facility	9	1,404,673	71	98	34
All Other Properties	171	42,292,809	104	202	46	
Grand Total		2,595	719,473,511			

NOTE: Does not include data center properties for confidentiality reasons.



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■ TREND ANALYSIS METHODOLOGY

The trend analysis presented in this report applies to individual properties that reported in 2016 and reported again in 2019. The properties included in the trend analysis were only those that were analyzed properties in 2019. Weather-normalized source energy use per sq. ft. was used for the trend analysis to control for weather variations between the calendar years of the comparison, as well as any changes in the properties' square footage.⁵

A total of 1,951 analyzed properties from 2019 also reported data in 2016 and had a value for the weather-normalized source energy use intensity metric in both 2019 and 2016. This cohort of 1,951 properties was included in the trend analysis for energy use.

A total of 1,999 analyzed properties from 2019 also reported data in 2016 and had a value for the total GHG emissions metric in both 2019 and 2016. This cohort of 1,999 properties was included in the trend analysis for GHG emissions.

⁵ For more information, see the ENERGY STAR Portfolio Manager Technical Reference on Weather and Climate:
<https://portfoliomanager.energystar.gov/pdf/reference/Climate%20and%20Weather.pdf>



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■ CALCULATION METHODOLOGIES

The median weather normalized source energy use intensity (in kBTU/sq. ft.) for the sample properties was calculated for 2016 and 2019. The median for 2019 was then subtracted from the median in 2016. These calculations indicate a decrease in total weather-normalized source energy use for the group of properties analyzed.

The total GHG emissions (in CO₂e/year) for the sample properties was calculated for 2016 and 2019. The total for 2019 was then subtracted from the total in 2016. These calculations show a decrease in total GHG emissions for the group of properties analyzed. Table 3 shows the median weather-normalized source energy use intensity (in kBTU) and the total GHG emission values for 2016 and 2019 for this group of buildings, and the total percentage reductions achieved.

Table 3: Three-Year, Same Building Trend Analysis

Year	Median Weather-Normalized Source Energy Use Intensity (kBTU/sq. ft./year) (n=1,951)	Total Greenhouse Gas Emissions (CO ₂ e/year) (n=1,999)
2016	155.8	6,209,957
2019	143.9	5,309,338
Change	-11.9	-900,619
Percentage Change	-7.6%	-14.5%





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