

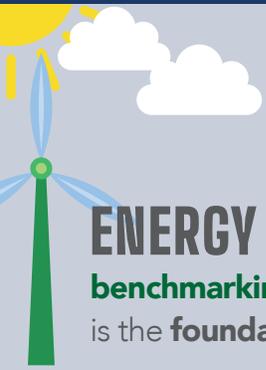


2020

CHICAGO ENERGY
BENCHMARKING

*** REPORT ***

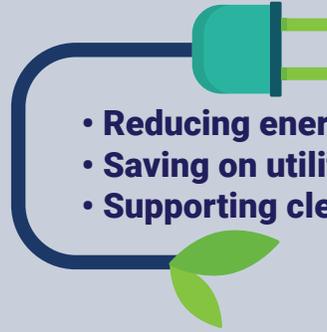
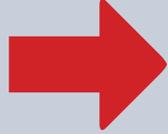
2020 Chicago Energy Benchmarking Report ★ ★ ★ ★



ENERGY

benchmarking

is the **foundation** for



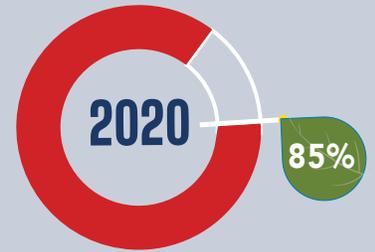
- Reducing energy,
- Saving on utility costs, &
- Supporting clean energy jobs.



REACH

Under **Chicago Energy Benchmarking**, **85%** of large buildings reported energy use in **2020**, down from **91%** in **2019**.

This drop in compliance rate is likely attributed to increased challenges for buildings operated during the COVID-19 pandemic. In a survey issued to non-compliant buildings in the Fall, several buildings cited a team focus shift to other priorities, or more difficulty engaging with building owners/managers during this time.



IMPACT AND OPPORTUNITY

The median carbon emissions per square foot (also known as Greenhouse gas emissions intensity) from reporting properties are down by **25%** since **2016**.

Energy use per sq. ft. (also known as Energy Use Intensity) for buildings reporting in the last three consecutive years 2017-2020) has dropped by **9%**.



BUILDING ON SUCCESS

The **Chicago Energy Rating System** was successfully rolled out in **2019** to increase **awareness** of energy use. Building owners are required to display a placard illustrating their building's energy performance to the general public. Approximately **30%** of buildings which received a one-to-four star rating in **2020**, received a four star rating. Chicago is proud to partner with building owners to be the **first city in the nation** to require this kind of **transparency**.



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



DEAR FELLOW CHICAGOANS,



Energy benchmarking serves as the foundation for reducing energy use, saving building operators, businesses, and residents money on their utility bills, and boosting our local economy by creating and supporting clean energy jobs throughout the City of Chicago.

These co-benefits directly align with two components of my commitment to eliminate poverty in Chicago: reducing expenses for Chicagoans and expanding quality jobs. But of course, benchmarking also addresses important climate issues facing our City. While the climate crisis broadly impacts the world, it disproportionately affects low-income communities and communities of color—sometimes referred to as “the climate gap”. Increasing temperatures and precipitation, punctuated by extreme flooding and heat waves, result in unexpected risks for vulnerable communities, including increased health risks.

While these impacts affect us all, the ability to navigate these challenges is far more difficult in underserved communities that may lack the necessary resources to react quickly and nimbly. As much as climate is an environmental issue, it is also a social and economic 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. The city is 59% of the way to meeting that goal. Energy use in buildings represents approximately 70% of the City’s current greenhouse gas emissions, and the city must improve building energy efficiency to meet our ambitious climate goals. Relatedly, the city also continues to strive towards reaching 100% renewable energy by 2035; assuring that buildings use 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 2020, we continued to see improvements in energy performance for the largest buildings across the city. These reporting properties represent 2,841 of the largest buildings in the City, amounting to over 720 million square feet of property. Between 2017 and 2020, buildings saw their energy use per square foot drop by 9%. Further, the carbon emissions per square foot continued to decline rapidly and has decreased by 25% from 2016 to 2020. 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.

Lori E. Lightfoot,
Mayor, City of Chicago







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I. EXECUTIVE SUMMARY

Energy benchmarking is the first step to identifying opportunities to reduce energy use and save on utility bills. In 2013, the City of Chicago adopted its benchmarking ordinance that required buildings over 50,000 square feet (sq. ft.) to report their energy use once per year, and perform data verification every three years. The City employed a tiered reporting approach to start with the largest buildings, and by 2016, all required buildings are reporting. The impetus for energy benchmarking has always been to raise awareness of energy performance through information and transparency, with the goal of unlocking energy and cost savings opportunities for businesses and residents. Following this trend, in 2019 the City began implementing the Chicago Energy Rating System, which makes energy use information for large buildings easily accessible to residents, while encouraging energy savings. The zero-to-four star rating system is based on existing and publicly available energy data, and requires buildings covered under the ordinance to post their rating in a prominent location on the property, as well as share this information at the time of sale or lease listing. Chicago was the first U.S. city to assign buildings an energy performance rating and require properties to post their rating.

In 2019, 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. Like energy data, water consumption data will provide valuable insight to assist building owners.

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 2020 alone, the median carbon emissions per sq. ft. (also known as GHG Intensity) for reporting buildings has fallen by 25% 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).

■ 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.

Since on-site data verification was challenging or at times not possible during the COVID-19 outbreak, the City of Chicago Department of Business Affairs and Consumer Protection (BACP) used its enforcement discretion to temporarily suspend enforcement of the Data Verification Requirement until June 1, 2021 for properties that were due for verification in 2020. There were no changes made to the annual reporting deadline for submitting benchmarking reports (June 1, 2020).

1 REACH

Compliance with the Chicago Energy Benchmarking Ordinance is high and continues to steadily increase every year. In 2020, 2,841 properties spanning over 720 million sq. ft. reported energy use, which represents a decrease of 87 properties since 2019. The 2020 reporting rate by number of properties was 85%, which is 6% lower than the 2019 reporting rate of 91%.

- This drop in compliance rate is likely attributed to increased challenges for buildings operating during the COVID-19 pandemic. In a survey issued to non-compliant buildings in the Fall, several buildings cited a team focus shift to other priorities, or more difficulty engaging with building owners/managers during this time.

2 IMPACT

The bulk of Chicago properties required to benchmark continue to perform above national averages, based on a median ENERGY STAR score of 60 out of 100. Energy use per sq. ft. (also known as Energy Use Intensity) for buildings reporting in the last three consecutive years (2017-2020) has dropped by 9%.



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. In February 2021, Cook County officials unveiled a similar county PACE program that is also accessible for qualified Chicago building owners.

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. Approximately 30% of buildings which received a one-to-four star rating in 2020, received a four star rating. A breakdown for all buildings which received a one-to-four star rating is shown in Table 1 below.



Table 1. 2020 Energy Rating Scores Breakdown

Number of Stars Received	Number of Buildings	Percentage
1 or 1.5	519	24%
2 or 2.5	507	24%
3 or 3.5	455	21%
4	651	31%
TOTAL:	2,132	100%



II. REACH: CHICAGO ENERGY BENCHMARKING BACKGROUND AND COMPLIANCE

OVERVIEW

The goal of the Chicago Energy Benchmarking Ordinance (2014) and Energy Rating System updates (2019) are to increase awareness of energy performance through visibility and transparency of information. Approximately 3,600 buildings that are 50,000 sq. ft. or greater are required to measure and report energy use annually, post updated placard ratings, and complete additional data verification every three years.

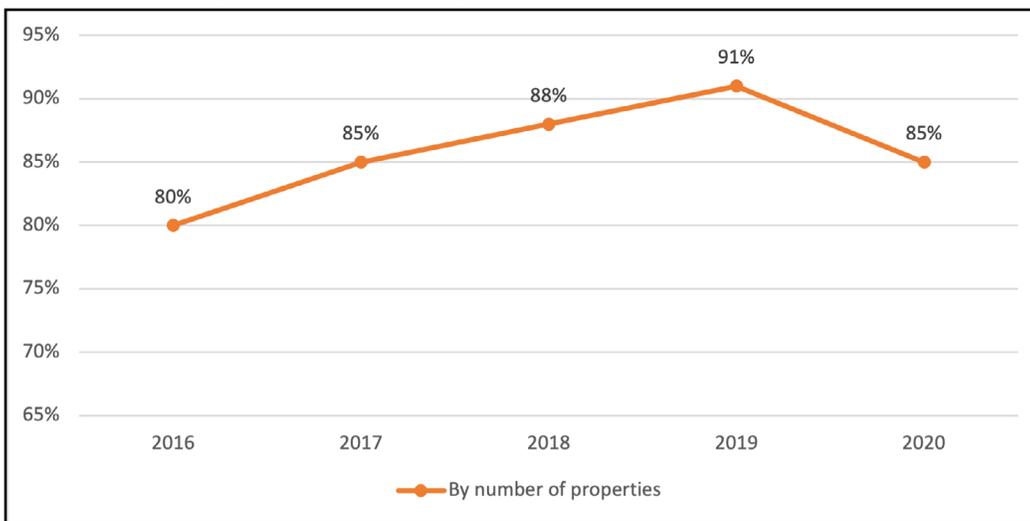
COMPLIANCE SUMMARY

Compliance with the Chicago Energy Benchmarking Ordinance is high and continues to steadily increase every year. The 2020 reporting rate by number of properties was 85%, which is 6% lower than the 2019 reporting rate of 91%.

2020 Reporting, by the Numbers:

- **2,841 total reporting properties**
- **85% reporting rate, when measured by number of properties**

Figure 1: Energy Benchmarking Reporting Rate, 2016 to 2019



In 2020, 2,841 properties submitted reports to the City of Chicago, and 80 additional properties submitted on a voluntary basis, for a total of 2,921 reports. 118 properties received temporary exemptions, leading to 2,959 “covered properties” (required by ordinance to report) reporting or exempt out of 3,491 total, resulting in a 85% reporting rate. 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.



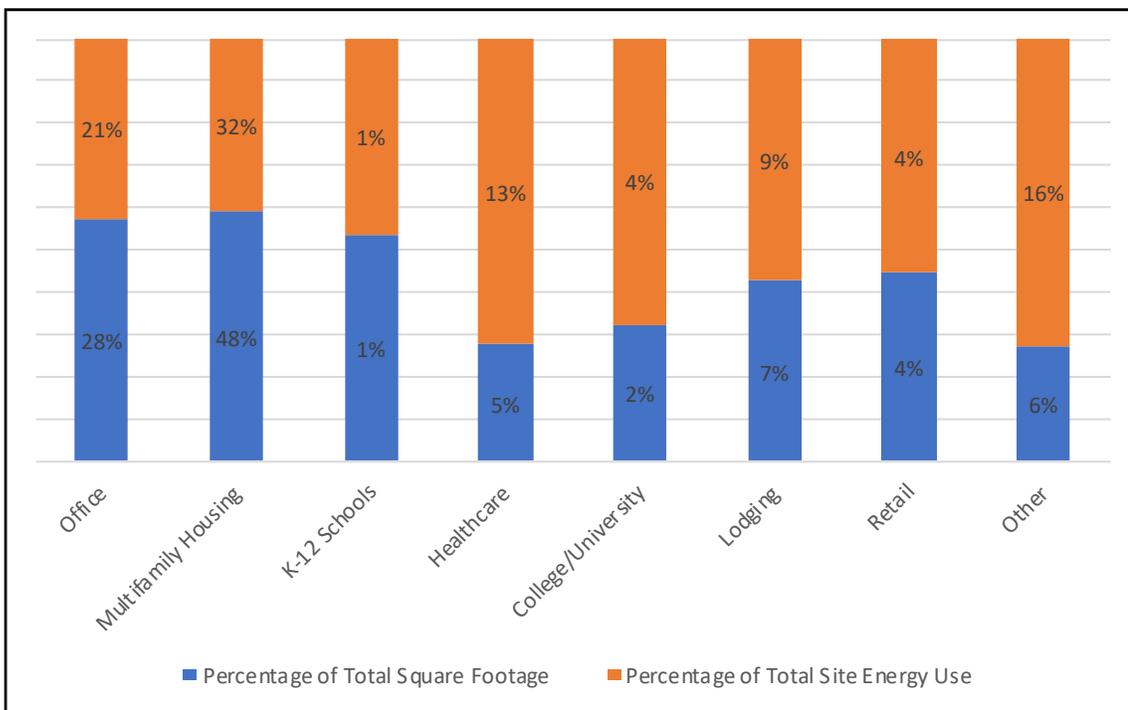
III. IMPACT: 2020 BENCHMARKING RESULTS

■ PROPERTIES ANALYZED IN 2019

Energy benchmarking reports from 2,187 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, pages 25-26.) 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, representing 48% of the total sq. ft., and 32% of total site energy use of all analyzed properties, followed by offices and then “other” space uses. (For more details on property types please see the Appendix, Table 3.)

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



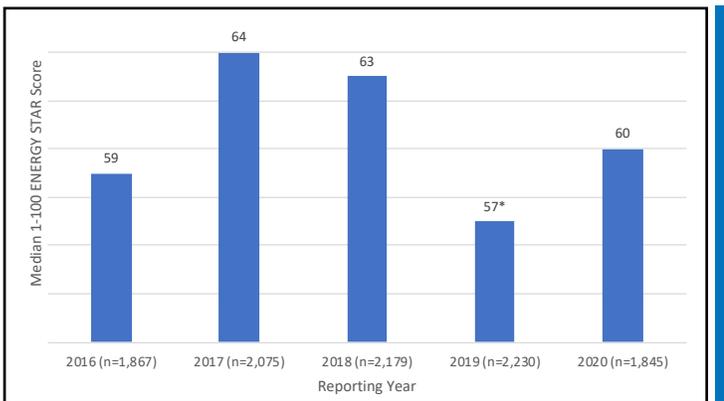


OVERALL ENERGY PERFORMANCE

The 1-100 ENERGY STAR score represents a property’s overall energy performance relative to similar building types 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 2020, the median ENERGY STAR score for all analyzed properties in Chicago was 60 out of 100, an increase of three points from the median of 57 in 2019. Figure 3 shows the median reported ENERGY STAR score from Chicago Energy Benchmarking reports over the past five years.

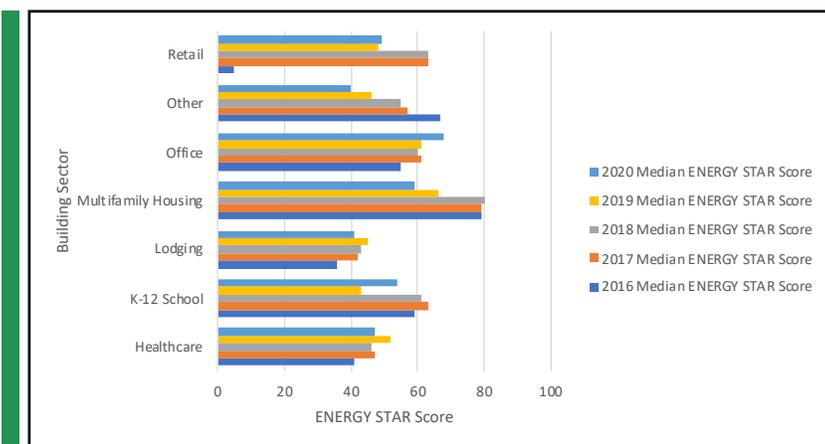
Figure 3: Median ENERGY STAR Scores, 2016 to 2020



*Drop due to updates implemented to the ENERGY STAR Portfolio Manager system in 2018

The median ENERGY STAR score has increased in the Retail, Office, and K-12 School property sectors, while the Multifamily Housing, Lodging, Other, and Healthcare sectors saw declines from 2019 to 2020. (See Figure 4). A median score of 60 is well 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: ENERGY STAR Scores by Building Sector Reported from 2016-2020



¹ In August 2018, EPA updated performance metrics for some U.S. buildings in ENERGY STAR Portfolio Manager® based on the most recent market data available. This update is part of EPA’s standard process to keep ENERGY STAR metrics as current as possible, and reflective of current market performance. At this time, the 1–100 ENERGY STAR scores and other source energy metrics were updated for certain U.S. building types benchmarking in Portfolio Manager across all time periods to reflect the latest performance metrics.

This update was followed by a score review period for U.S. K-12 schools, worship facilities, warehouse properties, hotels, offices, retail stores, and supermarkets, during which EPA engaged industry to get feedback, conduct additional analysis, and ensure the score models deliver metrics that support organizations’ energy efficiency goals. See additional information on this update here: <https://www.energystar.gov/buildings/facility-owners-managers/existing-buildings/use-portfolio-manager/update-energy-star-scores-cbecs>



TREND ANALYSIS

An important goal of the City's is that as building owners benchmark their buildings year-by-year, the insight gained will help pinpoint opportunities for improvements at the individual scale, but at a broader scale, analyzing broader trends help City officials identify technical assistance needs and other opportunities for leveraging assistance to buildings owners that need it the most. Understanding how buildings are performing over time is an important metric.

Nearly 1,800 properties that benchmarked and reported in 2017 and again benchmarked and reported in 2020 (three consecutive reporting years) saw an increase in total net energy costs of approximately \$5.9 million. This is large in part due to a substantial increase in total natural gas use of 2 billion kBTU, as well as an increase in total gross floor area of 63.5 million gross square feet. These properties, however, saw a reduction in energy use per sq. ft. by 9.2%, based on the median weather-normalized source energy use per sq. ft. from 2017 compared to 2020 (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 improve energy efficiency and achieve 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 25% from 2016 to 2020. All building sectors have seen decreases in the GHG intensity as shown in Figure 5. When comparing total GHG emissions from nearly 2,000 properties that reported in 2017 and again reported in 2020, total GHG emissions are down 9%, which equates to over 200,000 metric tons of carbon dioxide equivalents (CO₂e). This reduction is equivalent to removing nearly 55,000 passenger cars from the road each year.²

Figure 5: Median GHG Intensity from 2016-2020

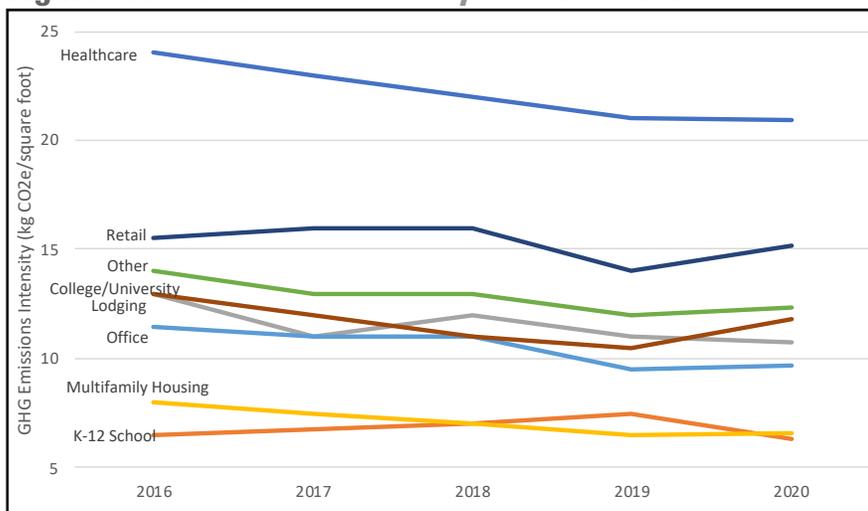
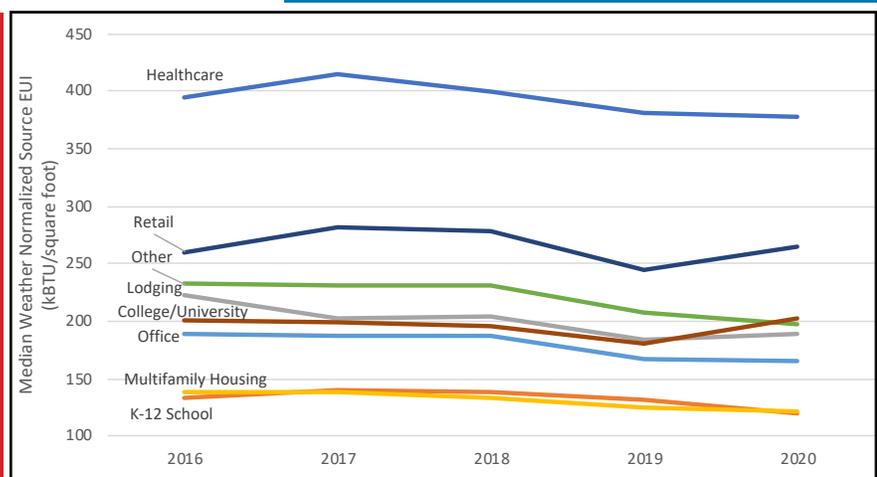


Figure 6: Median Source EUI 2016-2020

Finally, comparison over the past five years of benchmarking information shows that the median weather-normalized source energy use per sq. ft. for all reporting buildings has dropped by 7% from the 2016 to 2020 reporting years. All sectors saw decreases since the 2016 reporting year, with the exception of Retail and College/University. The greatest improvements have been seen in the Lodging sector (18% improvement) and Office sector (15% improvement).



²EPA 2013 est <http://www.epa.gov/cleanenergy/energy-resources/refs.html>



ENERGY STAR Certification

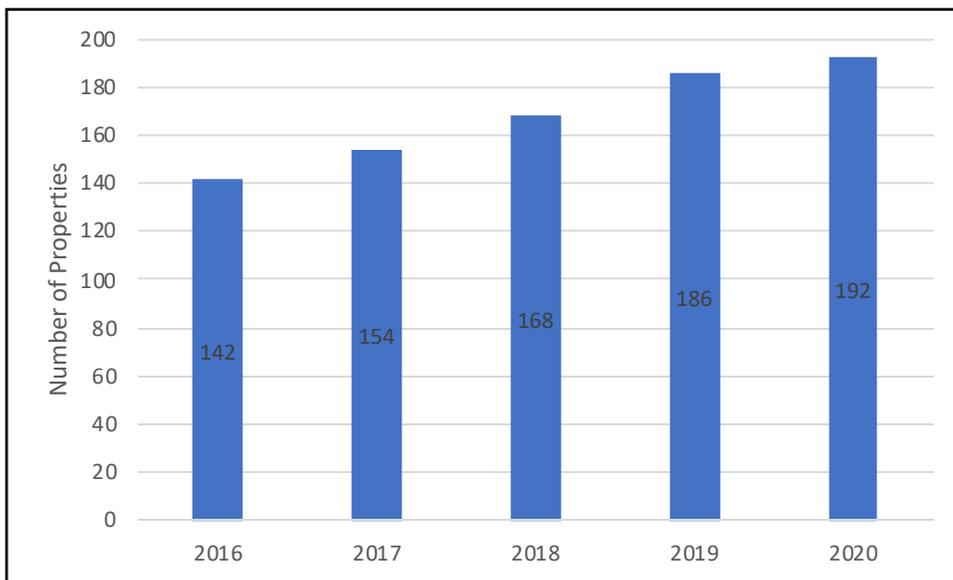
Properties that receive a score of 75 or higher and meet other criteria may be able to earn the ENERGY STAR label. In Chicago, the number of ENERGY STAR certifications continues to rise year after year (Figure 7). As of the 2020 Reporting Year, a total of 192 properties subject to the energy benchmarking 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 2016-2020





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. Incentives opportunities can change each year, so building owners may want to consider evaluating said opportunities on an annual basis.

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:

- **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 2019, Chicago PACE is a 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.

The program thus delivers a financial tool that facilitates the City’s sustainability efforts while providing economic development opportunities by reducing developer capital costs and driving down operational expenses for existing properties.

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

In February 2021, Cook County launched a similar program that is accessible to qualified building owners in Chicago.

For more information on the City of Chicago PACE program, please visit: www.ChicagoPACE.org

For more information on the Cook County PACE program, please visit: <https://iecapace.org/cook-county-c-pace-program>



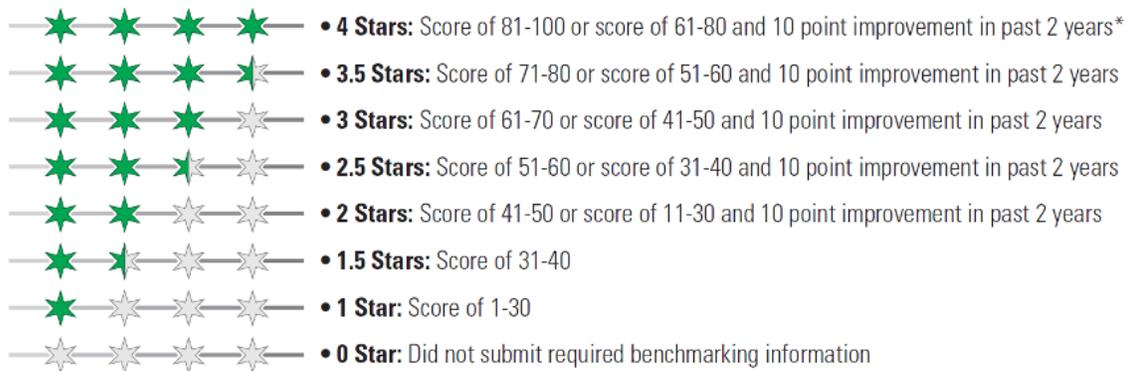


V. BUILDING ON SUCCESS: Energy Rating System Implementation

The original Chicago Energy Benchmarking ordinance (2013) 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. 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.³



■ 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 benchmark in 2020, average water use intensity across all buildings was 25.9 gallons per sq. ft., down from 26.2 gallons per sq. ft in 2019. Water use varies by building type, as shown in Figures 8 and 9 below.

Figure 8: TOTAL WATER USE BY PROPERTY TYPE

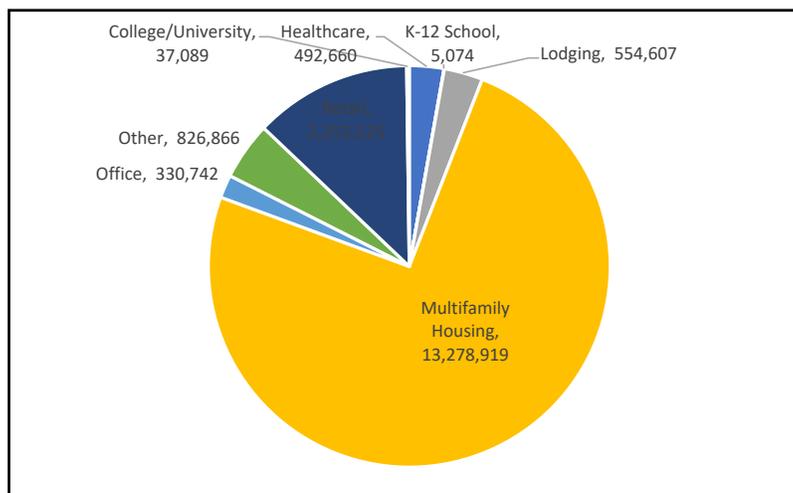
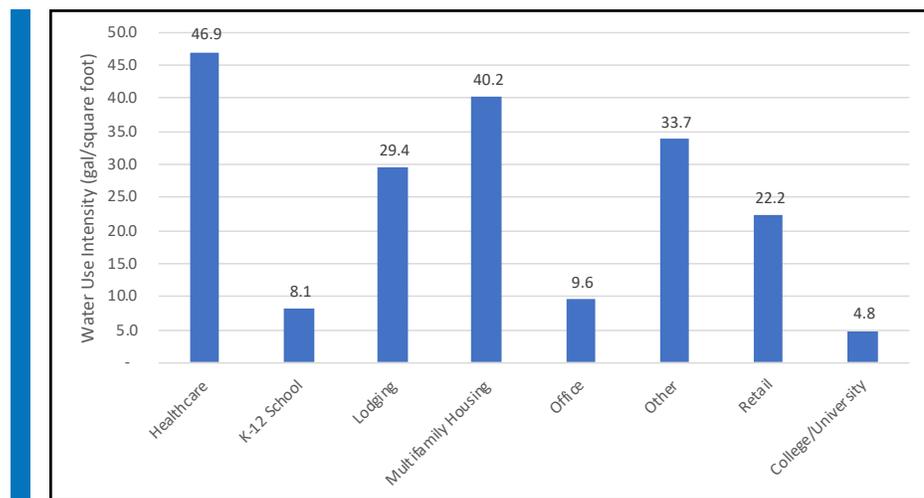


Figure 9: AVERAGE WATER USE INTENSITY BY PROPERTY TYPE



³E City of Chicago Greenhouse Gas Inventory Report https://www.chicago.gov/content/dam/city/progs/env/GHG_Inventory/Chicago-2017-GHG-Report_Final.pdf



VI. ACKNOWLEDGEMENTS

The City of Chicago is grateful for the assistance and input of several partnering organizations that have supported the implementation of the Chicago Energy Benchmarking Ordinance and the Chicago Energy Rating System.

The 2020 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

NATURAL RESOURCES DEFENSE COUNCIL (NRDC)

Mary Nicol, Climate Advisor

ELEVATE AND THE HELP CENTER TEAM

Gus Sandoval, Project Manager

Elena Savona, Director, Public Sector Programs

Lindy Wordlaw, Associate Director, Community Planning

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
- Enterprise Community Partners
- Illinois Environmental Council
- Illinois Green Alliance
- Institute for Market Transformation
- Midwest Energy Efficiency Alliance
- Natural Resources Defense Council
- Peoples Gas
- Seventhwave (now Slipstream)
- Sierra Club
- 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.⁴

- 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.⁵



⁴ 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>

⁵ 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

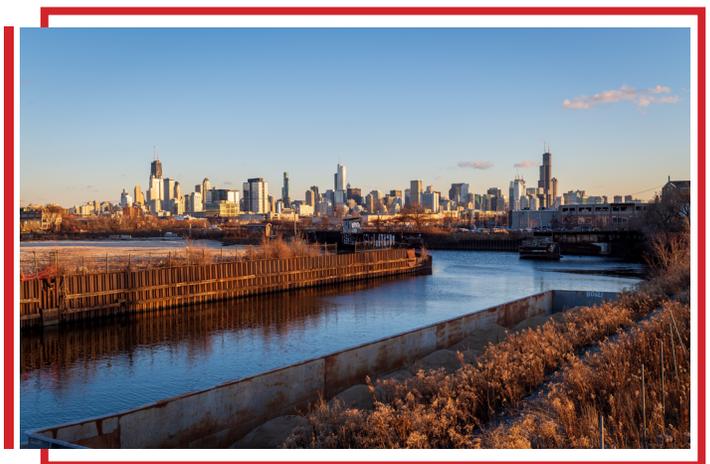
Under the Chicago Energy Benchmarking Ordinance, all covered properties are required to complete data verification once every three years, starting with the first year that the property is required to comply with the ordinance. Data verification is required to ensure that reported information is being 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.⁶ 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.



⁶ 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 2).

Table 2: Percentage of Analyzed Properties Using Estimated, Default, or Temporary Values

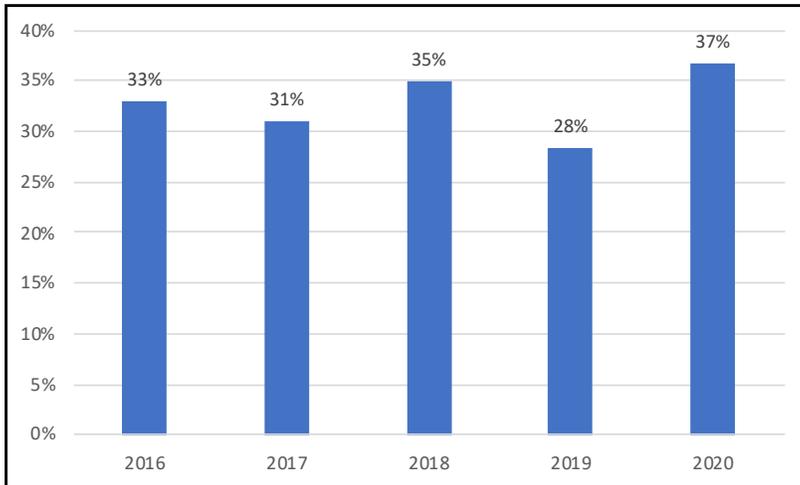
Type of Values	2016	2017	2018	2019	2020
Temporary Values	9%	5%	5%	5%	1%
Estimated Values – Energy	31%	24%	22%	19%	6%
Default Values	4%	3%	2%	1%	8%

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, 2018, and 2019 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 2,415 reporting properties (as of the analysis cutoff date, which was September 1, 2020).

Of these 2,415 reporting properties, 80 properties reported voluntarily (i.e. were not required to comply) and were removed from the dataset that was used for analysis, leaving 2,335 reports for “covered properties” (required to comply). From these 2,335 properties, 148 reports (6%) were removed from the data analysis due to being outliers or due to missing information.

The 148 records removed from the analysis either reported extreme values for key energy metrics or had other data issues as follows:

- 26 properties: Site EUI less than three kBTU/sq. ft. 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).
- 100 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 2018 or 2019. All properties with scores of 1 or 2 were removed.
- 17 properties: Missing electricity use.
- 5 properties: Missing Site EUI metrics.

This data cleansing process resulted in 2,187 covered building data submissions that provide the basis for the analysis presented in this report, a decrease of 19% from the analyzed properties in 2019, which included 2,598 analyzed properties.



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■ BUILDING SECTORS

Table 3 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 3: 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	5,433,564	90.2	199.15	61.5
	Office, 50,000 ft ² – 99,999 ft ²	66	4,886,165	77	172	59
	Office, 100,000 ft ² - 249,999 ft ²	86	13,654,129	90	166	61
	Office, ≥ 250,000 ft ²	150	143,154,511	78	161	73
	All Offices	310	167,128,369	82.7	165.2	68
Multifamily Housing	Multifamily Housing, 50,000 ft ² – 99,999 ft ²	385	27,261,784	75	118	66
	Multifamily Housing, 100,000 ft ² - 249,999 ft ²	373	60,671,563	75	121	62
	Multifamily Housing, ≥ 250,000 ft ²	372	193,644,129	75	128	52
	All Multifamily Housing	1,130	281,577,476	75	122.15	59
K-12 Schools	K-12 School, 50,000 ft ² – 99,999 ft ²	14	1,050,531	82	151	42
	K-12 School, 100,000 ft ² - 249,999 ft ²	22	3,322,617	68	113	67
	K-12 School, ≥ 250,000 ft ²	2	921,454	--	117	62
	All K-12 Schools	38	5,294,602	68.3	119.85	54
Healthcare	Ambulatory Surgical Center; Outpatient Rehabilitation/Physical Therapy; and Urgent Care/Clinic/Other Outpatient	4	792,751	123.7	315.55	--
	Hospital (General Medical & Surgical)	23	25,166,404	233.2	420.4	47
	Medical Office	11	2,864,676	125.2	260	45
	Other - Specialty Hospital	5	636,230	207.9	356.2	--
	All Healthcare	43	29,460,061	216.10	378.1	47
College/University	College/University, 50,000 ft ² – 99,999 ft ²	17	1,254,748	126.15	192.9	--
	College/University, 100,000 ft ² - 249,999 ft ²	12	26,411,588	91	184	--
	College/University, ≥ 250,000 ft ²	12	5,605,837	117.85	205.3	--
	All College/University	56	10,887,690	109.75	202.95	--
Lodging	Hotel	65	25,885,328	121.3	207.7	41
	Other - Lodging/Residential and Residence Hall/Dormitory	27	5,185,401	89.9	153.3	70
	Residential Care Facility	9	891,089	133.3	246	--
	Senior Care Community	60	7,366,989	130.7	169.45	32
	All Lodging	161	39,328,807	110.6	188.9	41



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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	4	997,232	103.25	198.1	--
	Enclosed Mall and Other - Mall	11	3,867,349	116	247.3	--
	Lifestyle Center and Strip Mall	21	4,413,608	106	221.85	--
	Retail Store	35	7,032,684	92.5	186.5	51
	Supermarket/Grocery Store	45	3,902,919	239.1	522.9	51
	Wholesale Club/Supercenter; Other – Services; and Repair Services (Vehicle, Shoe, Locksmith, etc.)	5	642,525	--	288.4	22.5
	All Retail	121	20,856,317	130.6	264.5	49
Other	Adult Education; Other – Education; and Preschool/Daycare	6	1,151,429	97.9	200.9	--
	Convention Center and Other-Entertainment/Public Assembly	1	9,245,333	80.5	143	--
	Courthouse; Other - Public Services; and Prison/Incarceration	6	7,388,391	158.35	148.6	68.5
	Fitness Center/Health Club/Gym	6	1,039,432	140.3	386.15	--
	Indoor Arena and Other - Recreation	4	511,961	122.4	185.5	--
	Laboratory	29	5,211,990	303	516.8	--
	Library	7	1,866,559	117.2	217.7	--
	Mixed Use	32	27,911,869	92	189	59
	Movie Theater; Performing Arts; and Social/Meeting Hall	9	1,636,470	121.4	251.25	--
	Museum	4	2,679,295	325.8	427.7	--
	Other	24	3,943,114	77.95	114	--
	Worship Facility	8	918,094	85	131.8	23.5
All Other Properties	136	63,503,937	--	--	--	
Grand Total		1995	618,037,258			

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 2017 and reported again in 2020. The properties included in the trend analysis were only those that were analyzed properties in 2020. 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.⁷

A total of 1,824 analyzed properties from 2020 also reported data in 2017 and had a value for the weather-normalized source energy use intensity metric in both 2020 and 2017. This cohort of 1,824 properties was included in the trend analysis for energy use.

A total of 845 analyzed properties from 2020 also reported data in 2017 and had a value for the total GHG emissions metric in both 2020 and 2017. This cohort of 845 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 2017 and 2020. The median for 2020 was then subtracted from the median in 2017. 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 2017 and 2020. The total for 2020 was then subtracted from the total in 2017. These calculations show a decrease in total GHG emissions for the group of properties analyzed. Table 4 shows the median weather-normalized source energy use intensity (in kBtu) and the total GHG emission values for 2017 and 2020 for this group of buildings, and the total percentage reductions achieved.

Table 4: Three-Year, Same Building Trend Analysis

Year	Median Weather-Normalized Source Energy Use Intensity (kBtu/sq. ft./year) (n=1,824)	Total Greenhouse Gas Emissions (CO ₂ e/year) (n=845)
2017	154.5	2,677,602
2020	140.3	2,436,318
Change	-14.2	-241,284
Percentage Change	-9.2%	-9.0%

⁷ 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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