


**ST. LOUIS
ENERGY
BENCHMARKING
REPORT
2017**



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REDUCING BUILDING ENERGY SUPPORTS ST. LOUIS' CLIMATE PROTECTION GOALS

Decreases Greenhouse Gas (GHG) Emissions & Improves Air Quality

Achieving an ENERGY STAR® score of 75 for all eligible STL buildings would result in an estimated:

↓11% GHG emissions



Equivalent to:
110.9M lbs burned coal

Annual cost savings of



\$61.5M

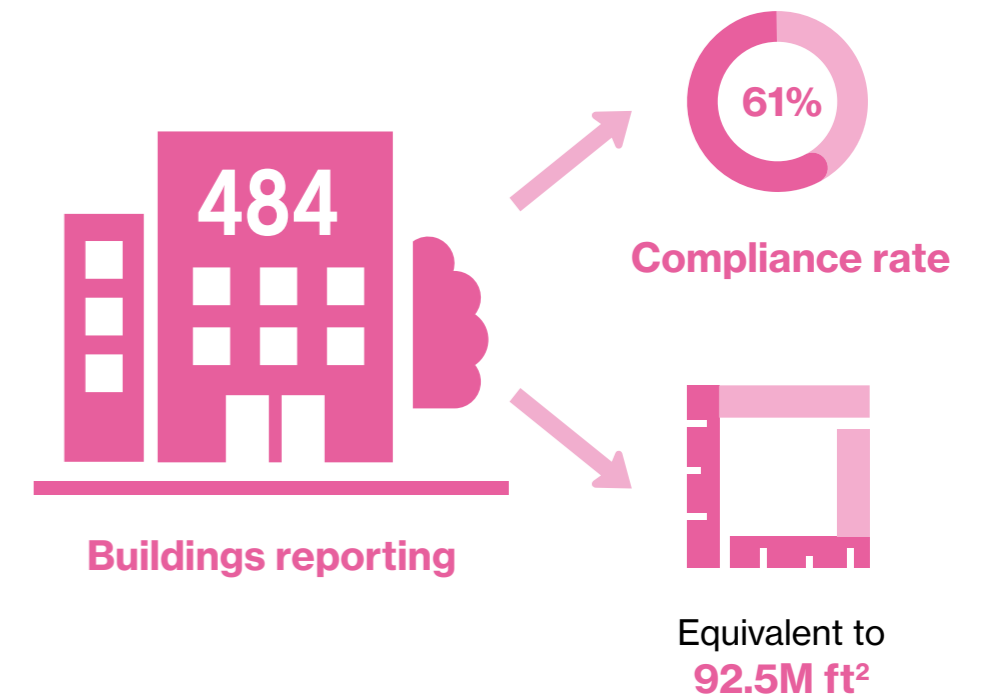
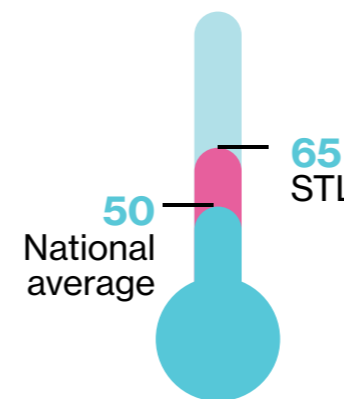
↓17% source energy use



2.4M Mbtu Saved

By educating building owners and operators about the Building Energy Awareness Ordinance, STL achieved the following in its 1st reporting year

Median ENERGY STAR® score of 65



Learn More:



Find ways to save energy with our [energy efficiency checklist](#)



Your building score ≥ 75? Get it recognized with an [ENERGY STAR® certification](#)



Fund your projects with incentives/rebates from [Ameren & Spire](#)

EXECUTIVE SUMMARY

Currently, the energy used in commercial, industrial and residential buildings is responsible for 77% of St. Louis' greenhouse gas emissions¹. Reducing energy use in buildings through energy efficiency has an array of benefits that range from job creation and utility bill savings to environmental benefits and improved health conditions for people in the community. The City of St. Louis Sustainability Plan identified programs that result in energy efficiency as a key sustainability objective in realizing these many benefits.[i]

Building owners and operators are usually the ones making the decision whether to implement efficiency measures; an energy benchmarking ordinance ensures that the owners and operators of the largest buildings in St. Louis have the energy information they need to make informed decisions. The goal of such an ordinance is to push building owners towards behavioral, operational and capital improvements. Improving energy efficiency is also a critical way St. Louis will reach the climate goal of reducing greenhouse gas emissions (GHG) 80% by 2050.

To reach the 80% reduction goal, the City of St. Louis recommends that there be a combined sector target of 30% GHG emissions reduction from the commercial, industrial, and residential building sectors². The strategies and actions set forth through the Building Energy Awareness Ordinance are intended to help guide the community toward achieving a 30% reduction of energy use in buildings. Reducing energy consumption in the built environment has positive social, environmental, and economic benefits, such as improved air quality and public health, reduced utility costs, and improved neighborhood vitality and quality of life.

[i] Please note: Cite information for this document can be found at: www.StLouisBenchmarking.com.

The Board of Aldermen unanimously passed the Building Energy Awareness Ordinance in January 2017. The ordinance requires municipal, institutional, commercial, and multifamily residential buildings 50,000 square feet or above to track and report their energy and water performance annually. For the 2017 reporting year, buildings were required to comply by April 1, 2018. The ordinance requires buildings to track and report data using the Environmental Protection Agency's (EPA) free, online ENERGY STAR® Portfolio Manager tool.

According to data reported for the 2017 calendar year, the top 4 energy consuming building types were Offices, Hotel, Multifamily Housing, and Hospital (general medical & surgical). Reporting St. Louis buildings have an average ENERGY STAR® score of 65. For source energy use across all reported building types, if properties took measures to increase their ENERGY STAR® score to 75 (the score required for ENERGY STAR® certification) data suggests that St. Louis could observe a 17% reduction in energy use and a 15% reduction in greenhouse gas emissions.



INTRODUCTION

Background on the “Building Energy Awareness Ordinance” (#70474)



Benchmarking is a critical first step in determining how best to reduce unnecessary energy use in buildings.

Buildings are responsible for 63% of greenhouse gas emissions in the City of St. Louis. What’s more, a relatively small number of large buildings represent most of these emissions and the associated energy use. According to the U.S. Environmental Protection Agency (EPA), 30% of the energy in buildings is used inefficiently or unnecessarily.³

Benchmarking means measuring a building’s energy use and comparing it to that of similar buildings. Making this information publicly available will allow owners and occupants to understand how their building’s energy performance compares to that of their peers, as well as identify the extent of the opportunity available for improvement. The City publishes building energy and water performance annually to enable the market to better value energy efficiency, similar to the miles-per-gallon ratings for cars or nutrition labels on food. Other cities with benchmarking and transparency requirements have seen 2-3% energy savings each year from buildings subject to benchmarking ordinances.

Effective in 2017, privately owned buildings and municipal buildings in St. Louis that are 50,000 square feet or more are required to be benchmarked, and owners must disclose annual energy and water consumption. Privately owned buildings must benchmark and submit reporting for the first compliance deadline no later than May 1, annually. Building owners will use a free, online tool called ENERGY STAR® Portfolio Manager to benchmark their buildings. Requiring large building to benchmark and report their energy use on an annual basis has been shown to be an effective driver of behavioral, operational and capital improvements to building energy performance.

Background on City Energy Project

The City Energy Project is a national initiative to create healthier and more prosperous American cities by improving the energy efficiency of buildings. Working in partnership, the Project and participating cities support innovative and practical solutions that reduce pollution, boost local economies, and create healthier environments. The pioneering actions of the 20 leading cities involved in the City Energy Project are shaping and defining next-generation energy efficiency efforts in communities nationwide. St. Louis is 1 of 20 cities in the City Energy Project.

The City Energy Project is a joint initiative of the Natural Resources Defense Council (NRDC) and the Institute for Market Transformation (IMT). It is funded by a partnership of Bloomberg Philanthropies, the Doris Duke Charitable Foundation, and The Kresge Foundation.



Compliance with St. Louis Benchmarking Ordinance

Building Summary	Privately Owned	Municipally Owned	Totals
Total Covered Buildings	983	19	1,002
Buildings Exempted	199	3	202
Buildings Required	784	16	800
Buildings Submitted	467	17	484
Required	424	16	440
Voluntary	43	1	44
Compliance Rate/ Response Rate			
Excluding Voluntary (N = 440)	54%	100%	55%
Including Voluntary (N = 44)	60%	106%	60%
Buildings Removed			
Buildings Removed Based on Data Cleaning Process	97	2	99
Totals	371	14	385

2017 Reporting Cycle

This report presents an analysis of the energy and water data reported by buildings in 2018, which covers energy use and water use data for the 2017 calendar year. The initial deadline for submitting building benchmarking data was April 1st, 2018. However, because this was the first year of reporting for St. Louis building owners, additional efforts were made to extend deadlines and provide support to as many of the covered buildings. To assist building owners comply, the Building Division created an Energy Concierge Service where questions could be answered via phone and email.

A dedicated website, www.stlbenchmarking.com, was also established to serve as a one-stop shop for all matters related to benchmarking compliance and energy efficiency in St. Louis. Resources included training and educational events, latest utility incentives, financing mechanisms, requesting aggregate utility data, and many others. The appendices and methodology for this report can also be found on www.stlbenchmarking.com, under the “Results” tab.

In 2017, 1,002 properties were covered by the benchmarking ordinance and required to submit energy and water data. Of those, 202 were exempted from reporting, leaving a total of 800 buildings to report. As of December 27, 2017, 440 properties submitted reports to the City of St. Louis, and 44 additional properties submitted on a voluntary basis, for a total of 484 reports. The 2017 reporting rate – the ratio of reporting sources to the total number of required sources -- was 61%. [HS1] Table 1 provides these numbers in greater detail. Total square footage of buildings reporting in 2017 was 92,465,992 ft².

THE LARGE BUILDING EFFECT

Why focus on large buildings?

Across the country, cities have been leading the way on sustainability and resiliency. Cities have the ambition and political will to pursue innovative initiatives to address the urgent challenge of climate change, such as increasing energy efficiency in buildings.

Furthermore, the majority of big buildings are concentrated within cities and account for a significant portion of each city's energy use. By focusing on the largest buildings first, cities can capture a considerable portion of the square footage of the building sector while working with a more manageable number of buildings. Improving the energy performance of these buildings yields compelling results.

Studies have shown significant potential to save energy. A 2012 study by the Rockefeller Foundation showed an investment potential of \$279 billion with energy-bill savings of more than \$1 trillion over 10 years.⁴

What are the non-energy benefits?

Economic Benefits

With energy and water costs accounting for on average 26.8 percent of office building operating costs⁵, efficiency improvements can help building owners and tenants to significantly cut their utility bills, which will free up money currently being spent on utility bills to flow back into the local economy. For example, these savings can be put toward other needs, such as the purchase of goods and services, which in turn drive local economic activity. Making cities' buildings more efficient may also create jobs at all skill levels—investments made to improve building performance support local, high-skill jobs that cannot be outsourced. Here in St. Louis, retaining and attracting a skilled and innovative workforce helps us stay competitive and create a desirable community where people want to live, work and play.

Public Health Benefits

By reducing unnecessary energy use, utilities are under less pressure to provide power at the busiest hours of the day in the most populated areas. Reduction in electricity demand can help address regional air quality issues, which have positive implications for air quality related health concerns, such as asthma. The St. Louis region ranks as one of the most vulnerable regions nationally for respiratory allergies and asthma is a threat that will only increase with climate change.⁶

According to the recently released [Equity Indicators Baseline Report](#), children in St. Louis do not start on an even playing field. Black children are more likely to have significant health issues. They are more likely to visit emergency rooms for injuries, illnesses, and diseases of all kinds. In particular, black children are far more likely to experience illnesses that are known to impact attendance and performance in school, including asthma and lead poisoning⁷. GHG reductions can benefit this vulnerable population.

We have the technology to make these buildings vastly more energy efficient. By doing so, St. Louis can slash energy waste, save money for its citizens, and improve the quality of life.

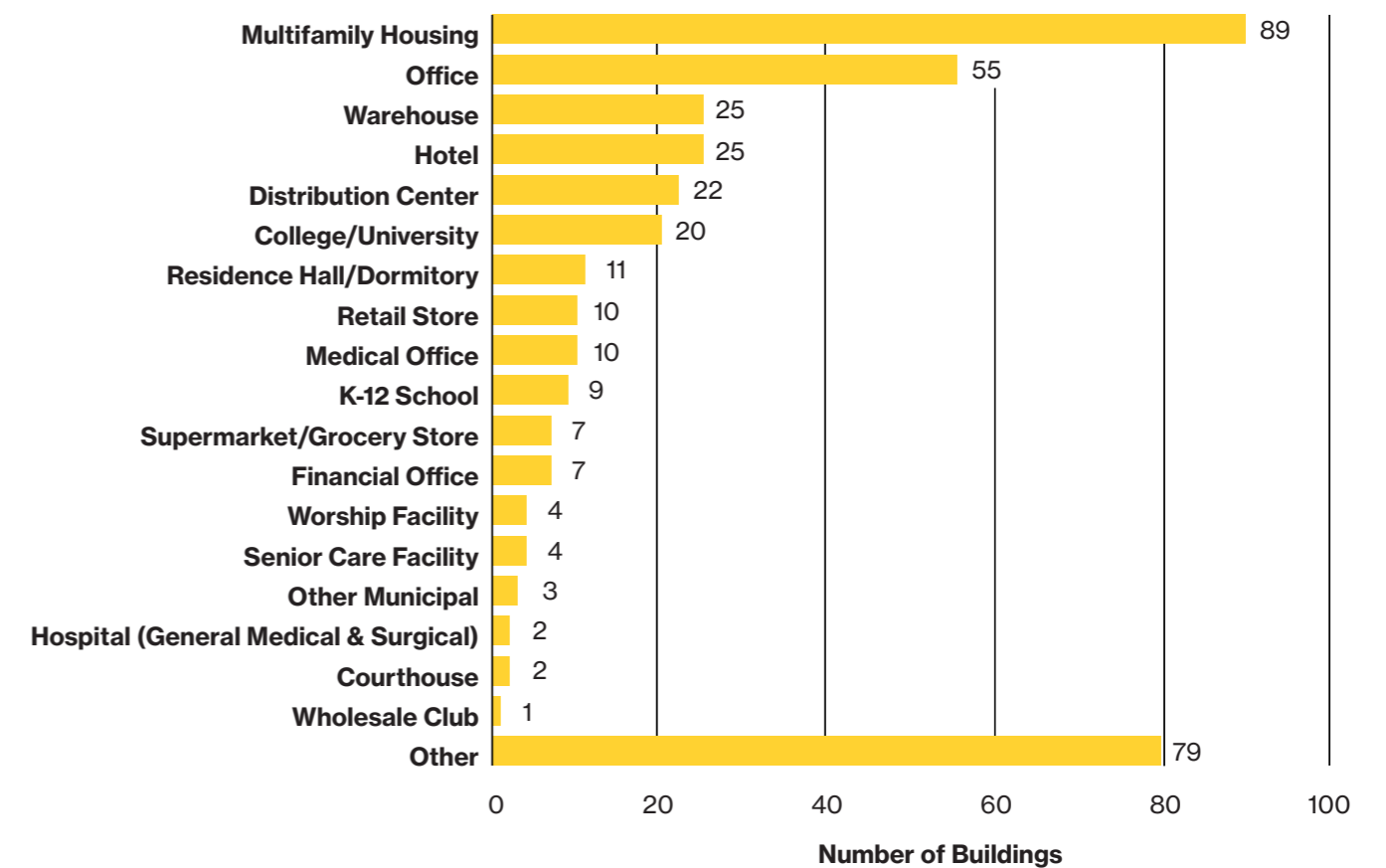
BUILDING CHARACTERISTICS

Benchmarking reports from 385 properties[1] were included in this analysis, and these buildings are referred to as “analyzed properties.” (For more details on the analysis methodology, please see the Appendix on stl-benchmarking.com.) Each property was assigned to one of 19 property groups[2].

Multifamily buildings were the largest reporting group, by far, in terms of the number of properties (see Figure 1), representing nearly a quarter of all analyzed properties. The next largest group was Offices, followed by Warehouses, Hotels, Distribution Centers, and Colleges/Universities.

Median weather normalized site energy use per square foot ranged from a low of 20.4 (Warehouse) and 20.7 (Distribution Centers) to a high of 311.1 (Hospitals). There is also a cluster of property types with similar rates of energy use per square foot that includes Retail, Lodging, Higher Education, and “Other” properties.

Total Number of Reporting Buildings by Building Use Type (N = 385)



ENERGY PERFORMANCE

Building Types

The 1-100 ENERGY STAR® Score represents 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 considerable opportunities for improvement. Figure 2 below reflects building types eligible for an ENERGY STAR® score.

St. Louis Building Types Eligible for an ENERGY STAR® Score

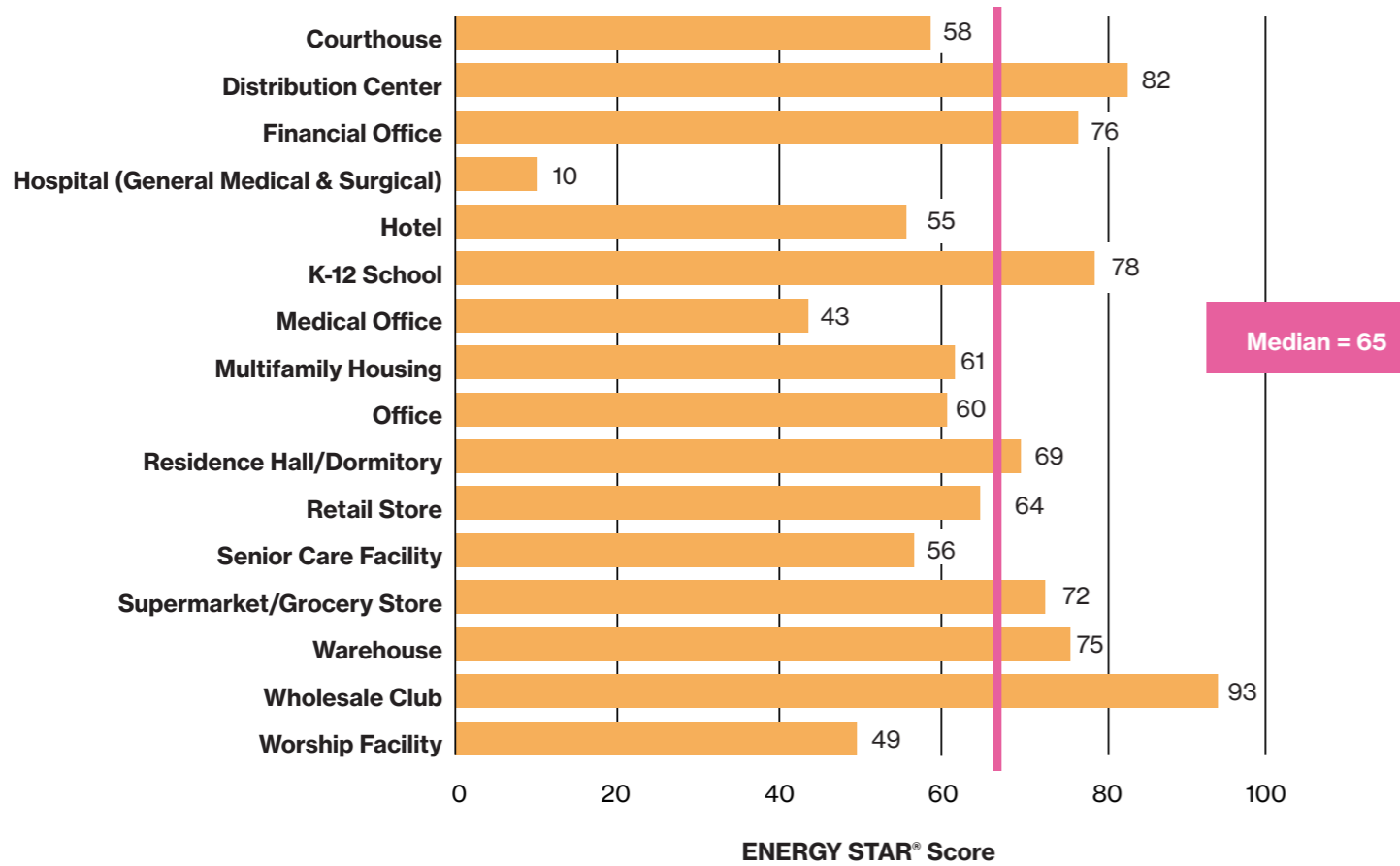
- | | | |
|---|---|---|
| 
Courthouse | 
Distribution Center | 
Financial Office |
| 
Hospital | 
Hotel | 
K-12 School |
| 
Medical Office | 
Mixed Use Property | 
Multifamily Housing |
| 
Non-Refrigerated Warehouse | 
Office | 
Refrigerated Warehouse |
| 
Residence Hall/Dormitory | 
Retail Store | 
Senior Care Community |
| 
Supermarket/Grocery Store | 
Wholesale Club/Supercenter | 
Worship Facility |

In 2017, 272 analyzed properties received an ENERGY STAR® score - 16 of which were municipally-owned buildings. The median ENERGY STAR® score for municipally-owned buildings was 87 and for commercial-owned buildings it was 64.

The median ENERGY STAR® score for all analyzed properties was 65 out of 100, 15 points higher than the national median (50) and on par with Chicago (64), though lower than Kansas City (72) and Denver (73). However, among these cities, St. Louis is the only one that was in its first year of implementing its benchmarking ordinance.

The median ENERGY STAR® score across all eligible building types ranged from a low of 10 (Hospitals) to a high of 93 (Wholesale Clubs) (See Figure 4).

Figure 4. 2017 Median ENERGY STAR® Score by Building Type



Energy Performance by Building Type

Table 2 describes the energy performance of analyzed buildings that were eligible to receive an ENERGY STAR® score. Essentially, the energy use intensity (EUI), expresses a building's energy use as a function of its size or other characteristics. EUI is expressed as energy (kBtu) per square foot per year. The higher the EUI, the more energy is used per square foot of space. For St. Louis, the overall weather normalized site EUI was 69—for municipally-owned buildings it was 89 and for commercially-owned buildings it was 68.

At the building type level, Multifamily Housing represented the majority of square footage across building types that reported benchmarking information, by far. Hotels and Distribution Centers follow. The median ENERGY STAR® score for Multifamily Housing fell around average, at 61, while Hotels were below average at 55, and Distribution Centers were on the higher end at 82. In comparing median weather normalized site EUI, Multifamily Housing was on the lower end at 46.7, Hotels were on the higher end at 101.9, and Distribution Centers were the lowest at 20.7.

Table 2. Energy Performance of Reporting Buildings by Building Type

Building Type	Building Square Footage		ENERGY STAR® Score		Weather Normalized Site EUI	
	Total	N	Median	N	Median	N
College/University	8,824,133	20	-	-	120	20
Courthouse	836,867	2	58	2	100.9	2
Distribution Center	5,275,992	22	82	13	20.7	22
Financial Office	3,161,854	7	76	5	76.1	7
Hospital (General Medical & Surgical)	1,533,097	2	10	2	311.1	2
Hotel	9,494,712	25	55	23	101.9	24
K-12 School	690,434	9	78	6	53.5	9
Medical Office	1,612,356	10	43	7	143	10
Multifamily Housing	12,800,915	89	61	49	46.7	89
Office	13,661,888	55	60	45	78.5	55
Other	13,660,283	79	-	-	110.3	79
Other Municipal	350,918	3	-	-	124.1	3
Residence Hall/Dormitory	1,119,704	11	69	11	79.3	11
Retail Store	1,176,574	10	64	4	82.6	10
Senior Care Facility	653,531	4	56	4	85.4	4
Supermarket/Grocery Store	418,889	7	72	6	236.6	7
Warehouse	2,800,124	25	75	16	20.4	25
Wholesale Club	380,000	1	93	1	50.9	1
Worship Facility	341,357	4	49	1	71.2	4
Privately Owned	75,947,432	371	64	191	68.2	371
Municipally Owned	2,846,196	14	87	4	88.8	14
All	78,793,628	385	65	195	68.9	384

Note: **All** includes all buildings analyzed, whether they were eligible to receive an ENERGY STAR® score or not.

EMISSIONS

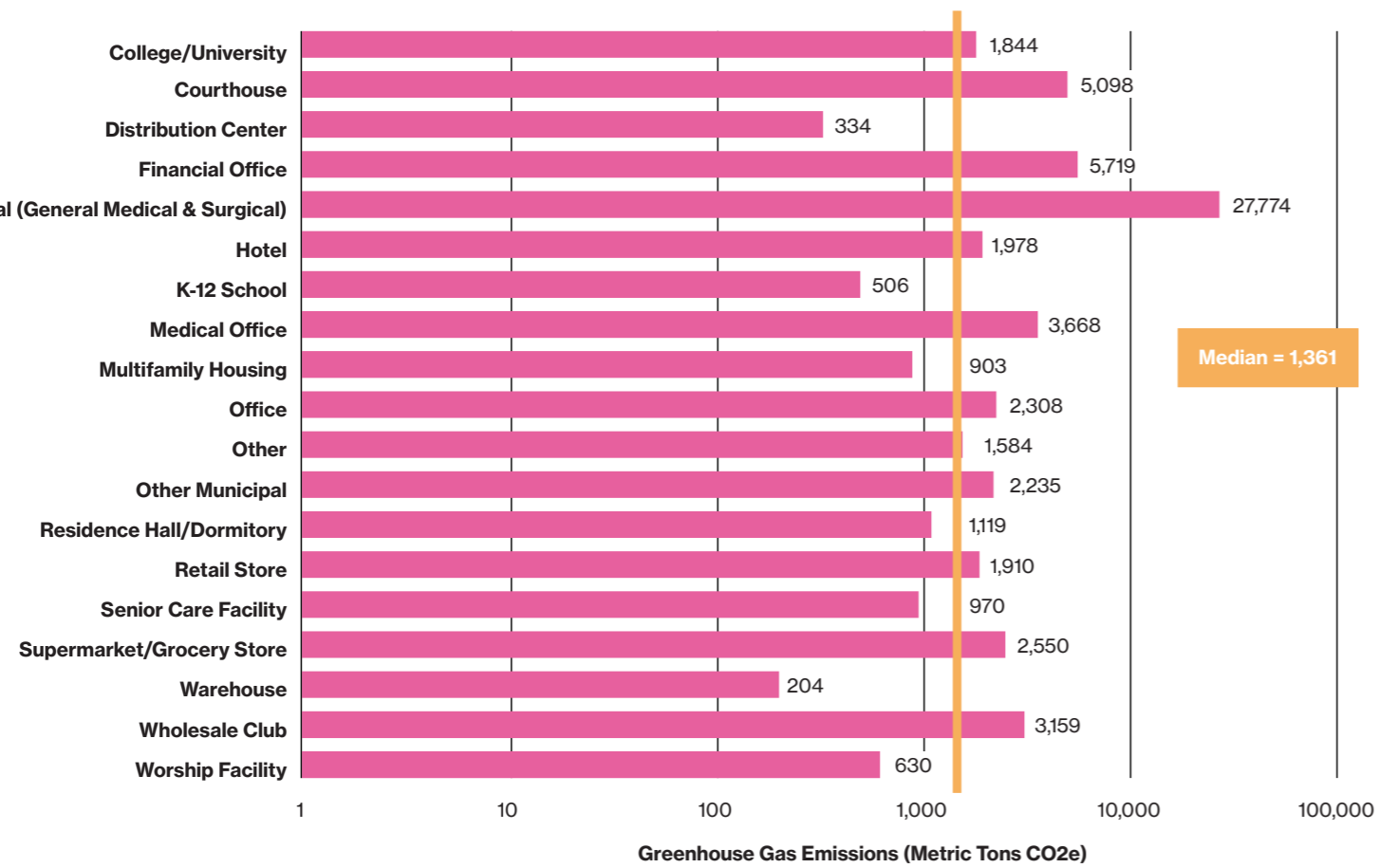
Greenhouse gas emissions are created from burning fossil fuels, such as coal or natural gas, for electricity, heat, and transportation. Greenhouse gases trap heat and make the planet warmer. Commonly known greenhouse gases are carbon dioxide, methane, and nitrous oxide⁸.

Greenhouse gas emissions from building energy use are reported for all analyzed buildings in Figure 5 below. The median greenhouse gas emissions (metric tons CO₂e) for St. Louis for benchmarked buildings was 1,361—for municipally-owned buildings, it was 1,961 and for commercially-owned buildings it was 1,352.

At the building level, Warehouses were the building type with the lowest median greenhouse gas emissions (204) and Hospitals were the building type with the highest median greenhouse gas emissions (27,774).



Table 2. Energy Performance of Reporting Buildings by Building Type

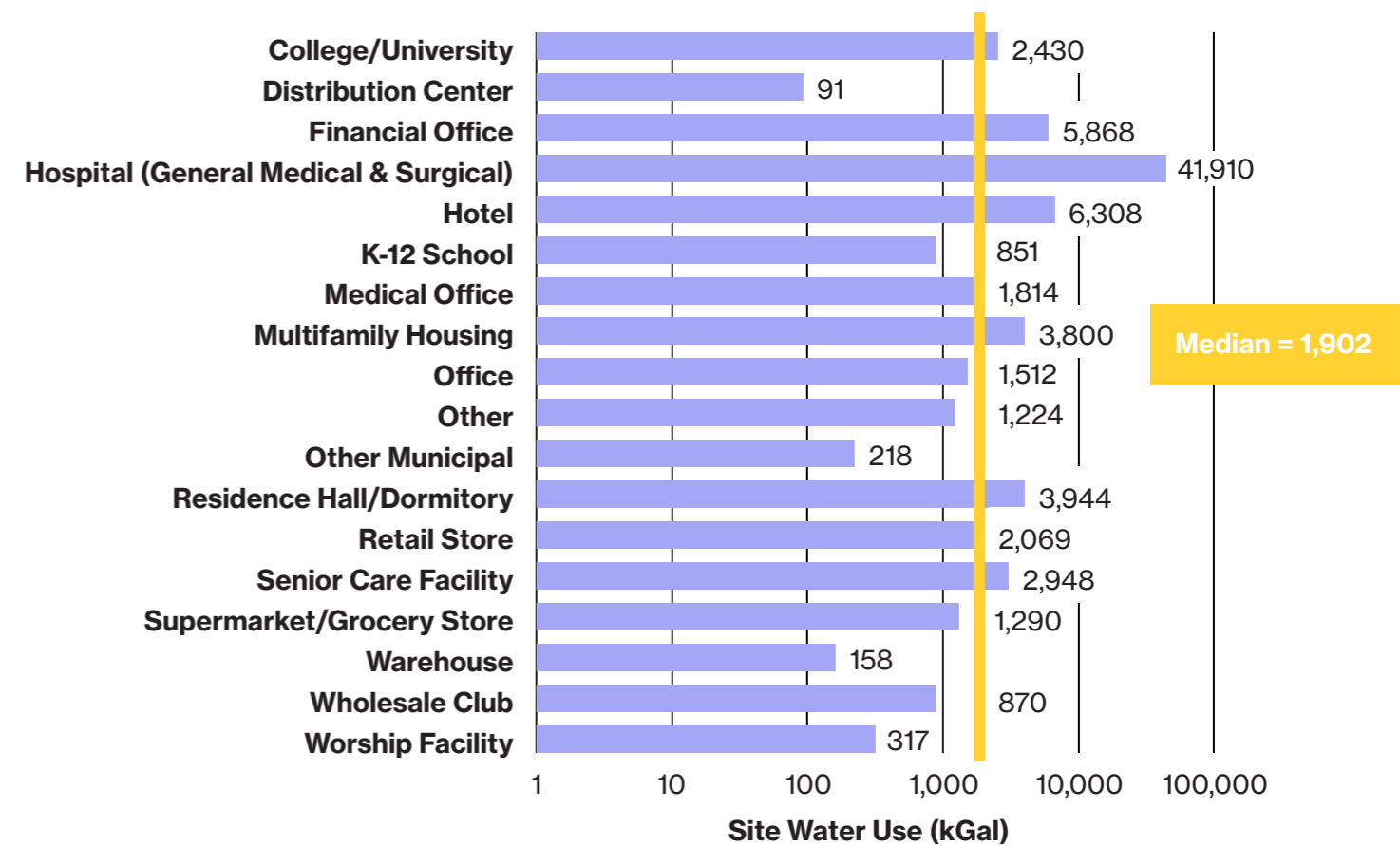


WATER PERFORMANCE



The number of sites for analysis was reduced to 385 as a result of data cleaning steps (Appendix A). For these 385 sites, analysis of water usage was measured in thousands of gallons (kGal). 328 of the 385 sites submitted information on water usage. Below, the figure 6 displays median water use for each reporting building type.

2017 Median Water Use Intensity by Building Type



WHAT'S

Achieving a compliance rate of 61% in the first year of reporting involved the cooperation and efforts of many partners and staff involved in implementing the Building Energy Awareness Ordinance – a BIG thanks to all who were involved!

In the years to come, and as buildings continue to report and greater efficiency is pursued, the City of St. Louis will work with its partners on the following objectives:

- Push for a compliance rate of 80% for the 2018 reporting year and strive for 100% compliance each year thereafter
- Greater coordination with the local utilities on providing automated, aggregate utility data transfer into ENERGY STAR® Portfolio Manager for building owners
- Develop and pass the Midwest's first, city-wide building performance standard for minimum required level of energy performance for existing buildings
- Increased participation of available utility incentives/rebates and local energy efficiency resources, such as Property Assessed Clean Energy (PACE)
- Train and certify more private-sector building operation and maintenance staff through Green Professional Building Skills Training (GPRO) and Building Operator Certification® (BOC)

NEXT

GLOSSARY



BOC

A nationally recognized professional certification for facilities operations and maintenance staff. Stands for Building Operator Certification®.

ENERGY STAR® Portfolio Manager

A free, online tool developed by the U.S. EPA that is used nationwide to measure and track energy and water consumption, as well as greenhouse gas emissions. www.energystar.gov/benchmark

ENERGY STAR® Score

EPA's 1-100 ENERGY STAR® score is an external benchmark for assessing the performance of commercial buildings. The ENERGY STAR® score, expressed as a number on a simple 1 - 100 scale, rates performance on a percentile basis: buildings with a score of 50 perform better than 50 percent of their peers; buildings earning a score of 75 or higher are in the top quartile of energy performance (energystar.gov).

EPA

U.S. Environmental Protection Agency.

EUI

Energy use intensity. It is the energy use per square foot at a property (energy divided by square foot; kBtu/square foot).

GHG

Greenhouse gas emission, generated as a byproduct of energy consumption.

GPRO

A certificate program that teaches the people who build, renovate, and maintain buildings the tools to integrate high-performance construction and maintenance practices into their everyday work. Created by the Urban Green Council of New York City.

kBTU

Thousand British thermal unit, the amount of heat it takes to raise the temperature of thousand pounds of water by one degree Fahrenheit.

PACE

Property Assessed Clean Energy, a simple and effective way to finance energy efficiency, renewable energy, and water conservation upgrades to buildings.

Site Energy Use

The annual amount of all the energy your property consumes onsite, as reported on utility bills.

Source Energy

The total amount of all the raw fuel required to operate your property, including losses that take place during generation, transmission, and distribution of the energy.

Weather Normalized Site Energy Use Intensity (EUI):

The total amount of energy used per square foot in a building, normalized for weather. The energy is a sum of all the fuel types used in the building, including electricity, natural gas, fuel oil and steam, which are converted to kBtu, summed together, and then divided by the total square footage of the building. The higher the EUI, the more energy is used per square foot of space. The data are then weather normalized so that EUIs can be compared year over year - even if a very cool summer is followed by a very warm one.



To learn more about benchmarking and building efficiency,
visit www.stlbenchmarking.com