



Town of
Brighton

Public Works Department

Commissioner of Public Works – Tim Keef, P.E.

Evert Garcia
Assistant Engineer

September 18, 2018

Honorable Town Board
Town of Brighton
2300 Elmwood Avenue
Brighton, NY 14618

Re: 2017 Benchmarking Report

Dear Supervisor Moehle and Town Board Members:

In 2017 the Town of Brighton passed the Local Law for Energy Benchmarking Municipal Buildings of the Town of Brighton. This local law requires the Town of Brighton to annually report the energy use of covered municipal buildings, a practice known as benchmarking. The following document constitutes the first benchmarking report prepared by the Town of Brighton since the enactment of the local law. I recommend that your Honorable Body receive and file the attached 2017 Benchmarking Report.

Respectfully,

Evert Garcia
Department of Public Works

Cc: Mike Guyon, Commissioner of Public Works

Attachment



Brighton

Year-End Benchmarking Report

For year
2017

Prepared by:
Town of Brighton
Department of Public Works



Table of Contents

Contents

I. Executive Summary.....	3
II. Background.....	3
III. 2017 Results	4
IV. Historical Comparison.....	8
V. Glossary & Acronyms	11
VI. References.....	12



I. Executive Summary

Climate change is a reality, but there is much that we can do to address it at a local level, especially when it comes to buildings. In New York State, buildings account for over 60% of energy use¹. That is why in 2017 the Town of Brighton passed the Local Law for Energy Benchmarking for Municipal Buildings of the Town of Brighton. This local law requires the Town of Brighton to annually report their energy use for covered municipal buildings, a practice known as benchmarking. The four major key elements to benchmarking are:

- Measuring a building's energy use.
- Comparing its use to the average for similar buildings and at similar points in time.
- Allows the Town to understand their buildings' relative energy performance.
- Helps identify opportunities to cut energy waste.

Studies have shown that this simple exercise of reporting a building's energy use can raise awareness and often result in significant energy reduction². Equally important, the information collected from each building allows the Town to understand trends and opportunities. That is why benchmarking is growing in popularity. For example, New York City (NYC) has required annual benchmarking of energy and water use for the public sector since 2010 and for large private sector buildings since 2011. NYC was able to achieve an 84% compliance rate in 2012, for which the DOE estimates that NYC saw a cumulative energy savings of 5.7% from 2010 through 2013 with a savings of over \$267 million³.

a. Meeting the 20 by 30 Goal

Through New York State's comprehensive energy strategy, Reforming the Energy Vision (REV), the State has established Climate Action Goals for both greenhouse gas reduction and energy usage based on a 1990 baseline year. The NYS short term greenhouse gas emissions reduction goal is to reduce emissions by 40% by the year 2030.

Brighton, an environmentally conscious community, has historically considered actions to mitigate climate change through initiatives and programming. As a result, comparing the 2001 GHG baseline inventory with the 2014 inventory indicates that the Town of Brighton has attained the New York State percentage GHG goal for 2030. In fact, the Town of Brighton had a GHG reduction of 58% from 2001 to 2014.

With this in mind, Brighton is proposing goals that differ from New York State's goals. The CAP proposes that the Town of Brighton Facilities achieve a 20% GHG reduction from 2014 levels by 2030. The 2014 GHG inventory for Town facilities determined that 51% of emissions stemming from Town facilities derive from covered municipal buildings⁴. Improvement to efficiencies in Town's facilities can be a driving force to help meet the GHG reduction goals set by the CAP.

II. Background

The Local Law for Energy Benchmarking for Municipal Buildings of the Town of Brighton states that its purpose and intent is to, "Promote the public health, safety, and welfare by making available good, actionable information on municipal building energy use to help identify opportunities to cut costs and reduce pollution in the Town of Brighton." The following document contains energy consumption and GHG emissions for covered municipal buildings derived from the Energy Star Portfolio Manager software.

The Energy Star Portfolio Manager is an EPA created online tool which can be used to measure and track energy, water consumption and greenhouse gas emissions (GHG) for buildings across the nation. The EPA estimates that



40% of the U.S. commercial building space is already benchmarked in Portfolio Manager, making it an industry leading benchmarking tool⁵. Portfolio manager is currently the tool of choice among cities such as New York, Seattle, and Boston which have passed mandatory benchmarking laws.

For benchmarking purposes, the Town of Brighton's covered municipal buildings have been divided into three sectors as depicted in Figure-1, Operations, Town Hall and Parks & Recreation, which mimics the 2014 Greenhouse Gas Inventory organizational structure. Each covered municipal building's energy use and GHG emissions were computed by the software from electrical, natural gas, and water utility bills which were inputted for calendar year 2017.

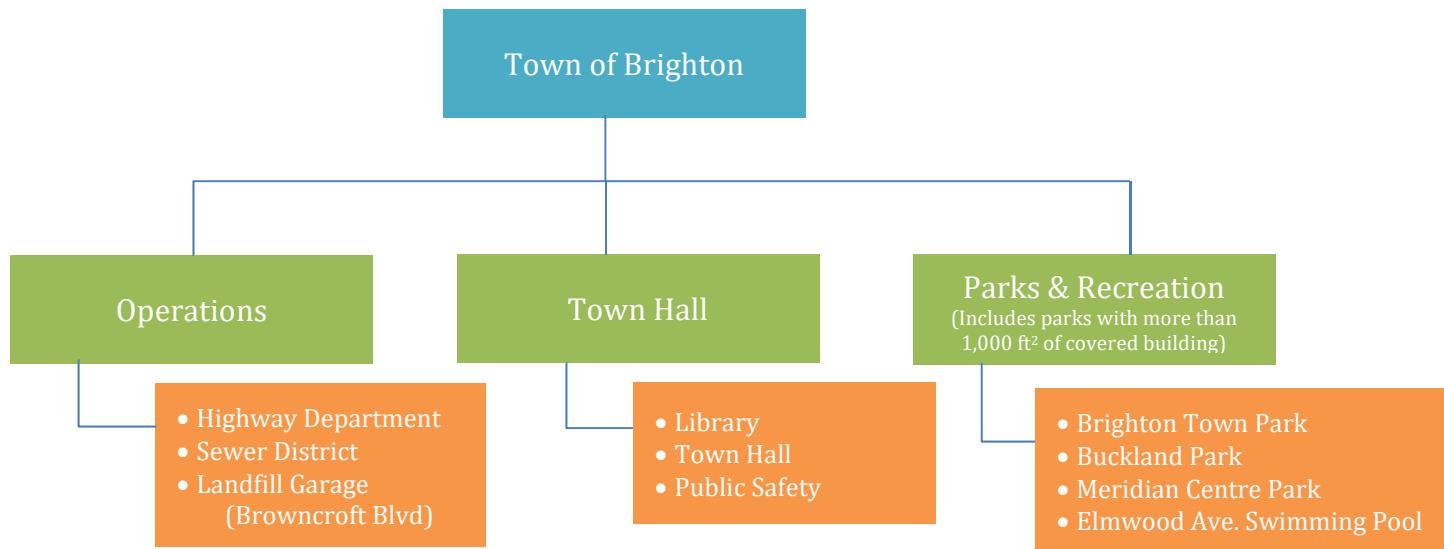


Figure-1. Town Organizational Breakdown

III. 2017 Energy Use

The total GHG emitted from covered municipal buildings in the Town of Brighton was **492.8 MTCO_{2e}** for the 2017 calendar year as determined Portfolio Manager. Table 1 summarizes the energy consumption for the covered municipal buildings in each sector derived from the benchmarking information.

Table 1: GHG Emissions Summary per Sector

Sector	Total Annual GHG Emissions (MTCO _{2e})	Percentage (%)
Operations	152.6	31
Town Hall	300.7	61
Parks & Recreation	39.5	8
Total:	492.8	100



Tables 2-4 below further break down the energy use and emissions by each covered municipal building in all three sectors.

Table 2: Energy Summary by Building in Operations Sector

Operations					
Building Name	Address	Gross Floor Area (ft ²)	Site EUI (kBtu/ft ²)	Weather Normalized Source EUI (kBtu/ft ²)	Annual GHG Emission (MTCO _{2e})
Highway Department	1941 Elmwood Ave.	43,000	64.3	110.3	143.7
Landfill Garage (Browncroft Blvd)	444 Browncroft Blvd	3,000	56.5	90.5	8.9

Table 3: Energy Summary by Building in Town Hall Sector

Town Hall					
Building Name	Address	Gross Floor Area (ft ²)	Site EUI (kBtu/ft ²)	Weather Normalized Source EUI (kBtu/ft ²)	Annual GHG Emission (MTCO _{2e})
Town Hall and Library	2300 Elmwood Ave.	56,714	100.0	218.2	288.7

Table 4: Energy Summary by Building in Parks & Recreation Sector

Parks & Recreation					
Building Name	Address	Gross Floor Area (ft ²)	Site EUI (kBtu/ft ²)	Weather Normalized Source EUI (kBtu/ft ²)	Annual GHG Emission (MTCO _{2e})
Brighton Town Park	777 Westfall Rd.	2,500	55.3	116.4	7.1
Buckland Park	1341 Westfall Rd.	6,100	96.9	253.2	29.5
Meridian Centre Park	2025 South Winton Rd.	1,300	22.3	68.3	1.4
Elmwood Ave. Swimming Pool	2300 Elmwood Ave.	2,700	11.3	32.8	1.5

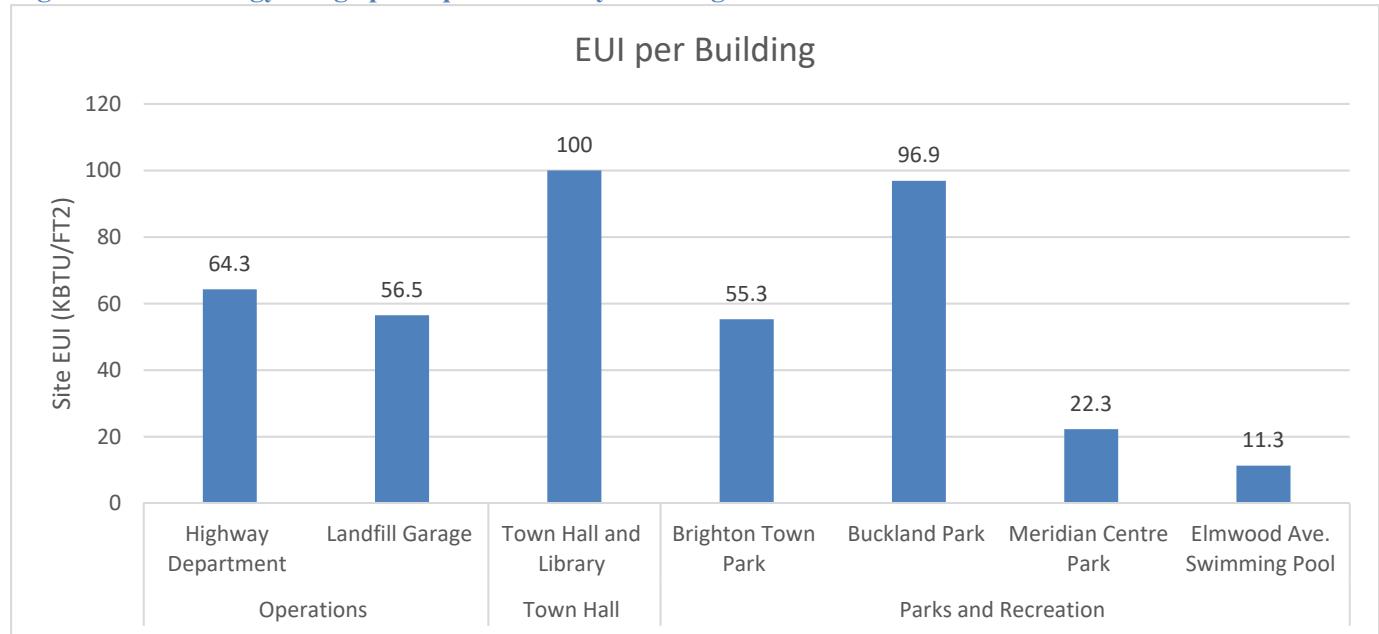
When benchmarking a building in Portfolio Manager, one of the key metrics provided is its energy use intensity, or EUI. Essentially, the EUI expresses a building's energy use as a function of its size or other characteristics. Generally, a low EUI signifies a good energy performance.

For most property types in Portfolio Manager, the EUI is expressed as energy per square foot per year. It's calculated by dividing the total energy consumed by the building in one year (measured in kBtu or GJ) by the total gross floor area of the building.

It is important to note that certain properties will always use more energy than other types of properties. For example, an elementary school uses relatively little energy compared to a hospital which operates on a 24/7 basis.

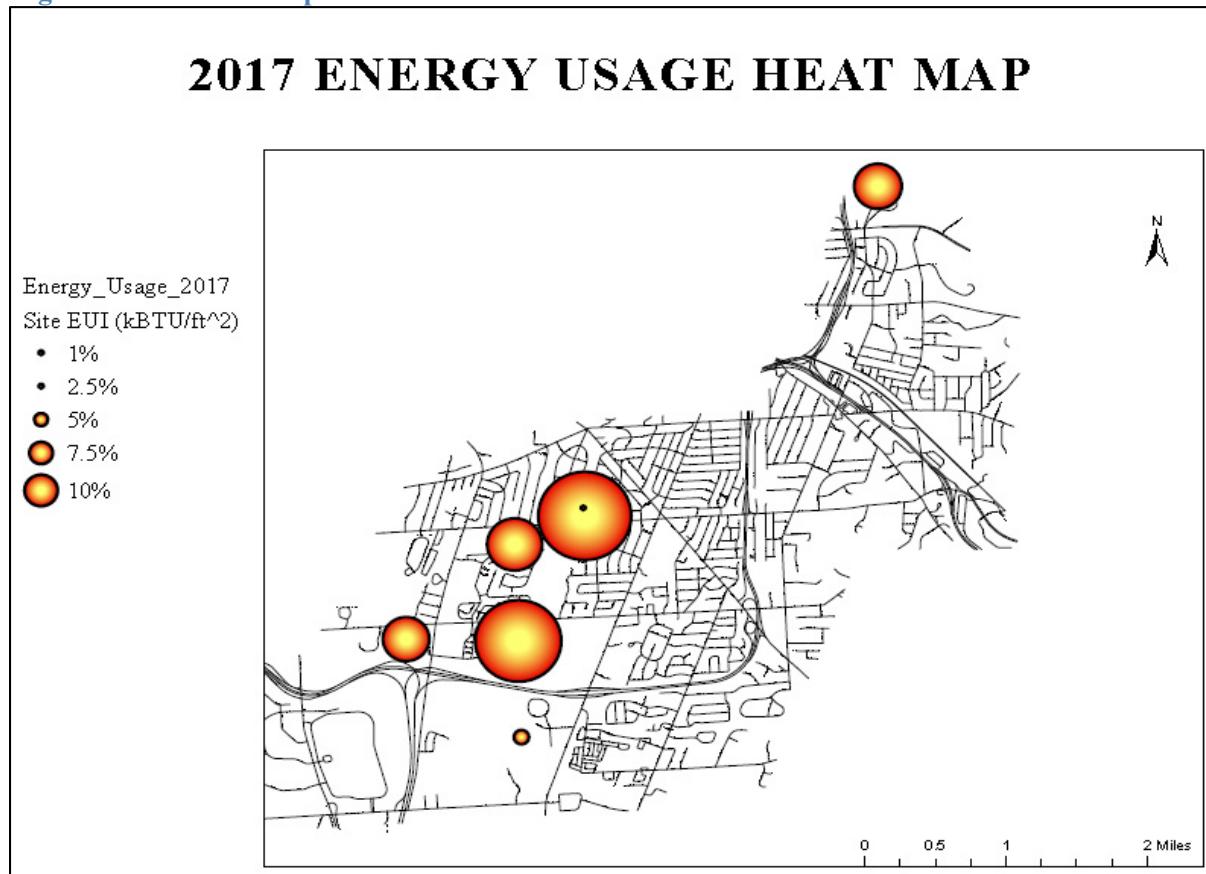
The Town Hall building, which has the highest gross floor area (56,714 ft²), is responsible for 60% of the covered municipal facility GHG emissions. Additionally, Portfolio Manager determined that the Town Hall building has a Source Energy Use Intensity (EUI) of 218.2 kBtu/ft². Interestingly, the buildings at Buckland Park, which have a relatively small gross floor area of 6,100 ft² combined, have a higher energy source EUI rating of 253.2 kBtu/ft². Unfortunately, Portfolio Manager does not track mean EUI values for “Other” building category, which is what all of the Town’s municipal facilities fall under. Therefore, at this time, it is difficult to properly compare the Town’s benchmark scores to other buildings of similar nature across the country. In this instance, the Site EUI score might be the best way to evaluate Town facilities energy performance. Upon reviewing the Site EUI values, the Town Hall and Buckland Park Campus still account for the two largest site EUI values of 100.0 kBtu/ft² and 96.9 kBtu/ft², respectively. Figure 2 below provides Site EUI comparison for the buildings benchmarked in the Town of Brighton.

Figure 2: Site Energy Usage per Square Foot by Building



To better visualize the EUI per building a heat map was created with the help of the Town’s GIS system. The heat map shows the EUI value of each building as a percentage of the total EUI value. The size of the symbol corresponds to the EUI percentage. As a result, it allows a visual comparison of the EUI’s of each building on a Town-wide map. The heat map is shown below in Figure 3.

Figure 3: EUI Heat Map



This report is not the only place in which much of this data can be found. The Town's benchmarking law data indicates that the Town will annually publicly disclose benchmarking information for the previous calendar year on the Town's website. This year's annual benchmarking report and associated data can be found at the following link: https://www.townofbrighton.org/DocumentCenter/View/9291/2017-Benchmarking-Report_Final

a. Site EUI vs. Source EUI

The EPA has determined that source energy is the most equitable unit of evaluation. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses. By taking all energy use into account, the score provides a complete assessment of energy efficiency in a building, therefore the EPA recommends using the source energy EUI metric as opposed to the site energy EUI metric.



Site energy is defined by the EPA as the amount of heat and electricity consumed by a building as reflected in your utility bills. Looking at site energy can help you understand how the energy use for an individual building has changed over time.

Site energy may be delivered to a building in one of two forms: primary or secondary energy. Primary energy is the raw fuel that is burned to create heat and electricity, such as natural gas or fuel oil used in onsite generation. Secondary energy is the energy product (heat or electricity) created from a raw fuel, such as electricity purchased from the grid or heat received from a district steam system. A unit of primary and a unit of secondary energy consumed at the site are not directly comparable because one represents a raw fuel while the other represents a converted fuel.

Therefore, to assess the relative efficiencies of buildings with varying proportions of primary and secondary energy consumption, it is necessary to convert these two types of energy into equivalent units of raw fuel consumed to generate that one unit of energy consumed on-site. To achieve this equivalency, EPA uses source energy.

IV. Historical Comparison

With the law being enacted in 2017, this will be the first benchmarking report which reflects the results of the Energy Star Portfolio Manager analysis. The electricity and natural gas usage data from 2014 was imputed into the Energy Star Portfolio Manager in order to collect data on site energy use and greenhouse gas emissions for all of the Town's properties. Previously, a Greenhouse Gas Inventory for the year 2014 was performed by the Town of Brighton using a spreadsheet tool developed by ICF International for NYSERDA. In order for the methodology to be consistent for this benchmarking report, the 2014 site energy usage and greenhouse gas emissions were recalculated in the same program as the 2017 data, Energy Star Portfolio Manager. The comparison allows the Town to monitor the trend in energy use and GHG reduction to see if we are on target to meeting the reduction goals established in the Town's Climate Action Plan of 20 by 30 for Town Facilities. Figures 4 and 5 provide a comparison of energy usage (electricity and natural gas) and total emissions for 2014 and 2017.

Figure 4: 2014 vs 2017 Energy Usage

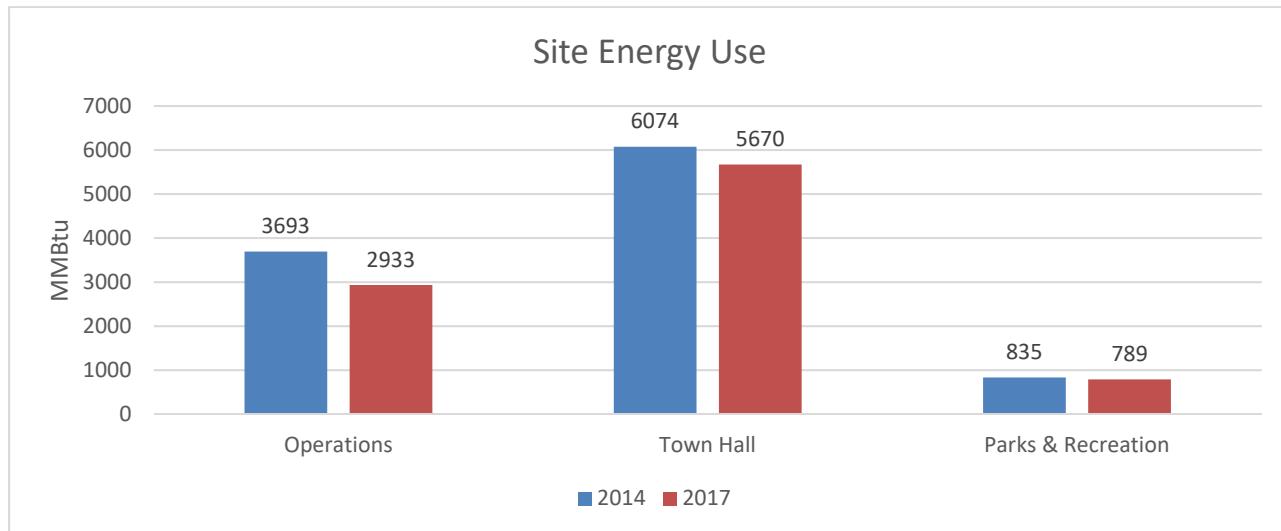
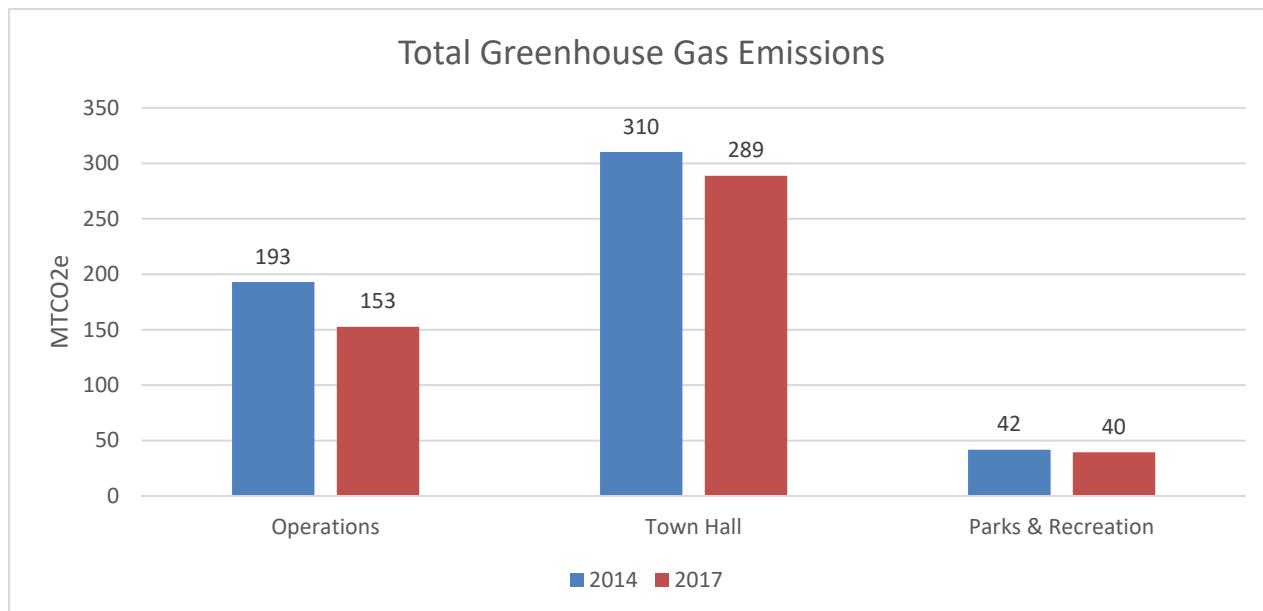


Figure 5: 2014 vs 2017 Emissions



When comparing energy consumption and emission generated by Town Facilities in 2014 and 2017, we can see a general pattern of reduction appear across the board. Table 5 below indicates that reduction in both the energy usage and emissions generated was acquired throughout all the sectors. The greatest reduction in energy usage and total greenhouse gas emissions occurred in the Operations sector with a reduction of 21% and 21%, respectively. The large reductions in the Operations sector may be due to the installation of a white roof on their office, the changing of windows in the office area, converting 10% of Operations lights to LED, and changing all of the garage bay doors to insulated models. These changes helped to increase the energy efficiency of the Operations sector and reduce the amount of energy used by the department. In addition, 2017 had 13% fewer heating degree days than 2014. Therefore, it can be inferred that less energy was used for heating facilities in 2017. This leads us to believe that in 2017 Rochester would emit less greenhouse gas emissions because of less frequent heating of facilities.

Table 5: 2014 vs 2017 Energy Usage

	% Change in Site Energy Usage	% Change in Total GHG Emissions
Operations	-21	-21
Town Hall	-7	-7
Parks & Recreation	-5	-5



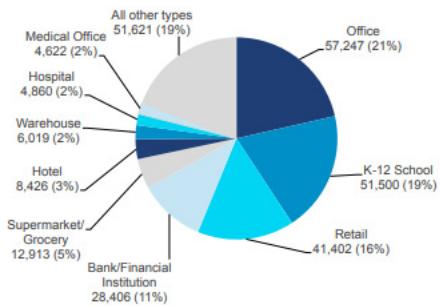
Because of this widespread market adoption, the EPA has indicated that they will prepare what they are calling a DataTrends series to examine benchmarking and trends in energy and water consumption across the Portfolio Manager database. The annual data trend summaries will be an ongoing series of original research and analysis from Energy Star. Since hundreds of thousands of buildings use Portfolio Manager to track their energy use, they have compiled their observations and statistics from this vast amount of data with the hope that this information will help inform and advance the industry.

Among the most interesting findings which has resulted from this database analysis, is that buildings that consistently benchmark energy use save an average of 2.4% per year. More information on the Portfolio Manager Data Trends series can be found here: <https://www.energystar.gov/buildings/about-us/research-and-reports/portfolio-manager-datatrends>.

Who is benchmarking?

Many different types of organizations use Portfolio Manager to benchmark the energy use of their buildings. Office, K-12 School, and Retail buildings are the most prevalent, accounting for close to 60% of those benchmarked, followed by Bank/Financial buildings. In the chart below, "All other types" includes multifamily buildings, colleges, malls, fire stations, and many more.

Benchmarking by Building Type
Number of Buildings



The number of buildings benchmarked in Portfolio Manager has grown dramatically over the past 10 years, almost doubling just since 2009. These buildings range widely on just about any measure, including size, location, age, building activity, and energy consumption.



V. Glossary & Acronyms

- **Covered Municipal Building:** Building or facility owned or occupied by the Town of Brighton that is 1,000ft² or larger
- **DOE:** Department of Energy
- **EUI:** Energy use intensity
- **GHG:** Greenhouse Gas
- **kBTu:** 1000 British Thermal Units. Where 1 BTU is the amount of heat needed to raise one pound of water one degree Fahrenheit
- **MT CO₂e:** Metric tons carbon dioxide equivalent. Standard unit for measuring GHG emissions
- **NYC:** New York City
- **Weather Normalized Source:** The source energy use the property would have consumed during a 30-year average weather conditions



VI. References

- 1 New York State Energy Research Development Authority (NYSERDA). "Improve Energy Use In Buildings." (2016). Retrieved from: nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Communities/Clean-Energy-Communities-Program-High-Impact-Action-Toolkits/Benchmarking (Fact Sheet PDF)
- 2 American Council for an Energy-Efficient Economical (ACEEE). "Multifamily benchmarking can save energy-with the right support." (2017). Retrieved from: aceee.org/blog/2017/09/multifamily-benchmarking-can-save
- 3 New York State Energy Research Development Authority (NYSERDA). "Benchmarking, A High-Impact Action for the Clean Energy Communities Program." Retrieved from: nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Communities/Clean-Energy-Communities-Program-High-Impact-Action-Toolkits/Benchmarking (Step-by-Step Guidance PDF, Slide 9)
- 4 Town of Brighton. "Greenhouse Gas Inventory." Retrieved from: Town of Brighton Department of Public Works Files.
- 5 Energy Star. "Portfolio Manager." Retrieved from: <https://www.energystar.gov/> (Portfolio Manager Login)