January 2014

THE CITY OF PHILADELPHIA | MAYOR'S OFFICE OF SUSTAINABILITY

BY THE NUMBERS

FLOOR AREA BENCHCHMARKED

9,916,800 SQUARE FEET

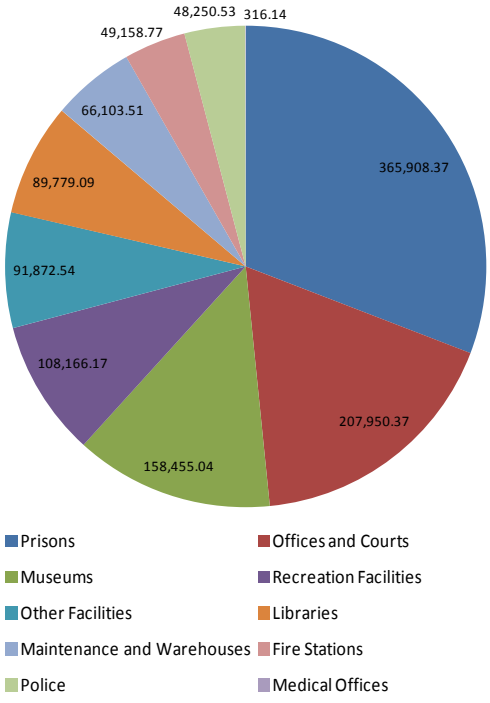
2011 GENERAL FUND ENERGY COSTS

$50 million

CO2 EMITTED BY BENCHMARKED FACILITIES

140,678 MEGATONS

MUNICIPAL ENERGY USAGE BY SECTOR (mmBtus)



EXECUTIVE SUMMARY

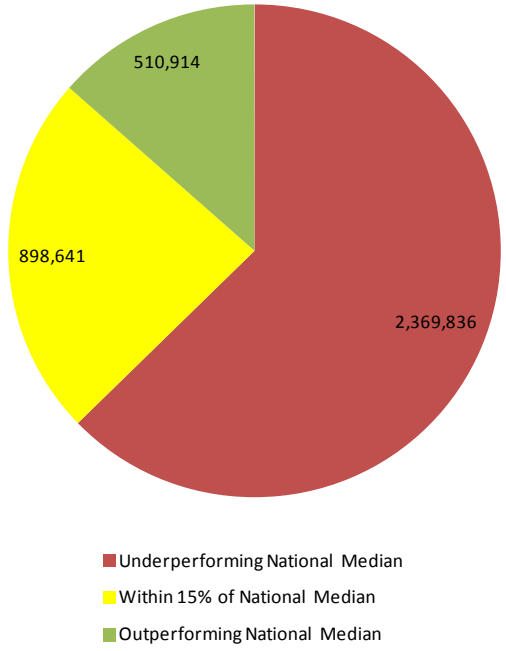
BACKGROUND AND PROJECT OVERVIEW: There are more than 600 facilities in the City of Philadelphia's building portfolio, serving a variety of functions from public safety and libraries to parks and recreation and administrative offices. They range in size from City Hall, the Central Library, and the Philadelphia Museum of Art to neighborhood recreation centers. In order to better understand the energy performance of this large and diverse portfolio, the City has begun tracking energy usage of more than 250 of its largest facilities using the U.S. EPA's ENERGY STAR Portfolio Manager tool.

In June 2012, City Council passed energy benchmarking and disclosure legislation requiring all commercial buildings 50,000 square feet or larger to use Portfolio Manager to report their energy and water usage annually to the City of Philadelphia, beginning with 2012 data. A year ahead of this requirement, the Mayor's Office of Sustainability (MOS) benchmarked 2011 energy usage for all municipal facilities 10,000 square feet and larger, as well as dozens of facilities below this threshold. By tracking data on an expanded set of municipal facilities and beginning a year before citywide required compliance, this report will establish a baseline for evaluating building performance in the years to come.

BENCHMARKING PROCESS: To track, analyze, and report energy usage, the City of Philadelphia uses Portfolio Manager, a free tool that has become the national standard for building benchmarking. For 2011 reporting, the MOS entered basic facility information (including facility type, square footage, and hours of operation) into Portfolio Manager as well as energy and water usage information from the City's utility partners. In 2013, both PECO and Veolia established automated benchmarking systems to transfer utility data into Portfolio Manager, which will improve reporting efficiency in future years.

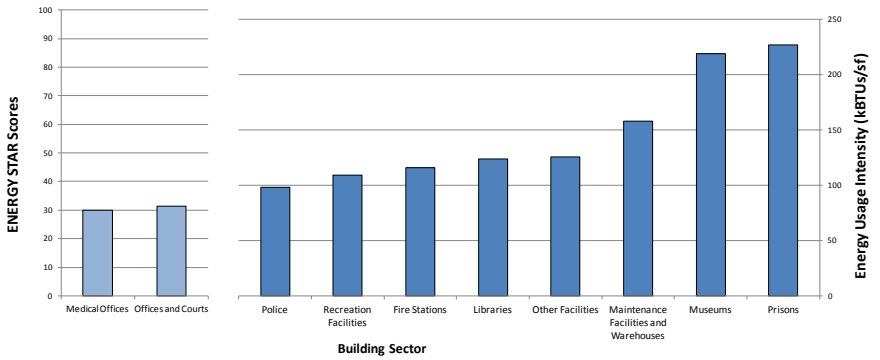
Building profiles vary dramatically between sectors. Prisons and office buildings account for nearly half of the energy consumption in the City's municipal portfolio.

FLOOR SPACE EFFICIENCY INDICATOR



KEY FINDINGS: Using Portfolio Manager, MOS benchmarked 2011 energy usage for over 250 facilities, totaling nearly 10 million square feet of floor area and nearly 1.4 million mmBTUs of energy, the equivalent of 22 City Halls. Each building in the municipal portfolio has been grouped into categories (or "sectors") based on use. Full results for every benchmarked building can be found online at www.phila.gov/benchmarking.

SECTOR ENERGY USAGE SUMMARY



- Seven of the ten sectors in this report were compared to a national average for similar building types. As shown in the Floor Space Efficiency Indicator, Philadelphia's municipal buildings fall below national standards for energy performance as measured by both Energy Use Intensity (energy per square foot) and EPA ENERGY STAR scores (see sidebar). This result is a reflection both of the age of many city-owned buildings as well as the City's limited capacity to address deferred building maintenance.

- For eight of the ten sectors in this report, national medians were either unavailable or relied exclusively on Energy Use Intensity, an imperfect metric that does not account for differences in building usage within sectors. Planned improvements to the Portfolio Manager tool and the forthcoming release of updated national building survey data may make additional building sectors eligible for ENERGY STAR scores, allowing the City to better understand municipal energy usage.

- Twenty buildings in three sectors—offices and courts, prisons, and museums—consumed over 60% of the total energy in the portfolio benchmarked in this report. Prioritizing projects in these facilities will yield the greatest savings in both cost and greenhouse gas emission reduction for the City.

- This report will serve as an initial baseline for tracking and reporting municipal energy usage in future years. MOS continues to work with departments throughout the City to reduce building energy usage by focusing on targeted operational changes and strategic capital improvements with short payback periods. MOS is committed to annual reporting of municipal data, which will provide a dataset for reviewing the performance of existing projects and guiding decisions about future investments.

ENERGY STAR or EUI?

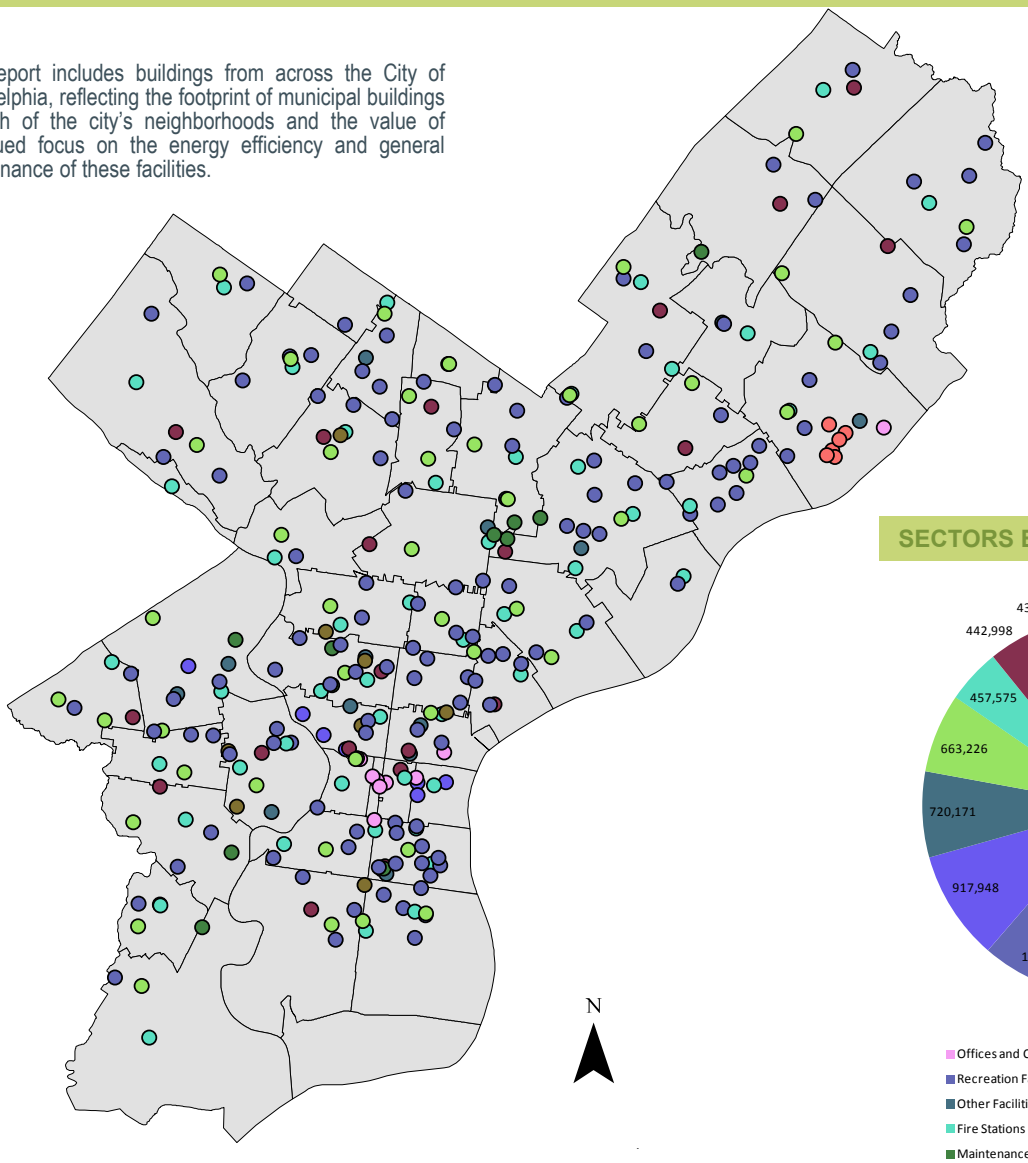
It is important to distinguish between Energy Use Intensity (EUI) and EPA ENERGY STAR (ES) scores. EUI is a measure of a site's energy use per building square footage—lower numbers reflect better energy efficiency. In contrast, ENERGY STAR is a 1-100 scale reflecting a building's overall energy usage compared to a national average, with 50 indicating an average score and higher numbers reflecting better efficiency. Only two sectors in this report are eligible to receive these scores.

SECTOR-LEVEL ANALYSIS: The pages that follow outline municipal benchmarking results at a sector level. For each sector, this report includes:

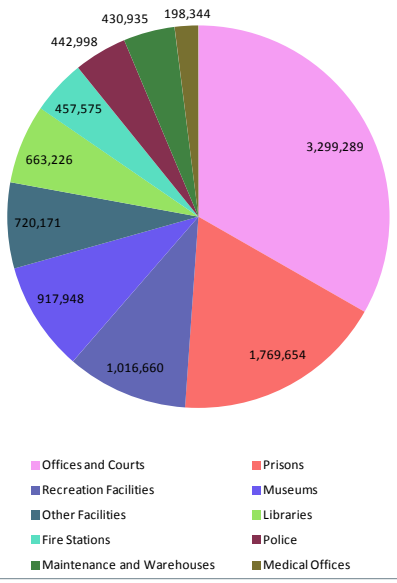
- A measure of sector-wide energy efficiency (EUI or ENERGY STAR score) and comparison to national sector medians, where applicable.
- Individual results for each facility in the sector, measured by EUI or ENERGY STAR score. Complete results of building performance and impact, including building size and age, usage by fuel type, and greenhouse gas emissions, is available online at www.phila.gov/benchmarking or through the City's open data initiative at www.phila.gov/data.
- Sector-specific examples of energy efficiency projects already underway, in the planning stages, or that may be pursued in the future.

FACILITIES BENCHMARKED BY SECTOR

This report includes buildings from across the City of Philadelphia, reflecting the footprint of municipal buildings in each of the city's neighborhoods and the value of continued focus on the energy efficiency and general maintenance of these facilities.



SECTORS BY SQUARE FOOTAGE



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

8

NATIONAL AVERAGE ENERGY STAR SCORE

50

PHILADELPHIA SECTOR AVERAGE ENERGY STAR SCORE

31.4

OFFICES AND COURTHOUSES

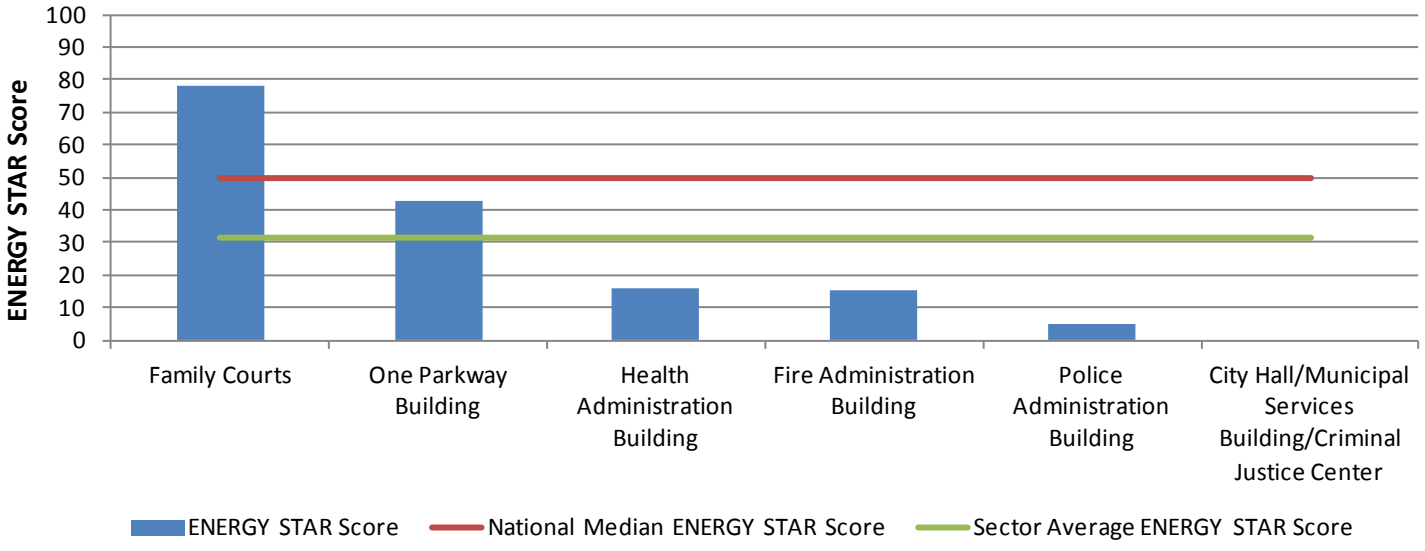
This category includes some of Philadelphia's largest and most iconic municipal buildings, including City Hall. Though City Hall itself is not eligible for an ENERGY STAR score (see below), five other facilities are considered "ratable" under the current system. Only the Family Court building exceeded the national average score of 50, with the four others scoring an average of only 20 on the 1-100 scale.

This sector's median year of construction is 1961, and the low scores of the City's offices and courthouses are in part a reflection of their age and condition. Nonetheless, the aggregate size and energy usage of these buildings underscore the importance of operational and capital investments in these facilities.

GUARANTEED ENERGY SAVINGS PROJECT: The guaranteed energy savings project in the municipal quadplex around City Hall is the biggest energy efficiency project currently underway in the City's portfolio, but it has so far gone relatively unnoticed, even by building occupants. This is due in part to good work of the construction teams operating behind the scenes and after hours, but also reflects the nature of the improvements which include lighting retrofits, building envelope improvements, and enhancements to the building controls and HVAC systems.

Three of the City's largest properties in this category—City Hall, the Municipal Services Building, and the Criminal Justice Center—share a common chilled water plant, which means that they must be benchmarked as a campus (and are not eligible for an ENERGY STAR score). Planned upgrades to these buildings include instrumentation that monitors how and where the chilled water is being consumed. This will enable the City to publish individual ENERGY STAR ratings for each of these facilities.

BENCHMARKING RESULTS FOR OFFICES AND COURTHOUSES



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

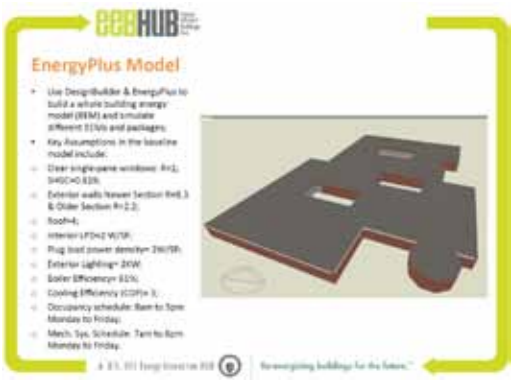
8

NATIONAL AVERAGE ENERGY STAR SCORE

50

PHILADELPHIA SECTOR AVERAGE ENERGY STAR SCORE

30



MEDICAL OFFICES

Philadelphia manages eight municipal medical facilities, providing a variety of health services to residents throughout the city. These offices, built primarily in the 1960s and 70s, fall well below national average ENERGY STAR scores for similar buildings, and therefore represent one of the best opportunities for energy-efficient investment and improved service delivery.

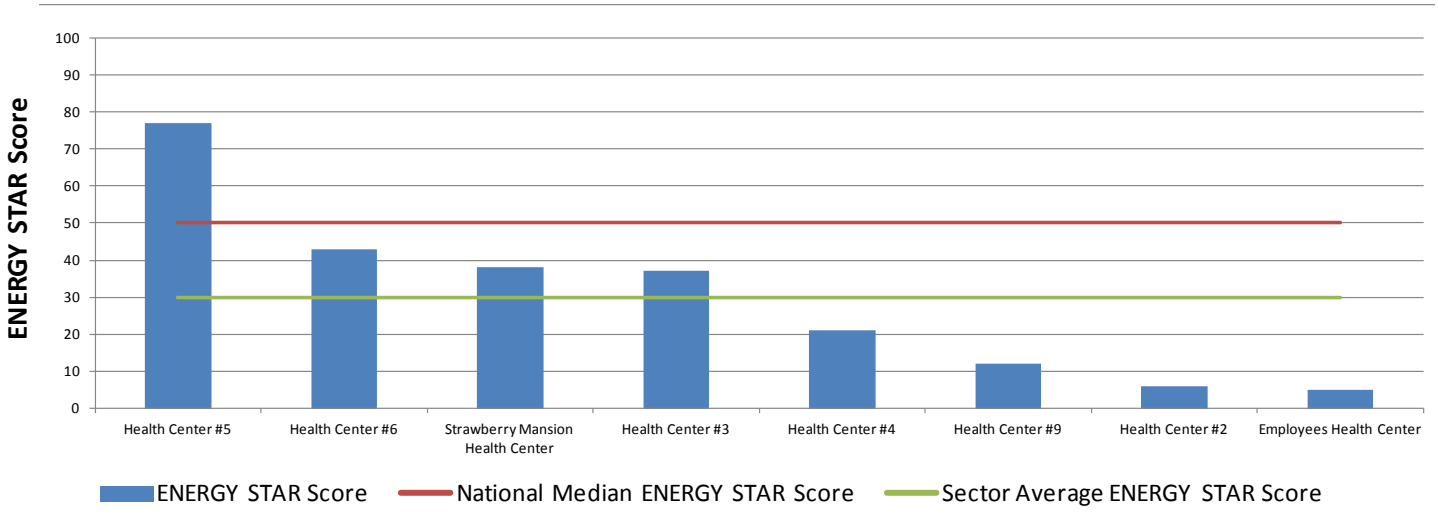
Of the eight facilities in this sector, only Health Center #5 exceeds the national average ENERGY STAR score. The remaining seven buildings are underperforming by an average of 27 points.

HEALTH CENTER #5: The municipally-owned medical office with the highest ENERGY STAR rating is Health Center #5, but the facility has earned that rating for the wrong reason: it's been largely vacant over the past several years. That's changing as Philadelphia continues to add population, and idled municipal facilities—including Health Center #5—are being utilized to meet growing demand.

In advance of this trend, MOS is working with the U.S. Department of Energy funded Energy Efficient Buildings Hub (EEB Hub) in the Philadelphia Navy Yard to identify key investments that can be made in Health Center #5 now to ensure that the building retains its high ENERGY STAR rating even it returns to full occupancy. The EEB Hub recommended improvements to building controls and lighting systems, and MOS is developing an investment plan to implement these recommendations.

Sophisticated building models developed in partnership with the EEB Hub have helped the City to identify key investments in Health Center #5.

BENCHMARKING RESULTS FOR MEDICAL OFFICES



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

22

NATIONAL MEDIAN SITE EUI[2]

82 kBtu/sf

PHILADELPHIA SECTOR MEDIAN SITE EUI

97.8 kBtu/sf

POLICE STATIONS

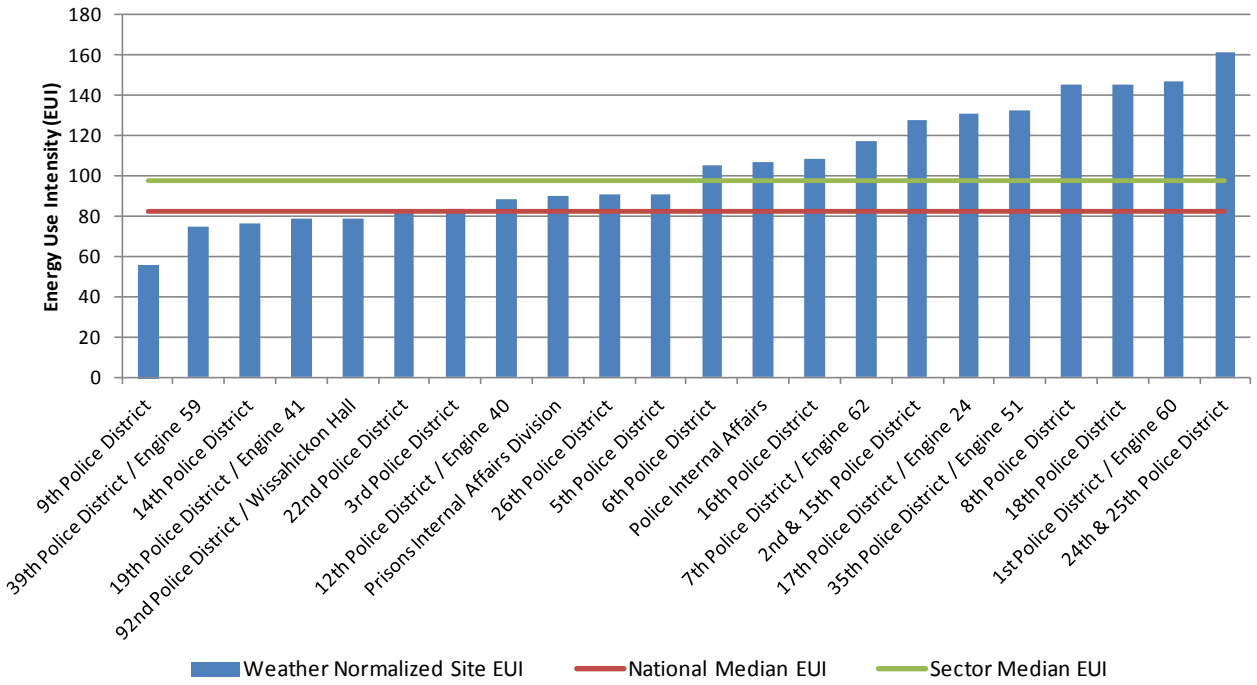
Philadelphia's police stations are among the city's most vital facilities, handling critical public safety functions and operating longer hours than most other sectors covered in this report. Of the nearly two dozen police stations included in this report, the majority fell below the national median for public safety facilities, demonstrating the opportunity for energy-efficient investment.

MOS is already working with the Police Department on building automation retrofits (see below), with additional projects under consideration Benchmarking scores are one several factors that can help to identify facilities that would benefit most from these retrofits and represent the greatest potential savings opportunities.

1ST POLICE DISTRICT BUILDING AUTOMATION: The Department of Public Property is currently retrofitting many of the police stations it maintains with building control systems that allow for remote operation. This limits time-consuming maintenance visits and frees up resources to address preventative maintenance issues.

One of the first stations to see this project through was the 1st Police District Building, where a remote building operation system was completed in Spring 2013. MOS and the Department of Public Property have complemented this project with a series of investments that will further enhance the building's performance. The recently completed improvements will deliver immediate benefits that will be reflected in future municipal reporting.

BENCHMARKING RESULTS FOR POLICE STATIONS



[2] CBECS data records both police and fire stations as "Public Order and Safety" facilities. Future iterations of the survey will provide separate categories for each sector, allowing us to better compare these buildings to a national median.

BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

79

NATIONAL MEDIAN SITE EUI

39 kBtu/sf

PHILADELPHIA SECTOR MEDIAN SITE EUI

108.9 kBtu/sf

RECREATIONAL FACILITIES

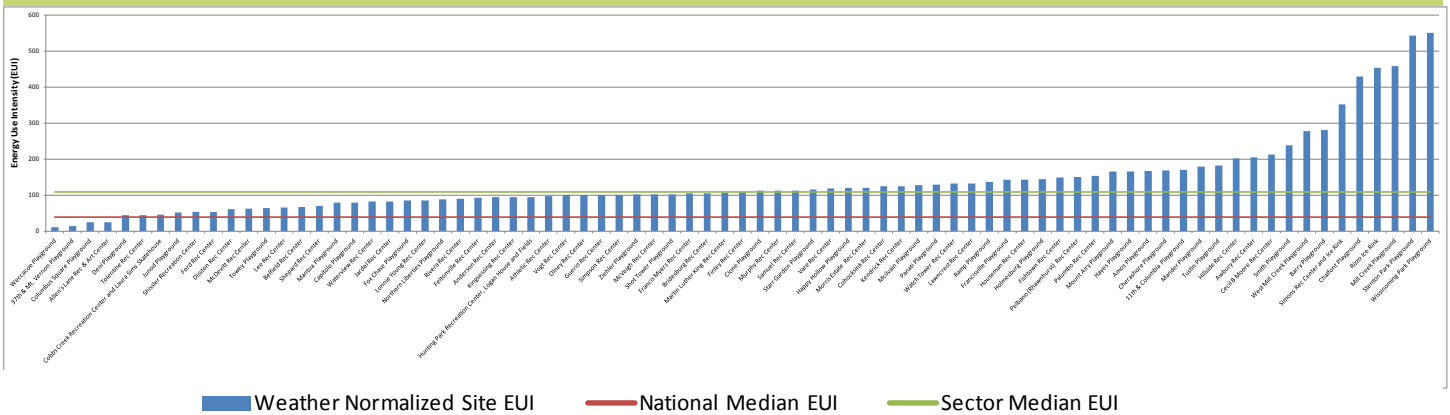
Philadelphia's parks, playgrounds, and recreation centers present a unique challenge in measuring and managing energy usage. With dozens of buildings benchmarked in this report, it is by far the largest sector in the municipal portfolio by number, but in many cases, these facilities are no more than a small service building metered jointly with exterior park lighting. This can vastly overstate energy intensity, a key consideration when evaluating the results below.

The combined size of recreation centers that are underperforming the citywide median is over 300,000 square feet, the equivalent of a multistory office building. Replicating projects across many of these smaller facilities could the reduce energy costs and environmental impact of this sector while improving service delivery.

MULTI-SITE LIGHTING EFFICIENCY PROJECT: In partnership with Philadelphia Parks and Recreation (PPR), MOS won a $400,000 State grant for a series of energy-efficient upgrades across six recreational facilities. Already completed, these improvements represent the kind of multi-site efficiency investments the City will pursue in the years to come.

These improvements fall into three categories. As mentioned above, field lighting can dramatically alter a facility's energy usage; work already underway at PPR to manage this lighting will help reduce overall energy consumption. At the same time, PPR and MOS are working to improve security lighting, ensuring that public safety is not compromised. Finally, the project will improve energy efficiency within the recreational facilities themselves, with particular emphasis on lighting in corridors and gymnasiums.

BENCHMARKING RESULTS FOR RECREATIONAL FACILITIES



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

52

NATIONAL MEDIAN SITE EUI[3]

82 kBtu/sf

PHILADELPHIA SECTOR MEDIAN SITE EUI

116 kBtu/sf

FIRE STATIONS

Ben Franklin established the country's first fire company in 1736, and though none of the buildings examined in this section date back to the American Revolution, Philadelphia Fire Department facilities still form an important part of the city's fabric. This report analyzes data from 52 buildings, including stations as small as 4,000 square feet, well below the 10,000 square foot minimum threshold for benchmarking set by MOS.

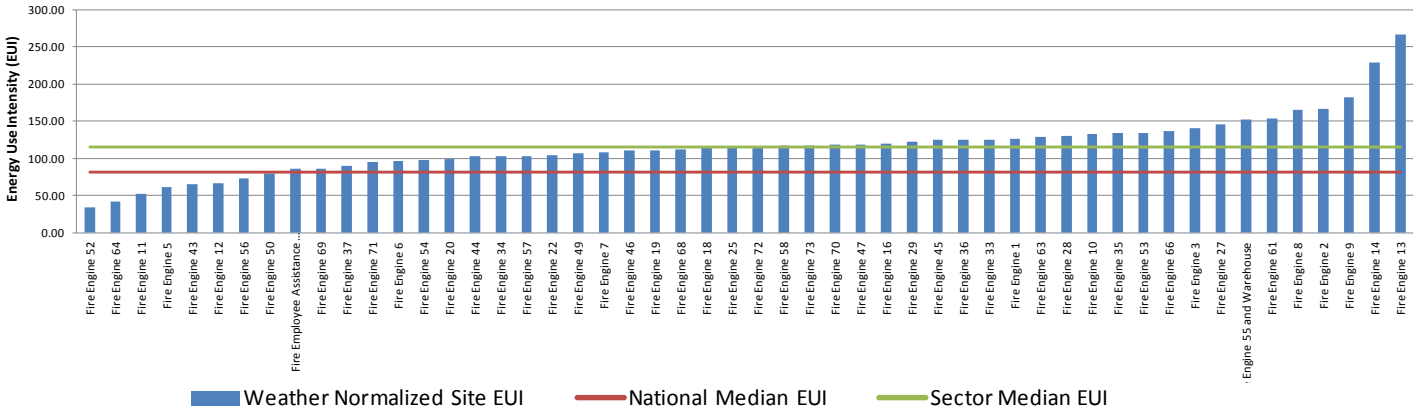
In 2011, only eight fire stations benchmarked in this report exceeded the national median for the energy efficiency of Public Order and Safety facilities in the U.S. Department of Energy's Commercial Building Energy Consumption Survey (CBECS).[3] While the CBECS facility grouping is imperfect (it also includes police stations), these results do suggest that there are significant opportunities for improved energy efficiency in many of these essential facilities.

FIRE ENGINE #38: In January 2013, the City of Philadelphia opened the newest fire station in the city, Engine 38 at the corner of Magee Avenue and Keystone Street in Tacony. The 12,200 square foot facility was designed from the ground up to efficiently manage energy and water usage through state-of-the-art HVAC systems, solar panels, and a green roof. Usage information is not yet available for this facility, but it has been designed to meet the criteria for LEED Silver certification; if certified, it will become the first LEED fire station in Philadelphia.

While the City's older fire stations may be unable to match Fire Engine 38's technical innovations, preventative maintenance and targeted investment will allow all facilities to reduce their energy usage.

Newly-opened Fire Engine #38 serves as a model next generation station, and of efficiency for facilities citywide.

BENCHMARKING RESULTS FOR FIRE STATIONS



[3] CBECS data records both police and fire stations as "Public Order and Safety" facilities. Future iterations of the survey will provide separate categories for each sector, allowing us to better compare these buildings to a national median.

BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

46

NATIONAL MEDIAN SITE EUI

92 kBtu/sf

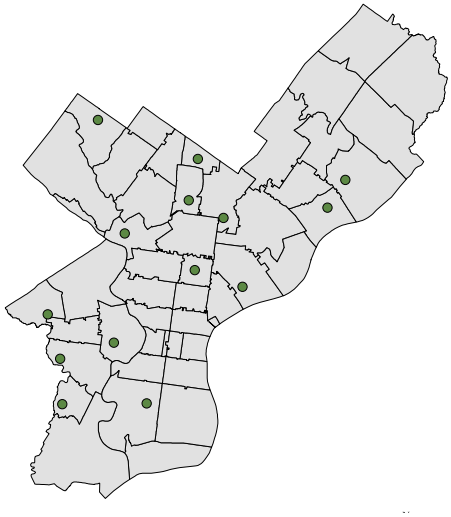
PHILADELPHIA SECTOR MEDIAN SITE EUI

123.8 kBtu/sf

LIBRARIES

When considering energy use in Philadelphia's libraries, it's hard to look past the Central Library, which is more than three times the size of the next-largest branch and uses as much energy as the next four largest libraries combined. With dozens of branches spread through the City, libraries in Philadelphia come in all sizes—and levels of energy usage.

In total, the City's library network uses more energy per square foot than the national median, suggesting that most facilities still have significant room for improvement. The nine facilities that fall below the national median have a median construction date of 1949 (versus 1961 for the remaining 37 buildings), suggesting that older libraries have actually done a better job of using energy efficiently than those built more recently.

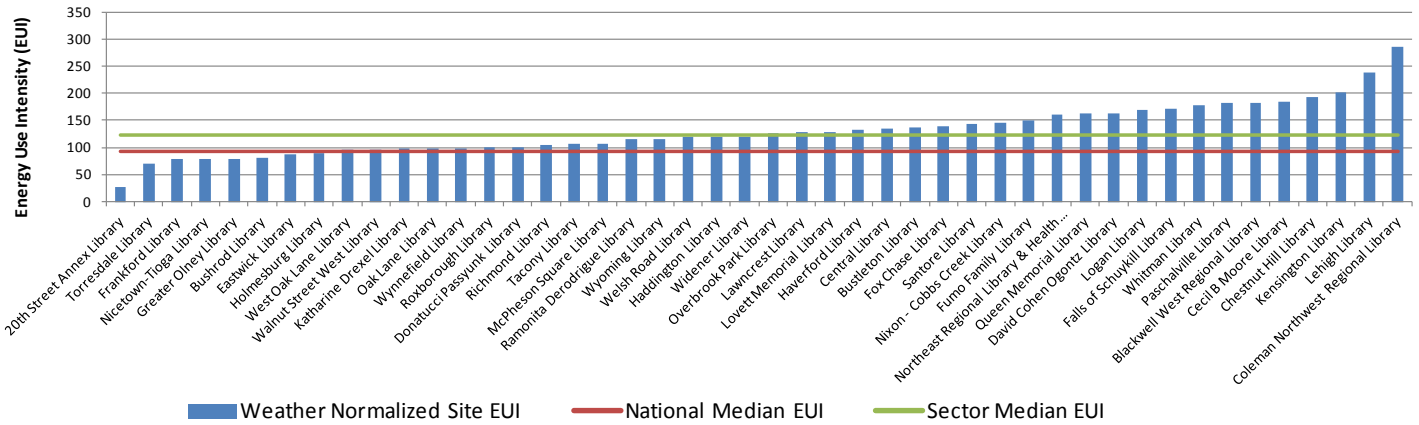


CARNEGIE LIBRARIES OF PHILADELPHIA: Many libraries in the city (including thirteen benchmarked for this report) are the legacy of industrialist and philanthropist Andrew Carnegie, whose commitment to public education led him to fund the construction of hundreds of libraries around the United States. In Philadelphia, the Carnegie library buildings have a median EUI 21% higher than the citywide median.

These buildings share a common layout and have similar energy use profiles, providing an opportunity to batch energy efficiency improvements. By developing a standard work order across several facilities and realizing cost savings through bulk ordering and project management efficiencies, Philadelphia has the opportunity to reduce energy consumption for some of the least efficient buildings in this sector at a much lower cost than would otherwise be possible.

The Carnegie Libraries of Philadelphia are spread across the city, but together represent a key opportunity for efficiency investment.

BENCHMARKING RESULTS FOR LIBRARIES



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

15

NATIONAL MEDIAN SITE EUI

N/A

PHILADELPHIA SECTOR MEDIAN SITE EUI

123.1 kBtu/sf

OTHER FACILITIES

As its name suggests, this sector is a catch-all for those buildings that don't fit neatly into any other category. These facilities include animal control shelters, police and fire academies, and community centers. While these buildings are not comparable to one another or to a national average, it is still important to consider their energy usage individually and to set a baseline for future evaluation.

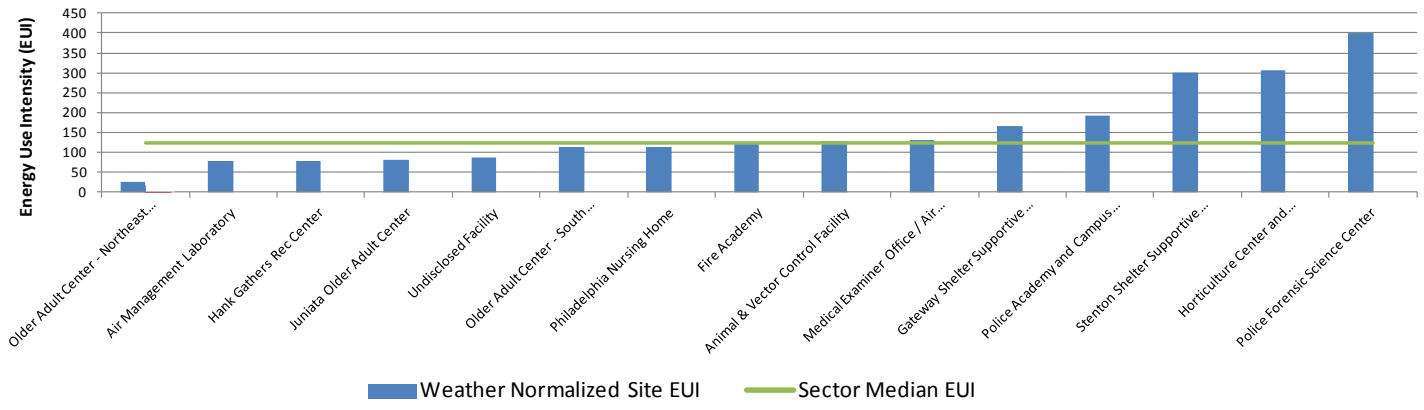
The disparity in energy use intensities shown in this sector, ranging from an Older Adult Center to the high-tech Philadelphia Forensic Science Center, speaks to the range of municipal services provided by the City of Philadelphia.

PHILADELPHIA FORENSIC SCIENCE CENTER: One of the first green buildings in Philadelphia's municipal portfolio, the Philadelphia Forensic Science Center at 700 Poplar Street in North Philly (completed in 2003) has been hailed as a pioneering example of green construction by the American Institute of Architects. The building retrofit took advantage of the cost-saving opportunities inherent in energy efficiency upgrades to improve building systems, insulation, and lighting while paying back these efficiency upgrades in less than three years.

The facility's high EUI is in part a function of the unique equipment and high-energy activities that occur within forensic labs of any kind. Nonetheless, the score does indicate that there are additional opportunities for the City to improve energy efficient operations even in a facility with a highly efficient design like the Forensic Center.

Despite the energy-intensive laboratory equipment that is an essential component of the Forensic Center's work, the facility is a great example of a comprehensive building retrofit. (Image Source: Croxton Collaborative Architects, P.C.)

BENCHMARKING RESULTS FOR OTHER FACILITIES



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED
15

NATIONAL MEDIAN SITE EUI
45 kBtu/sf

PHILADELPHIA SECTOR MEDIAN SITE EUI
157.9 kBtu/sf

MAINTENANCE FACILITIES AND WAREHOUSES

This category encompasses a broad group of buildings, from fleet shops and police depots to the City's library annex. These buildings are some of the largest in the municipal portfolio—the sector average is over 30,000 square feet—and the lighting demand for large maintenance facilities can be considerable.

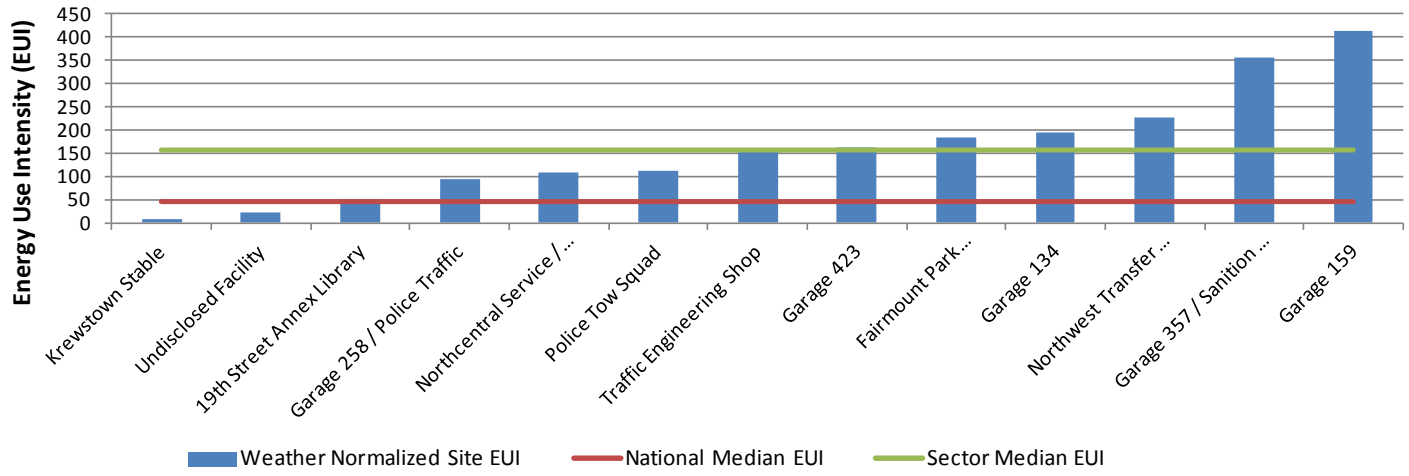
These requirements are reflected in the EUIs in this sector. The sector median is over 150 kBtus per square foot, and Garage 159 is the single most intense energy user benchmarked in this report. Given both its size and energy use profile, maintenance facilities and warehouses will provide some of the best opportunities to make energy-efficient investments that impact the citywide municipal portfolio.

New lighting has helped lower energy costs at Fleet Shop #134.

FLEET SHOP #134: At nearly 60,000 square feet, Fleet Shop 134 is one of the biggest maintenance facilities in the City of Philadelphia's portfolio. Until recently, it was also among its most inefficient (with an EUI nearly 20% higher than the sector median), thanks in large part to outdated facility lighting.

MOS partnered with the Office of Fleet Management and the Department of Public Property to update this lighting, adding new LED fixtures to illuminate the space. Not only will this reduce Fleet Shop 134's carbon footprint, it is saving taxpayer dollars. Fleet Shop 134's energy bills are expected to drop $40,000 annually.

BENCHMARKING RESULTS FOR MAINTENANCE FACILITIES AND WAREHOUSES



BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

7

NATIONAL MEDIAN SITE EUI[4]

N/A

PHILADELPHIA SECTOR MEDIAN SITE EUI

218.6 kBtu/sf

This new chiller isn't as flashy as a new Van Gogh, but it will help to reduce PMA's energy costs.

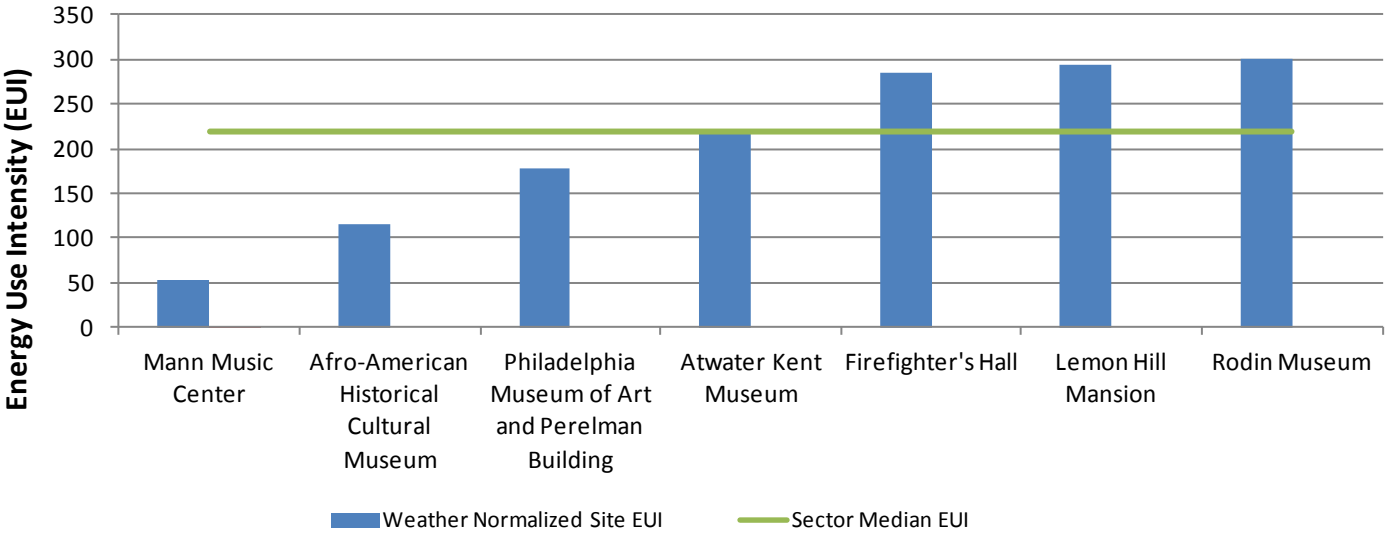
MUSEUMS AND HISTORIC PROPERTIES

The Philadelphia Museum of Art (PMA) is one of the largest municipal facilities in the city, with over 800,000 square feet dedicated to gallery, education, and office space. The museum is also one of the most visited, with almost 700,000 patrons in 2011. To preserve the artwork it houses, the PMA must strictly maintain the indoor climate at all times, so it's not surprising that the building is the single biggest energy consumer in the City's portfolio.

The other museums benchmarked are all high-usage facilities, with only the Mann Center consuming less than 50 kBtus per square foot. Until a national median or ENERGY STAR score for museums is established, it is difficult to rate the energy performance of these buildings, but future reports will allow the City to compare annual usage to this 2011 baseline and make operational and capital investment decisions based on usage trends.

PHILADELPHIA MUSEUM OF ART: While it remains the single largest energy user in the municipal portfolio, the Philadelphia Museum of Art has actually seen a decline in its EUI over the past four years, falling from a high of 189 to 177 in the most recent reporting (including some 2012 energy usage data). A big part of that decline is a series of modest projects—a chiller replacement, new LED lighting, elevator upgrades, and the installation of variable frequency devices (the equivalent of a "dimming" light switch in your home) on the facility's cooling towers—that add up to large savings. The Art Museum is a great example of how smaller, targeted investments and committed leadership can be just as effective as the "home run" retrofit in bringing down energy

BENCHMARKING RESULTS FOR MUSEUMS AND HISTORIC PROPERTIES



[4] Unlike other sectors in this report, the Commercial Building Energy Consumption Survey does not provide a national median EUI for museums.

BY THE NUMBERS

NUMBER OF FACILITIES BENCHMARKED

5

NATIONAL MEDIAN SITE EUI[5]

N/A

PHILADELPHIA SECTOR MEDIAN SITE EUI

227 kBtu/sf

CORRECTIONAL FACILITIES

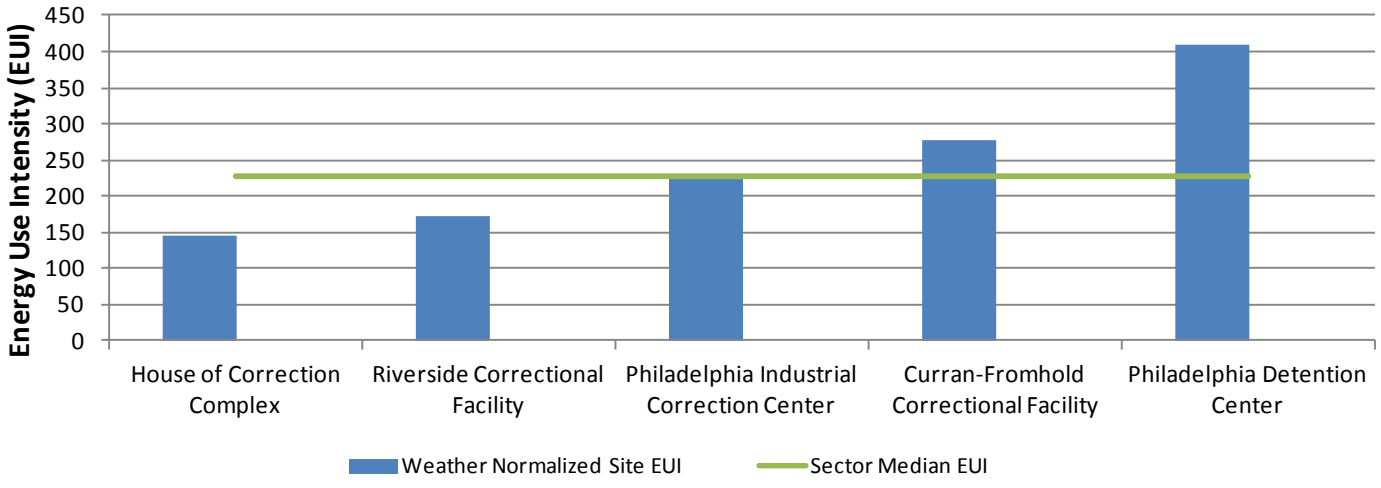
Five correctional facilities were benchmarked for this report, representing over 1.7 million square feet of floor space. Not only are these large buildings, they have tremendous energy requirements, including 24-hour lighting, HVAC, and security systems. This is reflected in the sector's EUIs—the median Site EUI is the highest of any sector, and these five facilities together combine for 22% of total General Fund energy usage.

As in the museum sector, there is not currently a national median for correctional facilities available. Nonetheless, the high energy usage inherent in this sector makes continued focus and investment in these facilities critical.

SECTOR-WIDE ENERGY EFFICIENCY OPPORTUNITIES: Of the City's ten largest municipal energy users, four are correctional facilities. Bringing lessons learned from elsewhere in the municipal portfolio to these buildings will allow the City to realize tremendous savings, both in monetary costs and reduced greenhouse gas emissions, while improving the performance of Philadelphia's overall portfolio.

The correctional facility sector has a significantly different energy usage profile from the rest of the City's portfolio, providing one of the largest remaining opportunities for investment among municipal facilities.

BENCHMARKING RESULTS FOR CORRECTIONAL FACILITIES



[5] Unlike other sectors in this report, the Commercial Building Energy Consumption Survey does not provide a national median EUI for correctional facilities.

GLOSSARY OF TERMS

Btu - British Thermal Unit
A unit of energy, which can represent both thermal energy and electricity. One BTU is the amount of energy required to raise one pound of water one degree Fahrenheit.

ENERGY STAR Rating
The 1-100 ENERGY STAR score was developed by the Environmental Protection Agency (EPA) and provides a metric for comparison with other similar buildings across the country. The score accounts for differences in climate, occupancy and operating hours. A score of 50 represents median energy performance, while a score of 75 or better indicates a building is a top performer.

Energy Auditing
An evaluation of a building's energy performance, to assess how much energy is being used and to identify opportunities to improve efficiency. The process typically involves a review of energy bills as well as a site visit to examine the building shell and mechanical systems.

Energy Benchmarking
The process of comparing a building's energy performance to other similar properties, based on a standard metric. ENERGY STAR Portfolio Manager was the software used to benchmark the public buildings in this report, and the metric for comparison is Energy Use Intensity (EUI).

Energy Use Intensity (EUI)
The metric used for comparing buildings in Energy Star, EUI expresses a building's energy use relative to its size. In this report it is expressed as kBtu/ft^2, and is calculated by taking the total energy consumed in a year (in kBtu) and dividing it by the floor area of the building (in ft^2). All EUIs in this report are weather-normalized (see below).

Site EUI
Site energy represents the amount of heat and electricity consumed by a building as reflected in your utility bills. This is a relevant metric for facility managers, to understand how a building's energy use has changed over time. Site EUI does not, however, account for the environmental impacts of transmission and delivery of energy. Site energy sources for public buildings in this report include: electricity, natural gas, chilled water and steam.

Total GHG Emissions (MtCO2e)
The metric used in this report for greenhouse gas emissions, which represent a million metric tons of carbon dioxide equivalents. Equivalent CO2 (CO2e) is a universal standard measurement for greenhouse gasses and their ability to trap heat in the atmosphere. These greenhouse gasses include carbon dioxide, methane, nitrous oxide and chloroflouro-carbons.

Weather normalized
When energy use is adjusted to account year-to-year weather differences, allowing for comparison of a building to itself over time. Through this procedure, the energy in a given year is adjusted to express the energy that would have been consumed under 30-year average weather conditions.

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