

# Energy Use Profile for HOUSATONIC COMMUNITY COLLEGE

## Benchmarking 2016



**Strategic energy management** presents a significant opportunity for campuses throughout Connecticut to improve building energy performance, save money and reduce carbon emissions.



**Benchmarking** is the process of comparing current energy usage data to previous years' energy usage data for the same facility or to the energy performance of comparable facilities. Benchmarking provides an opportunity to stimulate conversation and deeper inquiry into energy use, opportunities for savings and optimizing building performance.

MANY OF CONNECTICUT'S HIGHER EDUCATION INSTITUTIONS HAVE MADE BOLD CLIMATE CHANGE COMMITMENTS. Higher education, the only sector with a coordinated organizational commitment to carbon neutrality, provides a model for setting and tracking climate targets and accountability in meeting climate commitments.

In Connecticut, 27% of colleges and universities have made commitments to become carbon neutral and have developed greenhouse gas inventories and climate action plans for their campuses. These commitments impact over 44% of the full-time students enrolled at higher education institutions in Connecticut.

Accordingly, Connecticut's higher education institutions will provide a strong contribution to meeting Connecticut's goals for reducing greenhouse gas emissions by 80% by 2050.

Connecticut State Colleges and Universities (CSCU) campuses - which include 12 community colleges and 4 state universities - provide opportunities to approach sustainable energy

management systemically and make significant contributions toward the state's 20% energy reduction goals. Moreover, the CSCU campuses comprise 18% of the total square footage of all state agency buildings and 30% of all higher education students in Connecticut.

This report analyzes energy use and benchmarking data for **Housatonic Community College**. It was produced with companion reports for each of the 11 other community colleges in the CSCU system, with the goal of providing data and analysis to inform the CSCU Energy Master Plan and to improve energy management at Housatonic Community College specifically.

### KEY FINDINGS

# 90%



of Housatonic Community College's annual total energy cost in 2016 was for electricity, even though only 57% of its total energy was supplied by electricity.

# 7%

less energy (as measured in site energy use intensity) is being used by Housatonic Community College in 2016, as compared to 2013.

# \$81,750

in annual potential savings could be realized if Housatonic Community College reduced its building energy use by 10%.



*This report presents its findings first for the campus as a whole, then for separately metered areas on campus.*

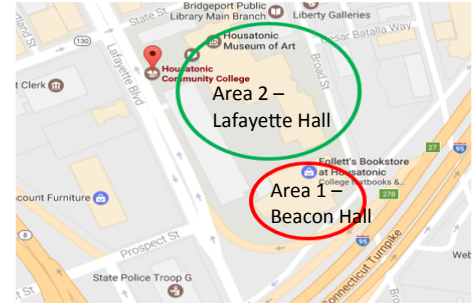
## Total Campus Findings

### Campus Information

**Housatonic Community College is comprised of two main buildings, Beacon and Lafayette Hall, as well as a campus parking garage.** These buildings are used primarily for classrooms and faculty and

staff offices. In 2007 Beacon and Lafayette underwent a renovation. Housatonic Community College’s gross area is 355,186 square feet.

This report analyzes total campus energy use, followed by energy use in two campus areas (see **Figure 1**). The sub-metered areas include: (1) the red circle—Beacon Hall, and (2) the green circle—Lafayette Hall. Electricity, natural gas, and water use are sub-metered by these two campus areas.



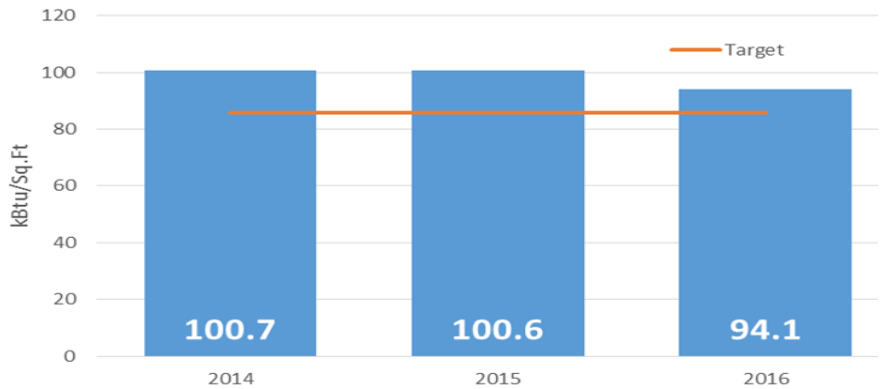
**Figure 1. Campus Map of Housatonic Community College.**

### Finding 1

**Between 2014 and 2016, energy use decreased by 7% for Housatonic Community College.**

The energy performance of a building is a reflection of the building’s design, systems, equipment, and operating and maintenance practices, as well as the behavior of those using the building. Site energy is the annual amount of all energy a property consumes onsite, as reported on utility bills. Site energy use intensity (EUI) is the site energy use per square foot of property.

The current average site EUI for community colleges in Connecticut is 101 kBtu/ft<sup>2</sup> (See **Methods** for source).



**Figure 2. Building energy performance** (site EUI) by calendar year from 2014 to 2016 (in blue) and a proposed energy use target (in orange) for Housatonic Community College. The target reflects a 10% reduction in energy use from 2016 use.

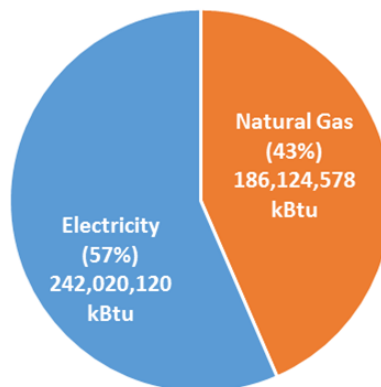
Housatonic Community College’s site EUI is currently below the Connecticut average, at 94.1 kBtu/ft, indicating better than average energy

performance among Connecticut community colleges. This report sets forth a 10% reduction in energy use as an attainable initial target.

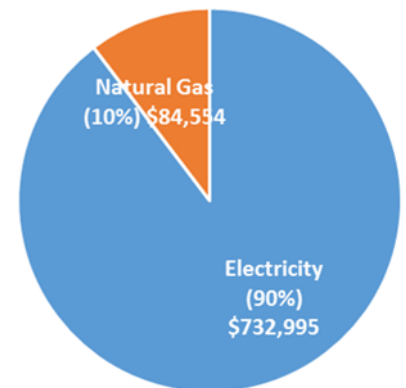
### Finding 2

**Electricity accounted for just over half of Housatonic Community College’s total energy use but 90% of its total energy costs in 2016.**

From May 2015 to April 2016, Housatonic Community College’s total campus energy consumption was split between electricity and natural gas (see **Figure 3** for energy consumption by energy source). However, due to the relatively higher cost per Btu of electricity during this time period, electricity costs were significantly higher at 90% of the total, compared to natural gas (see **Figure 4**). In order to optimize cost savings, the college might consider prioritizing actions that save electricity use (see **Next Steps** in this report), with the understanding that energy prices vary over time and that both electricity and natural gas prices may vary year to year.



**Figure 3. 2016 energy consumption by energy source** for Housatonic Community College.

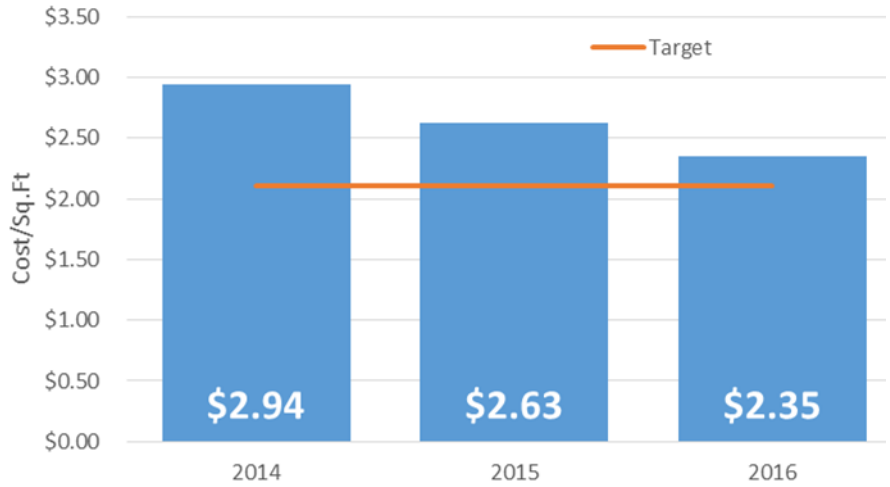


**Figure 4. 2016 energy cost** for Housatonic Community College.

### Finding 3

**Housatonic Community College has the potential to save up to \$81,750 per year, if building energy use is reduced by 10%.**

In 2014, Housatonic Community College spent \$2.94 per square foot on its total energy costs (including electricity and natural gas) versus \$2.35 in 2016 (see **Figure 4**). If Housatonic reduced its energy use by 10% below 2016 levels, the cost per square foot would drop to \$2.11, resulting in potential savings up to \$81,750 per year, assuming energy costs remained constant.

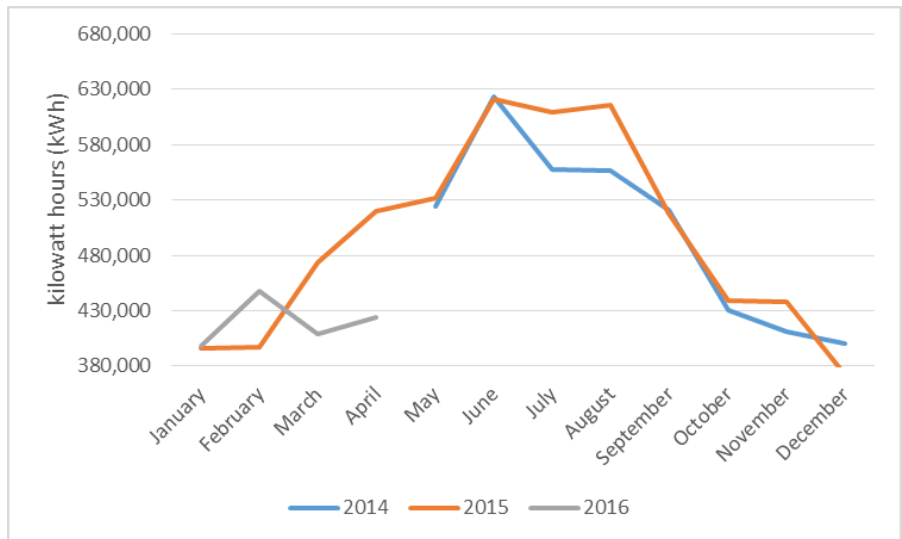


**Figure 5. Energy cost per square foot** for Housatonic Community College from 2014 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use from 2016 use.

### Finding 4

**Electricity use at Housatonic Community College varied between 375,000 kWh and 623,800 kWh over the course of the year, with peaks typically occurring in the summer.**

Detailed electricity use data are available for Housatonic Community College from May 2014 to April 2016 (see **Figure 6**). In general, electricity use typically peaked in June at 623,800 kWh. Of the annual data available thus far for full calendar years, electricity use was highest in 2015.

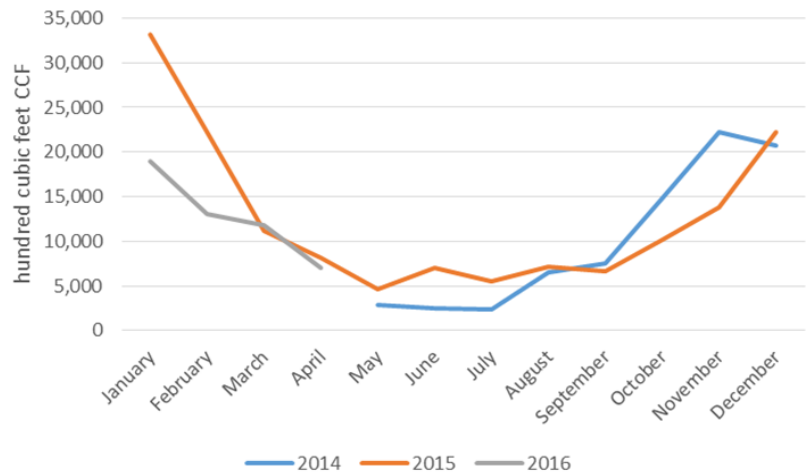


**Figure 6. Monthly electricity use** (in kilowatt hours) for Housatonic Community College from January 2013 to July 2016.

### Finding 5

**Natural gas use at Housatonic Community College varied seasonally with building heating needs.**

Detailed natural gas use data is available for Housatonic Community College from January 2013 to February 2016 (see **Figure 7**). During the months of May through September there is little natural gas use because there are no heating needs. Annually, natural gas use steadily climbs through the fall as outside temperature drops, peaking at an average of 25,000 ccf in January, and declines through late winter and early spring. The highest reported use was for the year 2015.



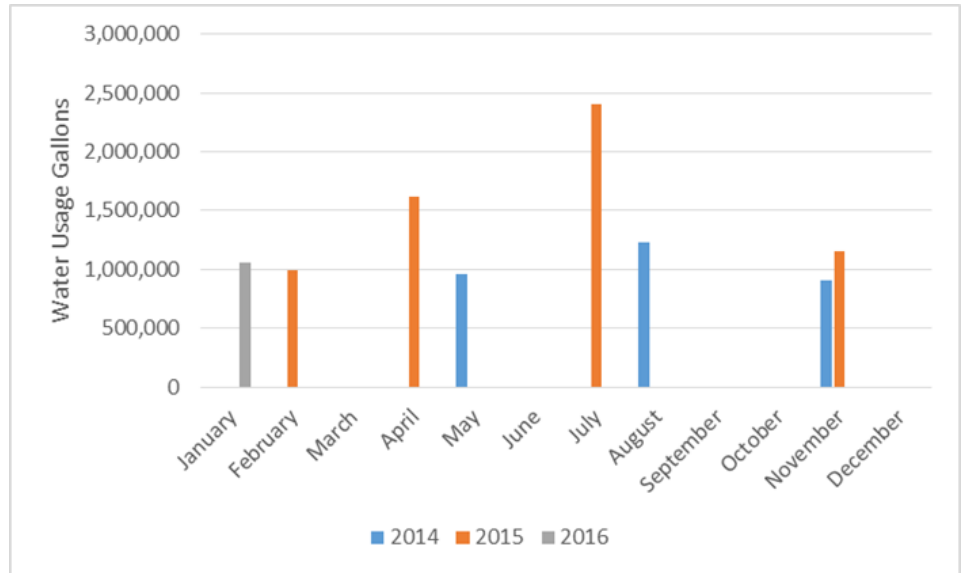
**Figure 7. Monthly natural gas energy use** (by hundred cubic feet) for Housatonic Community College from May 2014 to April 2016.

## Finding 6

### Water use at Housatonic Community College varied over the course of each year.

As with energy benchmarking, benchmarking water consumption can stimulate conversation about water use, opportunities for savings and optimizing water use.

Detailed water use data is available for Housatonic from May 2014 to April 2016 (see **Figure 8**). Typically, water meters are read and a bill is issued every 3 months. **Figure 8** reflects use according to these meter readings, with omitted bars representing unavailable data. Annual water costs at Housatonic are around \$24,500.

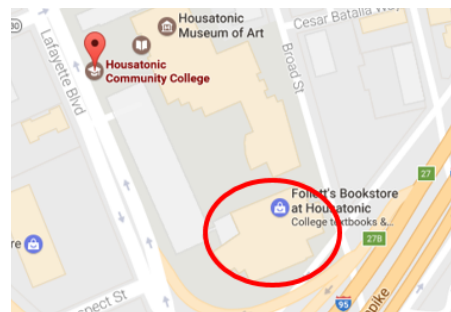


**Figure 8. Monthly water use (in gallons) for Housatonic Community College 2014 -2016.**

## Area 1 Findings: Beacon Hall

### Building Information

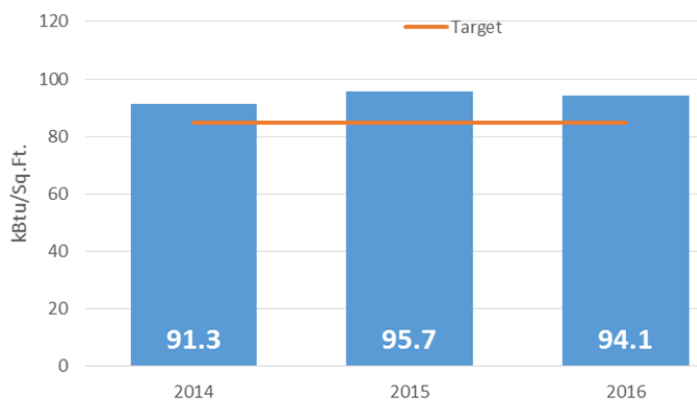
Beacon Hall at Housatonic Community College has a total gross area of 171,369 square feet. It was built in 1968, with renovations in 2007. Beacon Hall includes the campus bookstore, cafeteria and many classroom spaces. Beacon Hall has its own electric, natural gas and water meter. The findings below show the combined energy and water usage for these buildings.



**Figure 9. Campus Map showing Area 1 Beacon Hall.**

## Finding 7

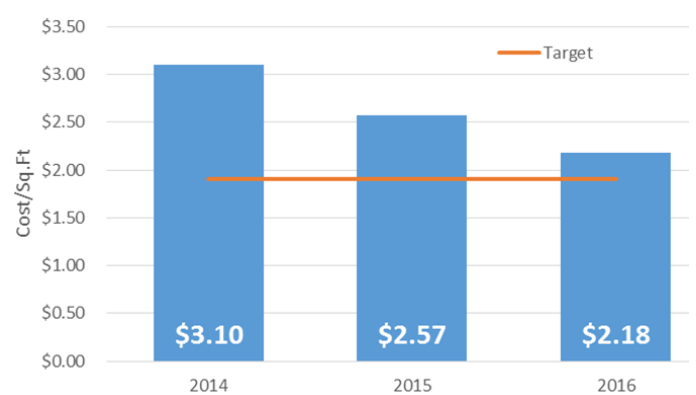
### Between 2014 and 2016, energy use increased by 3% for Beacon Hall.



**Figure 10. Beacon Hall building energy performance (site EUI) by calendar year from 2014 to 2016 (in blue) and a proposed energy use target (in orange) for Beacon Hall. The target reflects a 10% reduction in energy use from 2016 use.**

## Finding 8

### Beacon Hall has the potential to save up to \$31,540 per year, if building energy use is reduced by 10%.



**Figure 11. Energy cost per square foot for Beacon Hall from 2014 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use from 2016 use.**

### Finding 9

Electricity accounted for 57% of Beacon’s total energy use and 89% of its total energy costs in 2016.

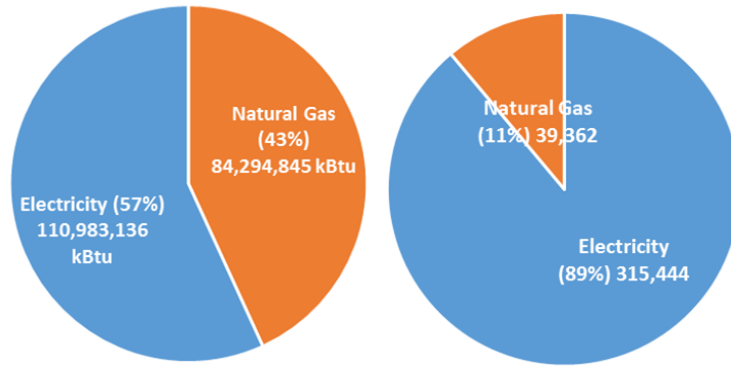


Figure 12 (left pie chart). 2016 energy consumption by energy source for Beacon Hall. Figure 13 (right pie chart). 2016 energy cost for Beacon Hall.

### Finding 10

Electricity use for Beacon Hall varied between 169,000 kWh and 292,000 kWh over the course of the year, with peaks typically occurring in June and July each year.

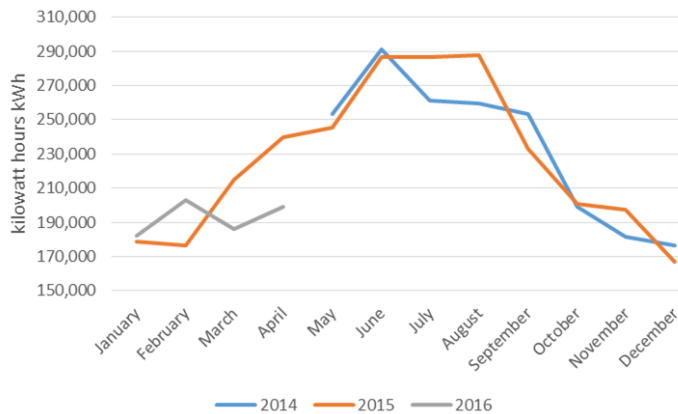


Figure 14. Monthly electricity use (in kilowatt hours) for Beacon Hall from January 2013 to May 2016.

### Finding 11

Natural gas use at Beacon Hall varied seasonally with building heating needs.

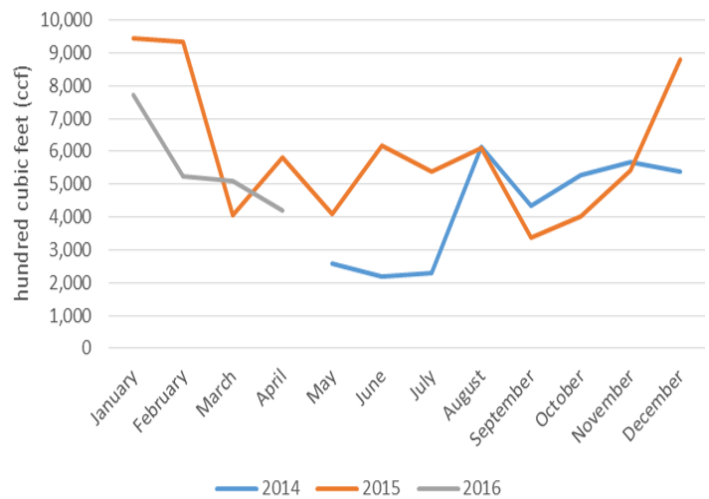


Figure 15. Monthly natural gas use (by hundred cubic feet) for Beacon Hall from May 2014 to April 2016.

### Finding 12

Water use at Beacon Hall varied over the course of each year, with an average annual cost of \$12,500.

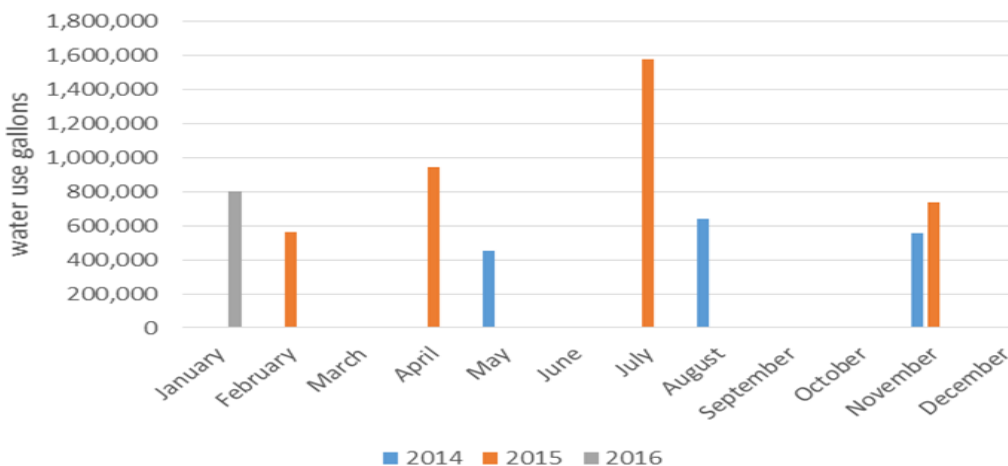


Figure 16. Monthly Water usage (in gallons) for Beacon Hall 2014-2016.



## Area 2 Findings: Lafayette Hall

### Building Information

Lafayette Hall at Housatonic Community College has a total gross area of 183,817 square feet. It was built in 1968, with renovations in 2007. Lafayette Hall includes a library, a performing arts center, staff and faculty departmental offices and classrooms, as well as a cafeteria and campus bookstore. Lafayette Hall has its own electric, natural gas and water meter. The findings below show combined energy and water use for these buildings.

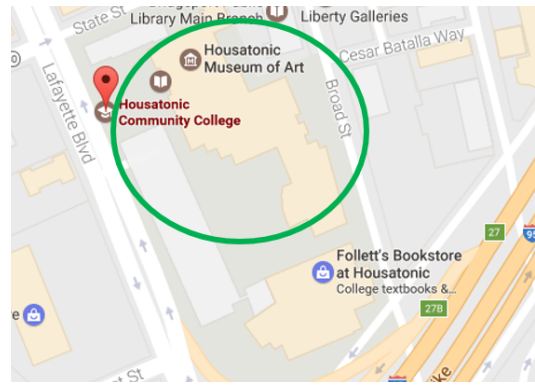


Figure 17. Campus Map showing Area 2 Lafayette Hall.

### Finding 13

Between 2014 and 2016, energy use decreased by 14% for Lafayette Hall.

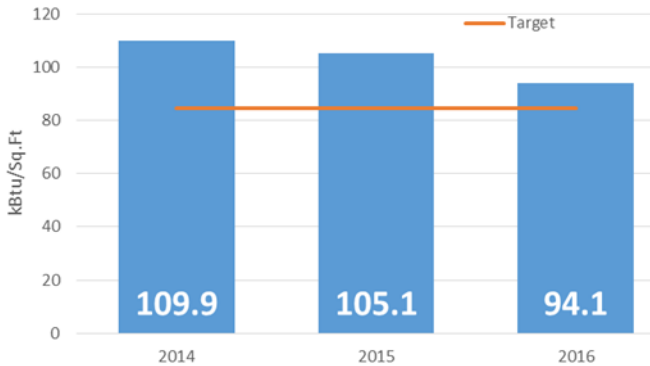


Figure 18. Building energy performance (site EUI) by calendar year from 2013 to 2016 (in blue) and a proposed energy use target (in orange) for Lafayette Hall. The target reflects a 10% reduction in energy use from 2016 use.

### Finding 14

Lafayette Hall has the potential to save up to \$46,070 per year, if building energy use is reduced by 10%.

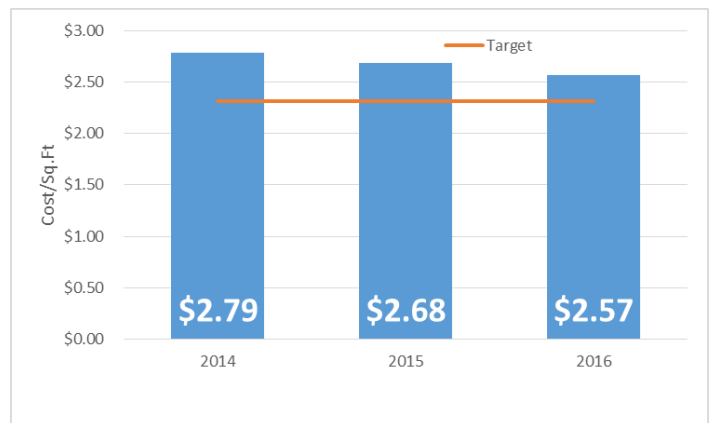


Figure 19. Energy cost per square foot for Lafayette Hall from 2014 to 2016 (in blue) and a proposed target (in orange) that assumes a 10% reduction in energy use from 2016.

### Finding 15

Electricity accounted for 56% of the Lafayette Hall's total energy use but 90% of its total energy costs in 2016.

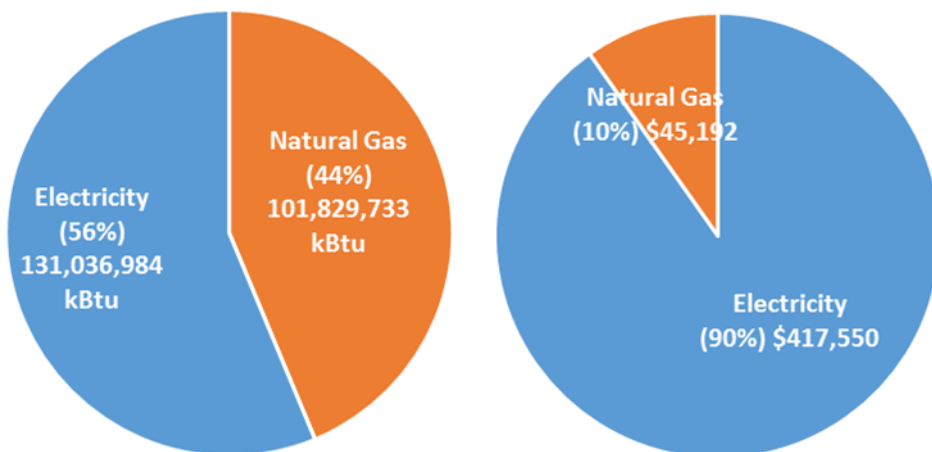


Figure 20 (left pie chart). 2016 energy consumption by energy source for Lafayette Hall.

Figure 21 (right pie chart). 2016 energy cost for Lafayette Hall.

### Finding 16

Electricity use and cost at Lafayette Hall varied between 210,000 kWh and 339,000 kWh over the course of the year, with peaks typically occurring in June.

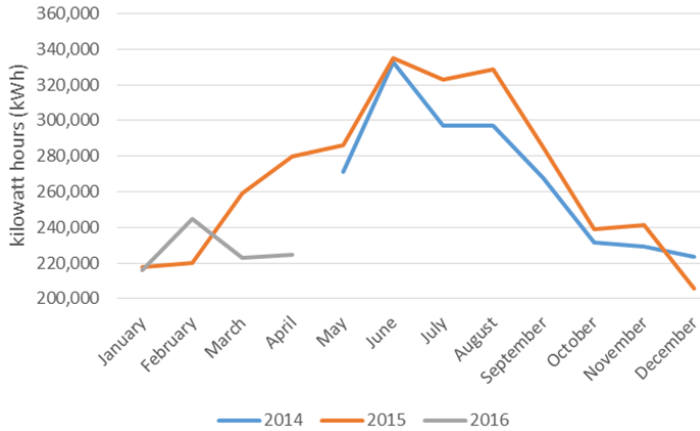


Figure 22. Monthly electric energy use (in kilowatt hours) for Lafayette Hall from May 2014 to April 2016.

### Finding 17

Natural gas use at Lafayette Hall varied seasonally with building heating needs.

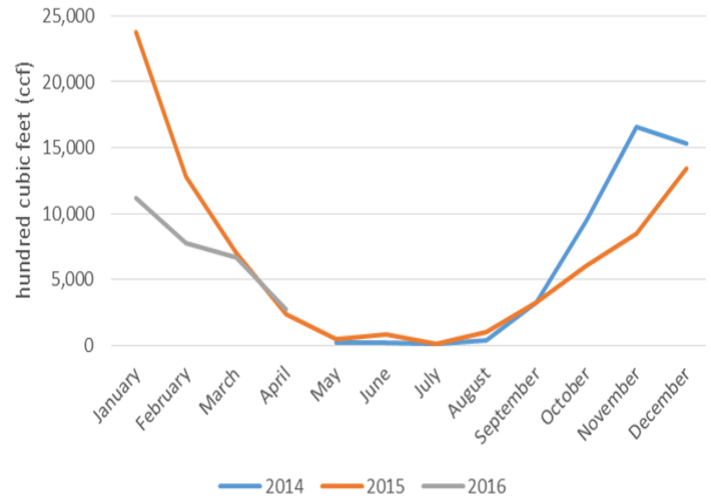


Figure 23. Monthly natural gas energy use (by hundred cubic feet) for Lafayette Hall from May 2014 to April 2016.

### Finding 18

Water use at Lafayette Hall varied over the course of each year.

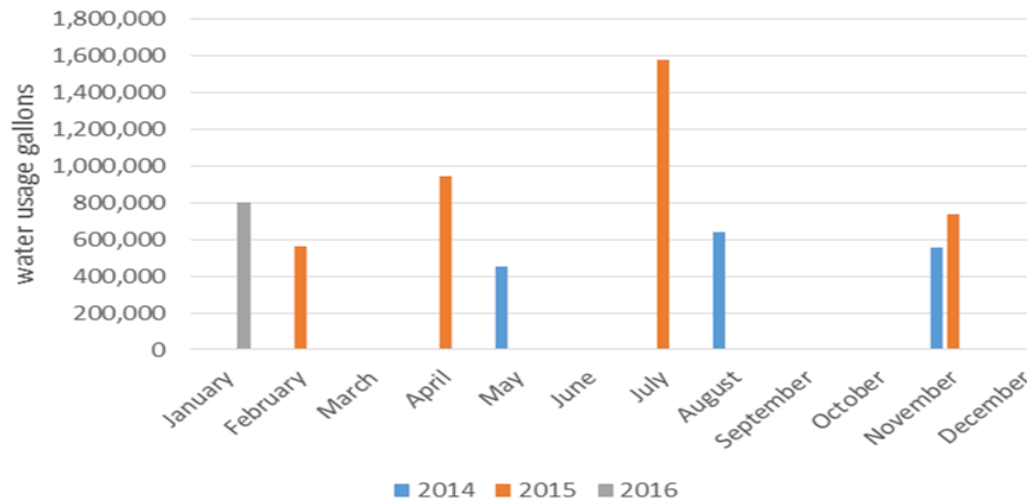


Figure 24. Monthly water use (in gallons) for Lafayette Hall from 2014-2016.

## Next Steps

Energy and water use benchmarking data provide a critical foundation to understanding building energy performance and tracking changes in energy use over time. While data alone cannot identify why a building is efficient or inefficient or what is causing a change in energy use, the data and graphs in this report are very useful tools in identifying the areas of further inquiry about energy use. For example:

- Although Housatonic decreased its energy use from 2014 to 2016 (see **Figure 1**) there are still significant opportunities to save energy and costs. Discussion with building operations staff and an on-site energy audit, available through the EnergizeCT program, would identify specific energy saving measures.
- Seasonal variations in electricity use (see **Figure 6**) and peaks of natural gas use in the winter months (see **Figure 7**) suggest opportunities to explore heating and cooling efficiencies to optimize energy costs, relative to building use.
- Housatonic Community College should consider adopting building energy performance targets, beginning with a 10% reduction in energy use. Many resources are available to help identify, finance and implement reductions.

- Housatonic Community College should explore opportunities for solar energy, which could further reduce energy costs.
- Housatonic's water use patterns (see **Figure 8**) should be explored to identify potential opportunities to optimize use.

The CSCU Energy Master Plan (Fall 2016 draft) provides additional detail on current operations and energy management practices and recommendations for improvement. The Energy Master Plan will provide a useful roadmap for coordinated, system-wide energy savings initiatives.

In addition, as stated earlier, there are many resources available through EnergizeCT and the Connecticut Green Bank to help implement energy saving actions. These include energy audits, retro commissioning, equipment financial incentives, and financing. Information on these programs is available through utility account representatives and at [www.energizect.com](http://www.energizect.com).

## Additional Background and Methods

### Benchmarking Experience and Value

The Institute for Sustainable Energy has benchmarked over 900 buildings in Connecticut using Energy Star Portfolio Manager. This benchmarking work has helped building owners understand energy use and take the next steps to identify opportunities and implement actions to save energy. According to the U.S. Environmental Protection Agency, buildings that were benchmarked consistently in Portfolio Manager over a 3-year period reduced energy use by an average of 2.4 percent per year, for a total savings of 7 percent.

### Data Sources and Energy Target

In 2015, Eversource launched an online, interactive data tool, known as the Eversource Customer Engagement Platform (CEP). In partnership with Eversource and the Connecticut State Colleges and Universities (CSCU) system office, the Institute for Sustainable Energy helped pilot the use of the CEP to obtain monthly electricity, natural gas usage, and cost data for this report. Water data was self-reported by Housatonic Community College and obtained by the Institute from the CSCU

System Office.

This report suggests an initial energy savings target of 10%. This report further references an average site EUI of 101 kBtu/ft<sup>2</sup> for community colleges in Connecticut. This figure was calculated by consultants Woodard & Curran for the 2016 CSCU Energy Master Plan using aggregate 2014 fiscal year energy data for all 11 community colleges in Connecticut.

### Energy Star Portfolio Manager

Energy Star Portfolio Manager is an online tool created by the U.S. Environmental Protection Agency, designed to track and assess energy and water use across multiple buildings. Portfolio Manager controls for key variables affecting a building's energy performance, including climate, hours of operation and building size, allowing for meaningful comparison of buildings within the same building type. In addition to energy use and cost data, Portfolio Manager analysis relies on building demographic data, such as the number of kitchens, walk-in freezers, pools, and other building features.

Currently, Portfolio Manager does not

include "Community College" as a building type. Data for all 11 community college campuses in Connecticut were coded as the "K-12 School" building type because community colleges, as non-residential centers of education, often function most similarly to this type of building. This coding enables appropriate comparisons between community colleges but should not be used to determine an Energy Star building score.

The Energy Star Portfolio Manager benchmarking account prepared for Housatonic Community College is available to authorized users, who have been provided the username and password to the account by the Institute for Sustainable Energy.

### Time Period Covered

Unless otherwise indicated in this report, data is substantially complete from January 2013 to August 2016, and annual data is reported by calendar year.

### Process and Quality Control

Source data were entered into Microsoft Excel before being uploaded to Energy Star's Portfolio Manager. Two independent reviewers cross-checked data to verify the accuracy of the data input.

## AUTHORS AND PARTNERS

### Institute for Sustainable Energy at Eastern Connecticut State University

This report was prepared by the professional staff and student interns of the Institute for Sustainable Energy at Eastern Connecticut State University. For over 15 years, the Institute has provided technical support to Connecticut's colleges and universities, state agencies, municipalities, K-12 schools, and others to implement practical solutions that increase energy efficiency, sustainability and resilience. [www.easternct.edu/sustainenergy](http://www.easternct.edu/sustainenergy)



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